Critical Review of Rate Constants for Reactions of Transients from Metal Ions and Metal Complexes in Aqueous Solution

George V. Buxton
University of Leeds, Cookridge Radiation Research Centre, Leeds, LS16 6QB, United Kingdom

Quinto G. Mulazzani
Istituto di Fotochimica e Radiazioni d'Alta Energia, Consiglio Nazionale delle Ricerche, Via P. Gobetti 101, 40129 Bologna, Italy

Alberta B. Ross
Radiation Chemistry Data Center, Radiation Laboratory, University of Notre Dame, Notre Dame, Indiana 46556

(Received 26 October 1994; revised manuscript received 28 February 1995)

Kinetic data for transient metal species in aqueous solution have been critically reviewed. The compilation covers over 2000 measurements of rate constants involving 660 metal ions and metal complexes from Groups 4-15; lanthanides and actinides are not included. Most of the data have been obtained by the methods of pulse radiolysis or flash photolysis. Data have been collected from 500 publications through 1993. *©1995 American Institute of Physics and American Chemical Society.*

Key words: aqueous solution; chemical kinetics; critical review; data compilation; flash photolysis; metal ions; pulse radiolysis; rate constants; transients.

Contents

1. Introduction 1056
2. Methods of Generation and Detection of Transients 1056
   2.1. Pulse Radiolysis 1056
   2.2. Photolysis 1057
      2.2.1. Photoionization 1057
      2.2.2. Oxidative Quenching of Tris(2,2′-bipyridine)ruthenium(II) ion.. 1057
3. Explanation of the Tables 1058
   3.1. Scope of the Compilation 1058
   3.2. Data Selection 1058
   3.3. Uncertainties and Sources of Error 1058
   3.4. Spectral Properties and pK_a's of the Metal Transients 1058
   3.5. Nomenclature 1058
   3.6. Arrangement of the Tables 1059
      3.6.1. Order of Entries 1059
      3.6.2. Rate Constants 1059
      3.6.3. pH 1059
      3.6.4. Ionic Strength 1059
      3.6.5. Temperature 1059
      3.6.6. Method 1059
      3.6.7. Comments 1059
      3.6.8. References 1059
4. List of Abbreviations and Symbols 1060
5. Acknowledgements 1062
6. References to Text 1062
7. References to Tables 1263
8. Molecular Formula Index 1276
9. Chemical Name Index 1301
10. Appendix I. Spectral Properties, pK_a's and Other Data 1324
11. Appendix II. List of Metal Transients 1341

List of Tables

1. Rate constants for silver transients 1063
1A. Spectral properties and pK_a's of silver transients 1324
2. Rate constants for aluminum transients 1071
2A. Spectral properties of aluminum transients .. 1324
3. Rate constants for gold transients 1072
3A. Spectral properties and pK_a's of gold transients 1325
4. Rate constants for bismuth transients 1074
4A. Spectral properties of bismuth transients 1325
5. Rate constants for cadmium transients 1075
5A. Spectral properties of cadmium transients ... 1325
6. Rate constants for cobalt transients 1085
6A. Spectral properties and pK_a's of cobalt transients 1326

©1995 by the U.S. Secretary of Commerce on behalf of the United States. This copyright is assigned to the American Institute of Physics and the American Chemical Society.
Reprints available from ACS; see Reprints List at back of issue.

7. Rate constants for chromium transients 1112
7A. Spectral properties of chromium transients .. 1328
8. Rate constants for copper transients..... 1123
8A. Spectral properties and pK_a's of copper transients 1329
9. Rate constants for iron transients..... 1141
9A. Spectral properties and pK_a's of iron transients 1330
10. Rate constants for mercury transients..... 1151
10A. Spectral properties and pK_a's of mercury transients 1331
11. Rate constants for indium transients..... 1155
11A. Spectral properties and pK_a's of indium transients 1331
12. Rate constants for iridium transients 1156
12A. Spectral properties of iridium transients 1331
13. Rate constants for manganese transients 1157
13A. Spectral properties of manganese transients . 1332
14. Rate constants for molybdenum transients... 1162
14A. Spectral properties of molybdenum transients 1332
15. Rate constants for nickel transients 1163
15A. Spectral properties and pK_a's of nickel transients 1333
16. Rate constants for osmium transients..... 1184
17. Rate constants for lead transients..... 1185
17A. Spectral properties of lead transients 1334
18. Rate constants for palladium transients 1188
18A. Spectral properties of palladium transients .. 1334
19. Rate constants for platinum transients 1189
19A. Spectral properties and pK_a's of platinum transients 1335
20. Rate constants for rhenium transients 1200
20A. Spectral properties of rhenium transients.... 1335
21. Rate constants for rhodium transients 1201
21A. Spectral properties of rhodium transients.... 1336
22. Rate constants for ruthenium transients..... 1204
22A. Spectral properties and pK_a's of ruthenium transients 1337
22B. Values of the bimolecular rate constant for the reaction $Ru(bpy)_3^{3+}+MV^{\cdot -}\rightarrow Ru(bpy)_3^{2+}+MV^{2+}$ in aqueous solution..... 1339
23. Rate constants for antimony transients..... 1236
24. Rate constants for tin transients 1237
24A. Spectral properties of tin transients 1339
25. Rate constants for thallium transients 1238
25A. Spectral properties and pK_a's of thallium transients 1340
26. Rate constants for vanadium transients 1249
27. Rate constants for tungsten transients 1250
27A. Spectral properties of tungsten transients.... 1340
28. Rate constants for zinc transients..... 1251
28A. Spectral properties of zinc transients 1340

List of Figures

1. Effect of Ionic Strength on the Bimolecular Rate Constant for $Ru(bpy)_3^{3+}+MV^{\cdot +}\rightarrow Ru(bpy)_3^{2+}+MV^{2+}$ in Aqueous Solution . 1057

1. Introduction

A wealth of information on the rates of fast reactions of metal ions has been obtained in the last 30 years, but there has been no systematic review of the data since the first tables of rate constants were published in 1978.[1] Such information is valuable in the fields of homogeneous catalysis, radio-sensitisation and solar energy conversion.

The present compilation, which supersedes the previous one,[1] comprises critically reviewed rate constants for the reactions of metal ions and their complexes in aqueous solution, together with pertinent data on their spectral properties and acid dissociation constants.

Rate constants are recorded for reactions where the metal species has a transient existence. Thus the compilation contains not only those species that are inherently unstable (e.g., Cd^+, Tl^{2+}), but also stable ions which react so rapidly under the given conditions that they have to be generated *in situ* usually by the fast time-resolved methods of pulse radiolysis or flash photolysis. To keep the compilation within reasonable bounds we have generally omitted the vast amount of data that has been obtained by the slower time-resolved method of stopped-flow. Nevertheless, a few stopped-flow data have been included when we judge them to be particularly relevant to the pulse radiolysis or flash photolysis data. Finally, a small number of rate constants obtained from competition kinetics studies using γ-radiolysis and other steady-state methods are listed when they are the only available data.

A number of review articles have been published which deal with the mechanistic roles of metal ions[2–4] and the kinetic data compiled here are complementary to this mechanistic information.

2. Methods of Generation and Detection of Transients

2.1. Pulse Radiolysis

When moderately dilute ($\leq$1 mol L^{-1}) aqueous solutions are exposed to ionizing radiation, such as ^{60}Co γ-rays or fast electrons from an accelerator, energy is predominantly absorbed by the solvent to create radical and molecular products. The overall chemical change is summarized by Eq.(1):

$$4.1\ H_2O \rightsquigarrow 2.6\ e_q^- + 0.6\ H^\cdot + 2.7\ ^\cdot OH + 0.45\ H_2 + 0.7\ H_2O_2 + 2.6\ H^+, \quad (1)$$

where the numbers represent the radiation chemical yields, G-values, in units of molecules per 100 eV of absorbed energy. These units are converted to SI units of mol J^{-1} by multiplying by 1.036×10^{-7}.

The hydrated electron, e_{aq}^-, and the hydrogen atom are powerful reducing agents and the hydroxyl radical is a strong oxidant.[5] Because of these properties they are very effective in bringing about one-electron changes in the oxidation states of metal ions, so radiolysis, and particularly pulse radiolysis, has been widely exploited for this purpose. Reactions (2)–(4) below are some illustrative examples of how

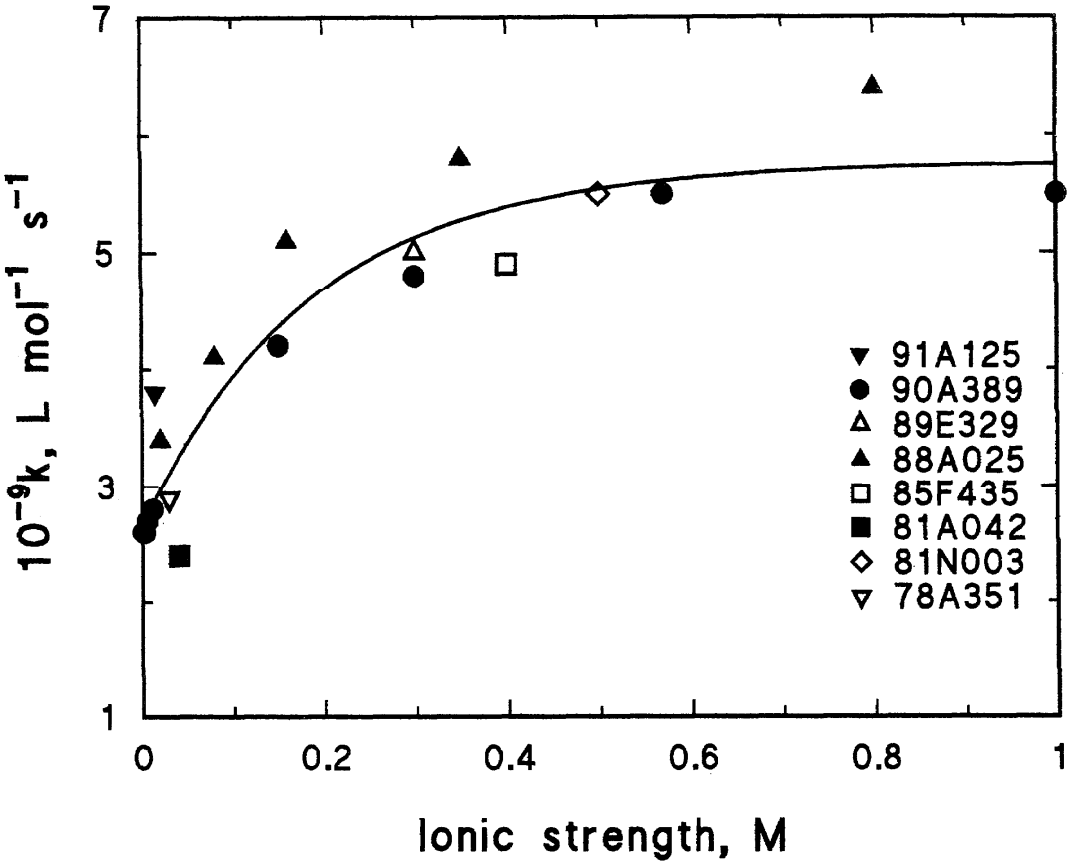

FIG. 1. Effect of Ionic Strength on the Bimolecular Rate Constant for $Ru(bpy)_3^{3+}+MV^{\cdot+}\rightarrow Ru(bpy)_3^{2+}+MV^{2+}$ in Aqueous Solution.

oxidation states, which are not generally accessible by ordinary chemical means, can be generated in aqueous solution:

$$e_{aq}^-+Ni^{2+}\rightarrow Ni^+ \quad k=1.9\times10^{10}\ \mathrm{L\,mol^{-1}\,s^{-1}}, \quad (2)$$

$$H^{\cdot}+Cu^{2+}\rightarrow Cu^{+}+H^{+} \quad k=9.1\times10^{7}\ \mathrm{L\,mol^{-1}\,s^{-1}}, \quad (3)$$

$$^{\cdot}OH+Tl^{+}\rightarrow TlOH^{+} \quad k=9.9\times10^{9}\mathrm{L\,mol^{-1}\,s^{-1}}. \quad (4)$$

Data for the reactions of these free radicals with other metal species can be found in Ref. 6, and details of the conditions used to separate the radicals are described in Ref. 5.

It is sometimes desirable to convert the primary radicals of water radiolysis [reaction (1)] to secondary radicals so that redox changes can be controlled. For example, the reactions of $^{\cdot}OH$ with metal ions are generally believed to result in the formation of hydroxo-adduct [e.g., reaction (4)] because simple outer-sphere electron transfer is unlikely on energetic grounds. On the other hand, outer-sphere electron transfer is more common with inorganic radicals such as $SO_4^{\cdot-}$ and $N_3^{\cdot}$. Judicious choice of the redox agent becomes important when metal ions have ligands which can also be oxidized or reduced. Data for the reactions of these secondary radicals with metal ions and their complexes can be found in Ref. 7.

2.2. Photolysis

2.2.1. Photoionization and Photoexcitation

In this case energy is imparted directly to the metal ion or complex when it absorbs a photon. The result may be loss of an electron (photoionization) or excitation of an electron to a higher orbital (photoexcitation). In the first case one-electron oxidation of the metal species occurs, but in the second case the excited state may be quenched oxidatively or reductively by electron transfer to an acceptor or from a donor, respectively. Extensive kinetic data and details of these redox quenching processes can be found in Ref. 8.

2.2.2. Oxidative Quenching of Tris(2,2′-bipyridine)ruthenium(II) ion

The oxidative quenching of $[Ru(II)(bpy)_3^{2+}]^*$ by 1,1′-dimethyl-4,4′-bipyridinium ion (MV^{2+}) [reaction (5)] provides an illustrative example of the type of process that is relevant to this compilation, namely the back electron transfer reaction (6) between the oxidation product Ru(III) $(bpy)_3^{3+}$ and the one-electron reduced quencher $MV^{\cdot+}$:

$$[\mathrm{Ru(II)(bpy)_3^{2+}}]^* + \mathrm{MV^{2+}} \rightarrow \mathrm{Ru(II)(bpy)_3^{3+}} + \mathrm{MV^{\cdot +}}, \quad (5)$$

$$\mathrm{Ru(III)(bpy)_3^{3+}} + \mathrm{MV^{\cdot +}} \rightarrow \mathrm{Ru(II)(bpy)_3^{2+}} + \mathrm{MV^{2+}}. \quad (6)$$

We highlight reaction (6) here because its rate constant has been measured many times under a wide range of conditions of pH and ionic strength. Figure 1 shows data for $I<1$ mol L^{-1} which form a self-consistent set. The solid line is given by the empirical expression:

$$k = \{3.1\times10^9[1-\exp(-5.3I)] + 2.7\times10^9\}\ \mathrm{L\,mol^{-1}\,s^{-1}}. \quad (7)$$

The data and their sources are listed in Appendix I, Table 22B; also included are data for $I>1$ mol L^{-1}.

3. Explanation of the Tables

3.1. Scope of the Compilation

The compilation contains data published by the end of 1993; data from a few papers received early in 1994 have also been included. The data were located through literature searches of the bibliographic database maintained by the Radiation Chemistry Data Center, and by examination of reviews.

Rate constants have not been recorded when the metal species is in the form of a macromolecule, a polymer or a colloid, or is contained in a micellar system, or in nonaqueous ($\leq$50% v/v H_2O) solvent. Intramolecular electron transfer reactions have also been omitted.

3.2. Data Selection

In order to be included in this compilation, values of the rate constants had to be reported in published papers, including proceedings of conferences, or communicated to us in the detail appropriate for a paper in a refereed journal. Preference has been given to data obtained under well defined experimental conditions for well characterized chemical species. However, data for which the conditions are poorly defined, or even unstated, have been included when no others are available on the grounds that they are better than no data at all. The reader is given sufficient information in each entry to judge the quality of the result.

3.3. Uncertainties and Sources of Error

In many cases authors have quoted the uncertainty of their data but the method of evaluation is not always specified. In others single values are reported to three significant figures. We have decided, therefore, not to report any errors and, since values of rate constants obtained in independent measurements are unlikely to have uncertainties of less than 5–10%, we have reported data to a maximum of two significant figures. In cases where the uncertainty is in the first figure or the data represent upper or lower limit values, only the first figure is recorded. Where the data have an uncertainty of more than 40–50%, they have been prefixed with "~". When discrepant values of a rate constant have been reported we have endeavoured to judge which is correct from the information available and report only that one. In a few cases where it has not been possible to make this choice, the data have been marked to indicate that there is an unexplained discrepancy.

For some reactions there is uncertainty about the mechanism and even the structure of the reactant. Where different authors have presented different interpretations we have noted them in a comment along side the entries (e.g., Table 19, entries 19.29 and 19.30). In those cases where subsequent work has shown an earlier identification of the transient reactant to be in error, the correct identification has been used in the entry from the earlier work (e.g., Table 15, entries 15.29.1–15.29.6).

One of the main sources of error in measuring rate constants is the failure to take proper account of temperature. Many measurements are reported without reference to the temperature at which they were made, although the ambient temperature can vary by several °C. Where the measuring temperature is reported we have recorded it in the entry in the column headed "t(°C)", otherwise this column is left blank.

Another source of error in data for reactions between charged species is due to measurement having been made at different, but unspecified, ionic strengths. Accordingly ionic strength is included in an entry only when it is specified by the authors. Lack of pH control can also be a source of error and again the pH has been recorded only if it is reported by the authors, or when it can be calculated from the *stated concentration* of H^+ or OH^-.

3.4. Spectral Properties and pK_a's of the Metal Transients

We have collected data on the optical absorption spectra and values of ϵ (molar absorptivity) of transient metal species in separate tables for each metal. The species are arranged in order of ascending oxidation number. When the oxidation number is not known it is listed as, for example, Pt(II/?) to indicate that the oxidation number of the starting material is (II) but that of the product is uncertain. The entry numbers in Tables 1–28 to which the data refer are included in these tables; also reported there are values of acid dissociation constants (pK_a).

For reactions between like species where the measured parameter is k/ϵ (or $2k/\epsilon$) discrepancies arise through the use of differing values of ϵ. If divergent values of k have been reported using different values of the molar absorptivity, the latter have been reassessed and values of k recalculated if appropriate.

3.5. Nomenclature

Each chemical species has been named according to IUPAC rules whenever posible. The names of the reacting species appear as headings for the entries. An index of chemical names and synonyms is provided (Sec. 9), as well as a molecular formula index (Sec. 8), as aids in locating reactants which are present in Tables 1–28.

When it is not clear where the redox change occurs in the generation of a transient metal complex, the name used

combines those of the starting material and the redox agent, e.g., Table 7, entry 7.13, "Tris(5-chloro-1,10-phenanthroline)chromium(III), carboxyl radical adduct." Table 19, entry 19.11, "Bis(ethylenediamine)platinum(II), H reaction product" and Table 15, entry 15.59, "Nitriloacetatonickelate(II), H-abstraction product."

Abbreviations are used in writing the reactions, and these are listed separately in Sec. 4. Generally the metal appears as the first symbol, but where it is clear that a free radical bonds to a metal centre that is bonded to other ligands, the radical symbol precedes that of the metal, e.g., Table 6, entry 6.83.1, $HOCH(CH_3)Co(4,11\text{-dieneN}_4)^{2+}$.

In some cases symbols of different ligands are contained in parentheses for the sake of clarity, e.g., Table 6, entry 6.108.1, $HOCH_2CoHEDTA(H_2O)^-$.

A roman numeral is used to indicate the oxidation state of the metal when it is not obvious from the formula of the complex. Water of hydration has generally been omitted from the formulae. In some cases, free radical species are enclosed in square brackets with a superscripted dot for the sake of clarity, e.g., Table 6, entry 6.98.1, $[Co(bpy)_2(bpyOH)]^{\cdot 3+}$ and Table 6, entry 6.1.29 $[2\text{-}CH_3NQ]^{\cdot -}$.

3.6. Arrangement of the Tables

There is a table for each metal and these are arranged in alphabetical order of the metal symbol. Where a reaction involves two different transient metal species, it is recorded in both tables; but for a reaction between two stable metal species where one of them is produced transiently, the rate contant appears in the table appropriate to the transient. Tables containing spectral properties and pK_a's have the same number, with the suffix A, as the rate constant tables for the individual metals. These tables are collected in Appendix I, Sec. 10.

3.6.1. Order of Entries

In each table the reactions are listed in order starting with the lowest oxidation state of a particular metal species. Subject to the principle of keeping similar organometallic transients together, they are generally listed within the ligand subgroupings: simple aliphatic, simple alicyclic and simple aromatic derivatives, followed by chelating and macrocyclic ligands. The order of entry of the metal transients in the tables is shown in the listing in Sec. 11 (Appendix II).

The reactions of each species are divided into groups according to whether the second reactant is a radical, an inorganic or an organic. First-order reactions are listed first, then radical–radical reactions, which precede the reactions with inorganics. Reactions with inorganics are grouped in alphabetical order of the main element. Reactions with organics follow, alphabetically by name. Multiple entries for the same reaction are listed in descending chronological order of publication date. The location of all reactants (including the metal transients) can be found from the Molecular Formula Index (Sec. 8) and the Chemical Name Index (Sec. 9).

3.6.2. Rate Constants

Values of k are in units of L mol^{-1} s^{-1} and these units are given at the head of the column. The unit of s^{-1} is included with the value of k when it refers to a first-order reaction or a bimolecular reaction with water.

3.6.3. pH

This is included in the entry when it is reported by the authors or if it can be calculated from the concentration of H^+ or OH^- in the solution.

3.6.4. Ionic Strength

The ionic strength is entered only when it is reported by the authors. The number of significant figures quoted by the authors has been retained.

3.6.5. Temperature

Most data have been obtained at ambient temperature which is not always reported. Unless the temperature was specified it has been omitted from the tables, but in those cases it can be taken to be the room temperature.

3.6.6. Method

This is entered in abbreviated form, e.g., p.r., f.p., etc., and the abbreviations are listed in Sec. 4.

3.6.7. Comments

The comments column contains detailed information in abbreviated form in the following order: The method used to obtain the value of k and the wavelength of measurement if appropriate; the composition of the solution; values of k obtained under other specified conditions. Where a reaction is reversible and the rate constant for the reverse reaction is also known it is reported as k_r. When a value of k has been obtained by computer fitting this is stated. Activation parameters, E_a, $\Delta H\ddagger$ and $\Delta S\ddagger$, are quoted if they are known. Also included in this column are rate constants for further changes in the primary product.

3.6.8. References to Tables

The references are listed by the serial number in the RCDC bibliographic database. These corresponding full references are presented in ascending chronological order in the bibliography (Sec. 7).

4. List of Abbreviations and Symbols

Methods and Other Symbols

c.k.	competition kinetics
condy.	conductivity
d.k.	decay kinetics
$\Delta G\ddagger$	free energy of activation
$\Delta H\ddagger$	enthalpy of activation
$\Delta S\ddagger$	entropy of activation
ϵ	extinction coefficient (molar absorptivity)
E_a	activation energy
e.d.	discharge
esr	electron spin resonance
f.p.	flash photolysis
f.p./rq	flash photolysis/reductive quenching
f.p./oq	flash photolysis/oxidative quenching
f.p./pi	flash photolysis/photoionization
G	radiation yield (molecules per 100 eV)
γ-r.	gamma radiolysis
I	ionic strength
K	equilibrium constant
k	specific rate of the forward reaction
k_r	specific rate of the reverse reaction
OQ	oxidative quencher
pK_a	negative logarithm of the acid dissociation constant, e.g., where $AH+H_2O \rightleftarrows A^-+H_3O^+$
phot.	photolysis
p.b.k.	product buildup kinetics
p.r.	pulse radiolysis
RQ	reductive quencher
satd.	saturated
soln.	solution
s.f.	stopped flow

Chemical Species and Ligands

ABTS	2,2′-azinobis(3-ethylbenzothiazoline-6-sulfonate)
Ac	acetyl
acac	acetylacetonato (2,4-pentanedionato)
Ala	alanine
$aneN_4$	5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane
$[13]aneN_4$	1,4,7,10-tetraazacyclotridecane
$[15]aneN_4$	1,4,8,12-tetraazacyclopentadecane
$[16]aneN_5$	1,4,7,10,13-pentaazacyclohexadecane
AQ	9,10-anthraquinone
AZAcapten	8-methyl-1,3,13,16-tetraaza-6,10,19-trithiabicyclo[6.6.6]eicosane
bpm	2,2′-bipyrimidine
bpy	2,2′-bipyridine
4,4′-bpy	4,4′-bipyridine
bpz	2,2′-bipyrazine
bth	2,2′-bithiazole
BuOH	butanol
tert-BuOH	*tert*-butyl alcohol (2-methyl-2-propanol)
chxn	*trans*-1,2-cyclohexanediamine
Cp	cyclopentadienyl
cyclam	1,4,8,11-tetraazacyclotetradecane
CysSH	cysteine
diamsar	1,8-diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosane
dien	diethylenetriamine
4,11-$dieneN_4$	5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene
4,13-$dieneN_4$	2,2,4,11,11,13-hexamethyl-1,5,10,14-tetraazacyclooctadeca-4,13-diene

4,14-dieneN$_4$	5,7,7,12,12,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,14-diene
10,13-dieneN$_4$	11,13-dimethyl-1,4,7,10-tetraazacyclotetradeca-10,13-diene
diHOamsar	1,8-bis(hydroxyamino)-3,6,10,13,16,19-hexaazabicyclo[6.6.]eicosane
dinosar	1,8-dinitro-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosane
DMCH	6,7-dihydro-5,8-dimethyldibenzo[*b*,*j*][1,10]phenanthroline
dmg	dimethylglyoxime
DMSO	dimethyl sulfoxide
DP	deuteroporphyrin
dppz	dipyrido[3,2-*a*:2′,3′-*c*]phenazine
DQ	duroquinone
DTPA	diethylenetriaminepentaacetate ion
EDDA	ethylenediaminediacetate ion
EDTA	ethylenediaminetetraacetate ion
en	ethylenediamine
Et$_4$dien	tetraethyldiethylenetriamine
EtOH	ethanol
Fc	ferrocene
HEDTA	*N*-(2-hydroxyethyl)-*N*,*N*′,*N*′-ethylenediaminetriacetate ion
HypO$^-$	hydroxyprolinato
Gly$^-$	glycinato
IDA	iminodacetate ion
Im	imidazole
In	indole
isn	isonicotinamide
mbpy	1-methyl-4,4′-bipyridinium
Me	methyl
Me$_6$[14]aneN$_4$	5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane
Me$_4$cyclam	1,4,8,11-tetramethyl-1,4,8,11-tetraazacyclotetradecane
Me$_{10}$cyclam	1,4,5,7,7,8,11,12,14,14-decamethyl-1,4,8,11-tetraazacyclotetradecane
MeNH$_2$[18]aneN$_6$	8-Amino-8-methyl-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1^{13,15}]octadecane
MeNO$_2$[18]aneN$_6$	8-Methyl-8-nitro-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1^{13,15}]octadecane
MeOH	methanol
Me$_2$pyo[14]aneN$_6$	α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-triene
Me$_2$pyo[14]hexaeneN$_4$	α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaene
Me$_2$pyo[14]trieneN$_4$	α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene
Me$_4$tetraeneN$_4$	1,3,8,10-tetraamethyl-1,4,8,11-tetraazacyclodeca-1,3,8,10-tetraane
MV^{2+}	1,1′-dimethyl-4,4′-bipyridinium (methyl viologen)
na	nicotinamide
NAD	nicotinamide adenine dinucleotide
NTA	nitrilotriacetate ion
NQ	naphthoquinone
PFP	tetra(*N*-methylisonicotinamidophenyl)phosphine
Ph	phenyl
phen	1,10-phenanthroline
pm	pyrimidine
PP	protoporphyrin
PrOH	propanol
pts	trisulfophthalocyanine
py	pyridine
pytda	2-(1,2,4-thiadiazol-5-yl)pyridine
pyth	2-(2-thiazolyl)pyridine
pz	pyrazine
Q	1,4-benzoquinone
QH$_2$	hydroquinone
sar	3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosane
SDS	sodium dodecylsulfate
sep	1,3,6,8,10,13,16,19-octaazabicyclo[6.6.6]eicosane
tacn	1,4,7-triazacyclononane
TAP	1,4,5,7-tetraazaphenanthrene

TAPP	tetra(4-trimethylammoniophenyl)porphine
TCPP	tetra(4-carboxyphenyl)porphine
TCPPS	tetra(2,6-dichloro-3-sulfonatophenyl)porphine
TEOA	triethanolamine
terpy	2,2′:2′,2″-terpyridine
tetraen	tetraethyldiethylenetriamine
tetraeneN_4	5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene
tetren	tetraethylenepentamine
TFPPS	tetra(2-fluoro-3-sulfonatophenyl)porphine
tim	2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene
TMpyP	tetra(1-methyl-4-pyridyl)porphine
2-TMpyP	tetra(1-methyl-2-pyridyl)porphine
3-TMpyP	tetra(1-methyl-3-pyridyl)porphine
TPP	tetraphenylporphine
TPPS	tetra(4-sulfonatophenyl)porphine
TpyP	tetra(4-pyridyl)porphine
2-TpyP	tetra(2-pyridyl)porphine
3-TpyP	tetra(3-pyridyl)porphine
trien	triethylenetetramine
TrpH	tryptophan
tspc	3,10,17,24-tetrasulfophthalocyanine
TTP	tetra(4-methylphenyl)porphine
$TxOH^-$	6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylate ion (Trolox C anion)
TyrOH	tyrosine
TZP	tetra[4-*N*-(3-sulfonatopropyl)pyridyl]porphine
U	uracil

5. Acknowledgements

The Radiation Laboratory at the University of Notre Dame is operated under Contract DE-AC02-76ER0038 with the Department of Energy. The Radiation Chemistry Data Center is supported jointly by the Office of Basic Energy Sciences of the Department of Energy and the National Institute of Standards and Technology, Standard Reference Data. This is Radiation Laboratory Document No. NDRL-3757. The authors wish to thank NATO and Consiglio Nazionale delle Ricerche for partial financial support. We also acknowledge the assistance of Dr. W.P. Helman for computer programming and text processing.

6. References to text

[1] G.V. Buxton and R.M. Sellers, Nat. Stand. Ref. Data Ser., Nat. Bur. Stand. (U.S.), **62** (1978).
[2] G.V. Buxton and R.M. Sellers, Coord. Chem. Rev. **22**, 195 (1977).
[3] D. Meyerstein, Acc. Chem. Res. **11**, 43, (1978).
[4] B.G. Ershov, Russ. Chem. Rev. **50**, 1119 (1981).
[5] G.V. Buxton, in *Radiation Chemistry. Principles and Applications*, edited by M.A.J. Rodgers and Farhataziz (VCH Publishers, New York, 1987).
[6] G.V. Buxton, C.L. Greenstock, W.P. Helman, and A.B. Ross, J. Phys. Chem. Ref. Data **17**, 513 (1988).
[7] P. Neta, R.E. Huie, and A.B. Ross, J. Phys. Chem. Ref. Data **17**, 1027 (1988).
[8] M.Z. Hoffman, F. Bolletta, L. Moggi, and G.L. Hug, J. Phys. Chem. Ref. Data **18**, 219 (1989).

TABLE 1. Rate constants for silver transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
1.1	**Silver atom**							
1.1.1	**Silver atom**							
	$Ag^0 + Ag^0 \rightarrow Ag_2^0$	$\sim 1.6 \times 10^{10}$				p.r.	Estimated from comparison of spectral changes and calculated concentration-time profiles of the early products of reduction of Ag^+.	93A166
1.1.2	**Silver(I) ion**							
	$Ag^0 + Ag^+ \rightarrow Ag_2^+$	8×10^9				p.r.	D.k. at 360 nm and p.b.k. at 310 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and 1×10^{-4} mol L^{-1} $AgClO_4$.	93A166
		6.5×10^9	1.0		29	p.r.	D.k. at 410 nm in soln. contg. 0.0042-0.34 mol L^{-1} *tert*-BuOH, 0.1 mol L^{-1} $HClO_4$ and 1×10^{-4} mol L^{-1} $AgClO_4$.	731053
		5.2×10^9	1.0		29	p.r.	D.k. at 410 nm in soln. contg. 0.0042-0.34 mol L^{-1} *tert*-BuOH, 0.1 mol L^{-1} $HClO_4$ and 1×10^{-4} mol L^{-1} $AgClO_4$; measured at pressure of 6.72 kbar.	731053
		5.9×10^9				p.r.	P.b.k. at 260 nm and d.k. at 360 nm in soln. contg. 0.1 mol L^{-1} MeOH and 10^{-5} mol L^{-1} Ag_2SO_4.	680431
1.1.3	**Diamminesilver(I) ion**							
	$Ag^0 + Ag(NH_3)_2^+ \rightarrow Ag_2(NH_3)_n^+$	5.2×10^9				p.r.	D.k. at 360 nm and p.b.k. at 260 nm in soln. contg. 0.1 mol L^{-1} MeOH, 0.1 mol L^{-1} NH_3 and 10^{-5} mol L^{-1} Ag_2SO_4. Product contains unknown number of ammine ligands.	680435
1.1.4	**Copper(II) ion**							
	$Ag^0 + Cu^{2+} \rightarrow Ag^+ + Cu^+$	6.5×10^8				p.r.	D.k. at 360 nm in soln. contg. 1×10^{-5} mol L^{-1} Ag^+.	78A410
1.1.5	**Iron(III) ion**							
	$Ag^0 + Fe^{3+} \rightarrow Ag^+ + Fe^{2+}$	1.2×10^9	2			p.r.	D.k. at 360 nm in soln. contg. 1×10^{-5} mol L^{-1} Ag^+.	78A410
1.1.6	**Oxygen**							
	$Ag^0 + O_2 \rightarrow Ag^+ + O_2^{\cdot -}$	5.0×10^9				p.r.	D.k. at 360 nm in soln. contg. 1×10^{-5} mol L^{-1} Ag^+.	78A410
1.1.7	**Hydrogen peroxide**							
	$Ag^0 + H_2O_2 \rightarrow$	3.5×10^9				p.r.	D.k. at 360 nm in soln. contg. 1×10^{-5} mol L^{-1} Ag^+.	78A410
1.1.8	**Bromoform**							
	$Ag^0 + CHBr_3 \rightarrow$	3.0×10^9				p.r.	D.k. at 360 nm in soln. contg. 1×10^{-5} mol L^{-1} Ag^+.	78A410
1.1.9	**Carbon tetrachloride**							
	$Ag^0 + CCl_4 \rightarrow$	1.1×10^9				p.r.	D.k. at 360 nm in soln. contg. 1×10^{-5} mol L^{-1} Ag^+.	78A410
1.1.10	**Chloroacetate ion**							
	$Ag^0 + ClCH_2CO_2^- \rightarrow$	1.5×10^8				p.r.	D.k. at 360 nm in soln. contg. 1×10^{-5} mol L^{-1} Ag^+.	78A410
1.1.11	**Chloroform**							
	$Ag^0 + CHCl_3 \rightarrow$	1.1×10^9				p.r.	D.k. at 360 nm in soln. contg. 1×10^{-5} mol L^{-1} Ag^+.	78A410
1.1.12	**Nitrobenzene**							
	$Ag^0 + C_6H_5NO_2 \rightarrow$	2.8×10^9				p.r.	D.k. at 360 nm in soln. contg. 1×10^{-5} mol L^{-1} Ag^+.	78A410

TABLE 1. Rate constants for silver transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
1.1	**Silver atom** — Continued							
1.1.13	**Nitromethane**							
	$Ag^0 + CH_3NO_2 \rightarrow$	2.3×10^9				p.r.	D.k. at 360 nm in soln. contg. 1×10^{-5} mol L^{-1} Ag^+.	78A410
1.2	**Silver(I) ion, complex with Ag(0)**							
1.2.1	**Silver(I) ion, complex with Ag(0)**							
	$Ag_2^+ + Ag_2^+ \rightarrow Ag_4^{2+}$	1.3×10^9				p.r.	D.k. at 310 nm in N_2O-satd. soln. contg. formate.	93A166
1.2.2	**Iron(III) ion**							
	$Ag_2^+ + Fe^{3+} \rightarrow$	3.0×10^8	2			p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L^{-1} Ag^+.	78A410
1.2.3	**Permanganate ion**							
	$Ag_2^+ + MnO_4^- \rightarrow$	$\sim 1.2 \times 10^{10}$			20	p.r.	D.k. at 545 nm in soln. contg. 10^{-5} mol L^{-1} MnO_4^- and varied [Ag^+].	650385
1.2.4	**Hydrogen peroxide**							
	$Ag_2^+ + H_2O_2 \rightarrow$	8.0×10^6				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L^{-1} Ag^+.	78A410
1.2.5	**Oxygen**							
	$Ag_2^+ + O_2 \rightarrow$	4.6×10^8				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L^{-1} Ag^+.	78A410
1.2.6	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$Ag_2^+ + Ru(bpy)_3^{3+} \rightarrow 2\ Ag^+ + Ru(bpy)_3^{2+}$	1.2×10^{10}				f.p./oq	P.b.k. in soln. contg. $Ru(bpy)_3^{2+}$ and Ag^+ (OQ).	80C004
1.2.7	**1,4-Benzoquinone**							
	$Ag_2^+ + Q \rightarrow 2\ Ag^+ + Q^{\cdot -}$	1.5×10^8	5.8		25	p.r.	P.b.k. at 430 nm in soln. contg. 0.005 mol L^{-1} Ag^+, (2-4) $\times 10^{-5}$ mol L^{-1} benzoquinone and 1 mol L^{-1} *tert*-BuOH.	761134
1.2.8	**Bromoform**							
	$Ag_2^+ + CHBr_3 \rightarrow$	5.0×10^8				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L^{-1} Ag^+.	78A410
1.2.9	**Carbon tetrachloride**							
	$Ag_2^+ + CCl_4 \rightarrow$	1.5×10^7				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L^{-1} Ag^+.	78A410
1.2.10	**Nitrobenzene**							
	$Ag_2^+ + C_6H_5NO_2 \rightarrow$	3.0×10^8				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L^{-1} Ag^+.	78A410
1.2.11	**Nitromethane**							
	$Ag_2^+ + CH_3NO_2 \rightarrow$	1.1×10^8				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L^{-1} Ag^+.	78A410
1.3	**Amminesilver(0)-silver(I) complex**							
1.3.1	**Diamminesilver(I) ion**							
	$Ag_2(NH_3)_n^+ + Ag(NH_3)_2^+ \rightarrow Ag_3(NH_3)_n^{2+}$	$\sim 10^8$				p.r.	Estimated from rate of formation of product in soln. contg. 0.01 mol L^{-1} $Ag(NH_3)_2^+$.	680435
1.3.2	**Amminesilver(0)-silver(I) complex**							
	$Ag_2(NH_3)_n^+ + Ag_2(NH_3)_n^+ \rightarrow Ag_4(NH_3)_n^{2+}$	2.5×10^9				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L^{-1} Ag^+ and 0.01 mol L^{-1} NH_3.	78A410
1.3.3	**Hydrogen peroxide**							
	$Ag_2(NH_3)_n^+ + H_2O_2 \rightarrow$	1.0×10^9				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L^{-1} Ag^+ and 0.01 mol L^{-1} NH_3.	78A410

TABLE 1. Rate constants for silver transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
1.3	**Amminesilver(0)-silver(I) complex** — Continued							
1.3.4	**Oxygen**							
	$Ag_2(NH_3)_n^+ + O_2 \rightarrow$	7.0×10^9				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L^{-1} Ag^+ and 0.01 mol L^{-1} NH_3.	78A410
1.3.5	**Bromoform**							
	$Ag_2(NH_3)_n^+ + CHBr_3 \rightarrow$	2.0×10^9				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L^{-1} Ag^+ and 0.01 mol L^{-1} NH_3.	78A410
1.3.6	**Carbon tetrachloride**							
	$Ag_2(NH_3)_n^+ + CCl_4 \rightarrow$	1.0×10^8				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L^{-1} Ag^+ and 0.01 mol L^{-1} NH_3.	78A410
1.3.7	**Chloroacetate ion**							
	$Ag_2(NH_3)_n^+ + ClCH_2CO_2^- \rightarrow$	3.0×10^6				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L^{-1} Ag^+ and 0.01 mol L^{-1} NH_3.	78A410
1.3.8	**Chloroform**							
	$Ag_2(NH_3)_n^+ + CHCl_3 \rightarrow$	2.0×10^8				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L^{-1} Ag^+ and 0.01 mol L^{-1} NH_3.	78A410
1.3.9	**Nitrobenzene**							
	$Ag_2(NH_3)_n^+ + C_6H_5NO_2 \rightarrow$	9.0×10^8				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L^{-1} Ag^+ and 0.01 mol L^{-1} NH_3.	78A410
1.3.10	**Nitromethane**							
	$Ag_2(NH_3)_n^+ + CH_3NO_2 \rightarrow$	1.5×10^8				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L^{-1} Ag^+ and 0.01 mol L^{-1} NH_3.	78A410
1.4	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoargentate(I) ion**							
1.4.1	**Water**							
	$AgTPPS^{5-} + H_2O \rightarrow AgTPPSH^{4-} + OH^-$	5×10^4 s^{-1}	8.0			p.r.	D.k. in N_2-satd. soln. contg. $AgTPPS^{4-}$ and 0.1 mol L^{-1} 2-PrOH.	81A247
1.5	**Silver(II) ion**							
1.5.1	**Chromate(V)**							
	$Ag^{2+} + Cr(V) \rightarrow Cr(VI) + Ag^+$	5.8×10^7	1		21	p.r.	D.k. at 270 nm in Ar-satd. soln. contg. 10^{-4} mol L^{-1} $Cr_2O_7^{2-}$ (mostly $HCrO_4^-$), 2×10^{-5} mol L^{-1} Ag^+ and 0.1 mol L^{-1} $HClO_4$.	89A422
1.5.2	**Perhydroxyl**							
	$Ag^{2+} + HO_2^{\cdot} \rightarrow Ag^+ + H^+ + O_2$	1.7×10^8	1		21	p.r.	D.k. at 280 nm in O_2-satd. soln. contg. 10^{-4} mol L^{-1} $Cr_2O_7^{2-}$ (mostly $HCrO_4^-$), 2×10^{-5} mol L^{-1} Ag^+ and 0.1 mol L^{-1} $HClO_4$.	89A422
1.5.3	**Hydrogen peroxide**							
	$Ag^{2+} + H_2O_2 \rightarrow Ag^+ + HO_2^{\cdot} + H^+$	4.5×10^7	3		21	p.r.	D.k. at 280 nm in N_2O-satd. soln. contg. 1 $\times 10^{-4}$ mol L^{-1} Ag_2SO_4 and 1, 5 and 10 $\times 10^{-4}$ mol L^{-1} H_2O_2.	89A422
1.5.4	**5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) ion**							
	$Ag^{2+} + ZnTMpyP^{4+} \rightarrow Ag^+ + [ZnTMpyP]^{\cdot 5+}$	6.0×10^7	4.0, 5.0	0.004		p.r.	P.b.k. at 690-700 nm in N_2O-satd. buffered soln. contg. Ag_2SO_4 and (1-4) $\times 10^{-4}$ mol L^{-1} porphyrin; the π-radical cation complexes with Ag(II).	85A038
1.5.5	**α-Aminoisobutyric acid**							
	$Ag^{2+} + (CH_3)_2C(NH_3^+)CO_2^- \rightarrow$	1.7×10^6	4.4			p.r.	D.k. in N_2O-satd. soln. contg. 5×10^{-1} mol L^{-1} $AgClO_4$ and (5-100) $\times 10^{-5}$ mol L^{-1} aminoisobutyric acid; reaction product assigned as a complex which decays by intramolecular oxidation, $k = 5 \times 10^3$ s^{-1}.	80A307

TABLE 1. Rate constants for silver transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
1.5	**Silver(II) ion** — Continued							
1.5.6	**6-Aminophenalenone**							
	Ag^{2+} + 6-NH_2PHO → Ag^+ + [6-NH_2PHO]$^{\cdot+}$	1.1×10^9				p.r.	P.b.k. at 420 nm in N_2O-satd. soln. contg. 0.005 mol L^{-1} Ag_2SO_4.	93A404
1.5.7	**Anisole**							
	Ag^{2+} + $C_6H_5OCH_3$ → Ag^+ + [$C_6H_5OCH_3$]$^{\cdot+}$	3.8×10^7	4		20	p.r.	P.b.k. in N_2O-satd. soln. contg. $AgNO_3$.	751171
1.5.8	**Diethyl disulfide**							
	Ag^{2+} + $C_2H_5SSC_2H_5$ → Ag^+ + [$C_2H_5SSC_2H_5$]$^{\cdot+}$	3.5×10^8	4			p.r.	D.k. at 300 nm and p.b.k. at 430 nm in N_2O-satd. soln. contg. 0.002 mol L^{-1} Ag^+ and various lower concn. of disulfide.	761143
1.5.9	**1,2-Dimethoxybenzene**							
	Ag^{2+} + 2-$CH_3OC_6H_4OCH_3$ → Ag^+ + [2-$CH_3OC_6H_4OCH_3$]$^{\cdot+}$	6.0×10^7	4		20	p.r.	P.b.k. in N_2O-satd. soln. contg. $AgNO_3$.	751171
1.5.10	**1,3-Dimethoxybenzene**							
	Ag^{2+} + 3-$CH_3OC_6H_4OCH_3$ → Ag^+ + [3-$CH_3OC_6H_4OCH_3$]$^{\cdot+}$	6.3×10^7	4		20	p.r.	P.b.k. in N_2O-satd. soln. contg. $AgNO_3$.	751171
1.5.11	**1,4-Dimethoxybenzene**							
	Ag^{2+} + 4-$CH_3OC_6H_4OCH_3$ → Ag^+ + [4-$CH_3OC_6H_4OCH_3$]$^{\cdot+}$	4.6×10^7	4		20	p.r.	P.b.k. in N_2O-satd. soln. contg. $AgNO_3$.	751171
1.5.12	**2,3-Dimethoxybenzoic acid**							
	Ag^{2+} + 2,3-$(CH_3O)_2C_6H_3CO_2H$ → Ag^+ + H^+ + [2,3-$(CH_3O)_2C_6H_3CO_2$]$^{\cdot}$	6.7×10^8	~3			p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 0.001 mol L^{-1} $AgSO_4$.	771006
1.5.13	**3,4-Dimethoxybenzoic acid**							
	Ag^{2+} + 3,4-$(CH_3O)_2C_6H_3CO_2H$ → Ag^+ + H^+ + [3,4-$(CH_3O)_2C_6H_3CO_2$]$^{\cdot}$	4.2×10^8	~3			p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 0.001 mol L^{-1} $AgSO_4$.	771006
1.5.14	**2,4-Dimethoxybenzoic acid**							
	Ag^{2+} + 2,4-$(CH_3O)_2C_6H_3CO_2H$ → Ag^+ + H^+ + [2,4-$(CH_3O)_2C_6H_3CO_2$]$^{\cdot}$	4.5×10^8	~3			p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 0.001 mol L^{-1} $AgSO_4$.	771006
1.5.15	**2,6-Dimethoxybenzoic acid**							
	Ag^{2+} + 2,6-$(CH_3O)_2C_6H_3CO_2H$ → Ag^+ + H^+ + [2,6-$(CH_3O)_2C_6H_3CO_2$]$^{\cdot}$	2.2×10^9	~3			p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 0.001 mol L^{-1} $AgSO_4$.	771006
1.5.16	**3,5-Dimethoxybenzoic acid**							
	Ag^{2+} + 3,5-$(CH_3O)_2C_6H_3CO_2H$ → Ag^+ + H^+ + [3,5-$(CH_3O)_2C_6H_3CO_2$]$^{\cdot}$	6.0×10^8	~3			p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 0.001 mol L^{-1} $AgSO_4$.	771006
1.5.17	**Dimethyl disulfide**							
	Ag^{2+} + CH_3SSCH_3 → Ag^+ + [CH_3SSCH_3]$^{\cdot+}$	5.2×10^8	3.5			p.r.	D.k. at 300 nm and p.b.k. in N_2O-satd. soln. contg. 0.002 mol L^{-1} Ag^+ and various lower concn. of disulfide.	761143
1.5.18	**Ethylene glycol**							
	Ag^{2+} + $HOCH_2CH_2OH$ →	1.3×10^6	4.7			p.r.	D.k. at 265 and 300 nm in N_2O-satd. soln. contg. 1.1×10^{-3} mol L^{-1} $AgClO_4$ and $(1.1\text{-}4) \times 10^{-3}$ mol L^{-1} ethylene glycol; reaction product assigned as a complex which decays by intramolecular oxidation, $k = 2.8 \times 10^3$ s^{-1}.	81A209
1.5.19	**Glycine**							
	Ag^{2+} + GlyH → $AgGly^+$ + H^+	1.5×10^6	4.4			p.r.	D.k. at 310 nm in N_2O-satd. soln. contg. 1×10^{-4} mol L^{-1} $AgClO_4$ and ~$1\text{-}2 \times 10^{-3}$ mol L^{-1} glycine; at [GlyH] > 0.01 mol L^{-1} $k = 5.2 \times 10^3$ s^{-1} for decay of the complex by intramolecular oxidation.	80A307

TABLE 1. Rate constants for silver transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
1.5	**Silver(II) ion** — Continued							
1.5.20	**Methionine**							
	$Ag^{2+} + Met \rightarrow Ag^{+} + [Met]^{\cdot+}$	3.3×10^{8}	<5			p.r.	D.k. in N_2O-satd. soln.; evidence is given that amino group of methionine (10^{-2} mol L^{-1}) is complexed with Ag^{+} (5×10^{-2} mol L^{-1} $AgNO_3$).	81A340
1.5.21	**2-Methoxybenzoic acid**							
	$Ag^{2+} + 2\text{-}CH_3OC_6H_4CO_2H \rightarrow Ag^{+} + H^{+} + [2\text{-}CH_3OC_6H_4CO_2]^{\cdot}$	6.8×10^{8}	~3			p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 0.001 mol L^{-1} $AgSO_4$.	771006
1.5.22	**3-Methoxybenzoic acid**							
	$Ag^{2+} + 3\text{-}CH_3OC_6H_4CO_2H \rightarrow Ag^{+} + H^{+} + [3\text{-}CH_3OC_6H_4CO_2]^{\cdot}$	3.0×10^{8}	~3			p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 0.001 mol L^{-1} $AgSO_4$.	771006
1.5.23	**4-Methoxybenzoic acid**							
	$Ag^{2+} + 4\text{-}CH_3OC_6H_4CO_2H \rightarrow Ag^{+} + H^{+} + [4\text{-}CH_3OC_6H_4CO_2]^{\cdot}$	3.8×10^{8}	~3			p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 0.001 mol L^{-1} $AgSO_4$.	771006
1.5.24	**1,2,3-Trimethoxybenzene**							
	$Ag^{2+} + 1,2,3\text{-}C_6H_3(OCH_3)_3 \rightarrow Ag^{+} + [1,2,3\text{-}C_6H_3(OCH_3)_3]^{\cdot+}$	2.5×10^{7}	4		20	p.r.	P.b.k. in N_2O-satd. soln. contg. $AgNO_3$.	751171
1.5.25	**1,2,4-Trimethoxybenzene**							
	$Ag^{2+} + 1,2,4\text{-}C_6H_3(OCH_3)_3 \rightarrow Ag^{+} + [1,2,4\text{-}C_6H_3(OCH_3)_3]^{\cdot+}$	7.0×10^{7}	4		20	p.r.	P.b.k. in N_2O-satd. soln. contg. $AgNO_3$.	751171
1.5.26	**1,3,5-Trimethoxybenzene**							
	$Ag^{2+} + 1,3,5\text{-}C_6H_3(OCH_3)_3 \rightarrow Ag^{+} + [1,3,5\text{-}C_6H_3(CH_3O)_3]^{\cdot+}$	5.6×10^{7}	4		20	p.r.	P.b.k. in N_2O-satd. soln. contg. $AgNO_3$.	751171
1.5.27	**2,3,4-Trimethoxybenzoic acid**							
	$Ag^{2+} + 2,3,4\text{-}(CH_3O)_3C_6H_2CO_2H \rightarrow Ag^{+} + H^{+} + [2,3,4\text{-}(CH_3O)_3C_6H_2CO_2]^{\cdot}$	4.7×10^{8}	~3			p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 0.001 mol L^{-1} $AgSO_4$.	771006
1.5.28	**3,4,5-Trimethoxybenzoic acid**							
	$Ag^{2+} + 3,4,5\text{-}(CH_3O)_3C_6H_2CO_2H \rightarrow Ag^{+} + H^{+} + [3,4,5\text{-}(CH_3O)_3C_6H_2CO_2]^{\cdot}$	4.0×10^{8}	~3			p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 0.001 mol L^{-1} $AgSO_4$.	771006
1.5.29	**2,4,5-Trimethoxybenzoic acid**							
	$Ag^{2+} + 2,4,5\text{-}(CH_3O)_3C_6H_2CO_2H \rightarrow Ag^{+} + H^{+} + [2,4,5\text{-}(CH_3O)_3C_6H_2CO_2]^{\cdot}$	2.6×10^{8}	~3			p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 0.001 mol L^{-1} $AgSO_4$.	771006
1.5.30	**2,4,6-Trimethoxybenzoic acid**							
	$Ag^{2+} + 2,4,6\text{-}(CH_3O)_3C_6H_2CO_2H \rightarrow Ag^{+} + H^{+} + [2,4,6\text{-}(CH_3O)_3C_6H_2CO_2]^{\cdot}$	1.1×10^{9}	~3			p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 0.001 mol L^{-1} $AgSO_4$.	771006
1.5.31	**Trimethylacetate ion**							
	$Ag^{2+} + (CH_3)_3CCO_2^{-} \rightarrow$	$\sim 1 \times 10^{8}$	4.3			p.r.	D.k. at 310 nm in N_2O-satd. in soln. contg. $AgClO_4$ and $\sim 1 \times 10^{-4}$ mol L^{-1} trimethylacetic acid (S); reaction product assigned as a complex which decays by intramolecular oxidation, at [S] = 2×10^{-4} to 1×10^{-2} mol L^{-1} $k = 1 \times 10^{4}$ s^{-1}.	80A307
1.6	**Hydroxysilver(II) ion**							
1.6.1	**Hydrogen ion**							
	$AgOH^{+} + H^{+} \rightarrow Ag^{2+} + H_2O$	8×10^{9}	4.3			p.r.	P.b.k. in N_2O-satd. soln. contg. 0.001 mol L^{-1} Ag^{+}.	79A304
		1.2×10^{10}				p.r.	D.k. at 310 nm in N_2O-satd. soln. contg. 0.001 mol L^{-1} Ag^{+} and varied [H^{+}].	78C006
1.6.2	**2,3-Dimethoxybenzoate ion**							
	$AgOH^{+} + 2,3\text{-}(CH_3O)_2C_6H_3CO_2^{-} \rightarrow Ag^{+} + OH^{-} + [2,3\text{-}(CH_3O)_2C_6H_3CO_2]^{\cdot}$	8.4×10^{8}	5-6			p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 0.001 mol L^{-1} $AgSO_4$.	771006

TABLE 1. Rate constants for silver transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
1.7	**Mono- and dihydroxysilver(II)** — Continued							
1.7.3	***cis*-1,2-Cyclohexanediol**							
	$AgOH^+/Ag(OH)_2 + c\text{-}C_6H_{10}(OH)_2 \rightarrow$	1.5×10^8	8.7			p.r.	P.b.k. at 400 nm in N_2O-satd. soln. contg. 1.2×10^{-3} mol L^{-1} $AgClO_4$ in borate buffer; reaction product assigned as a complex which decays by intramolecular oxidation, $k = 3 \times 10^3$ s^{-1}; $k = 8 \times 10^7$ L mol^{-1} s^{-1} for uptake of another glycol.	82A098
1.7.4	***trans*-1,2-Cyclohexanediol**							
	$AgOH^+/Ag(OH)_2 + c\text{-}C_6H_{10}(OH)_2 \rightarrow$	3.7×10^8	8.7			p.r.	P.b.k. at 400 nm in N_2O-satd. soln. contg. 1.2×10^{-3} mol L^{-1} $AgClO_4$; reaction product assigned as a complex which decays by intramolecular oxidation, $k = 3 \times 10^3$ s^{-1}; $k = 7.5 \times 10^7$ L mol^{-1} s^{-1} for uptake of another glycol.	82A098
1.7.5	**Diethyl disulfide**							
	$AgOH^+/Ag(OH)_2 + C_2H_5SSC_2H_5 \rightarrow Ag^+ + OH^-/2OH^- + [C_2H_5SSC_2H_5]^{\cdot+}$	7.0×10^8	8			p.r.	D.k. at 300 nm and p.b.k. in N_2O-satd. soln. contg. 0.002 mol L^{-1} Ag^+ and various lower concn. of disulfide.	761143
1.7.6	**Dimethyl disulfide**							
	$AgOH^+/Ag(OH)_2 + CH_3SSCH_3 \rightarrow Ag^+ + OH^-/2OH^- + [CH_3SSCH_3]^{\cdot+}$	5.6×10^8	8			p.r.	D.k. at 300 nm and p.b.k. in N_2O-satd. soln. contg. 0.002 mol L^{-1} Ag^+ and various lower concn. of disulfide.	761143
1.7.7	**Ethylene glycol**							
	$AgOH^+/Ag(OH)_2 + HOCH_2CH_2OH \rightarrow$	1.5×10^8	8.6			p.r.	P.b.k. at 400 nm in N_2O-satd. soln. contg. 1.2×10^{-3} mol L^{-1} $AgClO_4$; reaction product assigned as a complex which decays by intramolecular oxidation, $k = \sim 2.5 \times 10^3$ s^{-1}; $k = 3 \times 10^7$ L mol^{-1} s^{-1} for uptake of another glycol.	82A098
1.7.8	**Glycine, negative ion**							
	$AgOH^+/Ag(OH)_2 + Gly^- \rightarrow AgGly(OH)/AgGly(OH)_2^-$	6×10^7	9.0			p.r.	D.k. at 330 and 400 nm in N_2O-satd. soln. contg. 0.001 mol L^{-1} $AgClO_4$ and (0.5-4) $\times 10^{-3}$ mol L^{-1} glycine; experimentally indistinguishable from $AgGly(OH)/AgGly(OH)_2^- + Gly \rightarrow Ag(Gly)_2$; extrapolation gives 3×10^8 L mol^{-1} s^{-1} for reaction of the fully basic form, Gly^-. At $[Gly^-] > 0.001$ mol L^{-1}, $k = 50$ s^{-1} for decay of the complex, $Ag(Gly)_2$, by intramolecular oxidation; at low $[Gly^-]$, $k = 500$ s^{-1}.	80A307
1.7.9	**Trimethylacetate ion**							
	$AgOH^+/Ag(OH)_2 + (CH_3)_3CCO_2^- \rightarrow$	$<10^7$	8.8			p.r.	D.k. at 310 nm in N_2O-satd. in soln. contg. $AgClO_4$ and $\sim 1 \times 10^{-4}$ mol L^{-1} trimethylacetic acid.	80A307
1.8	**Dihydroxysilver(II)**							
1.8.1	**Dihydroxysilver(II)**							
	$Ag(OH)_2 + Ag(OH)_2 \rightarrow$	7.5×10^9	9.2-9.8			p.r.	D.k. at 270 nm and p.b.k. at 390 nm in N_2O-satd. soln. contg. 0.001 mol L^{-1} Ag^+; reaction suggested to be dimerization $\rightarrow [Ag(OH)_2]_2$ and ultimate formation of Ag(III), which decays with $k = \sim 0.1$ s^{-1}.	79A304

TABLE 1. Rate constants for silver transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
1.9	**Tetraamminesilver(II) ion**							
1.9.1	**Tetraamminesilver(II) ion**							
	$Ag(NH_3)_4^{2+} + Ag(NH_3)_4^{2+} \rightarrow$	6×10^5	11.5			p.r.	D.k. at 270 nm in N_2O-soln. contg. 0.001 mol L^{-1} Ag^+ and 1 mol L^{-1} NH_3.	79A304
1.9.2	**Alanine, negative ion**							
	$Ag(NH_3)_4^{2+} + Ala^- \rightarrow Ag(NH_3)_3(Ala)^+ + NH_3$	8×10^5	11.5			p.r.	D.k. at 270-280 nm in N_2O-soln. contg. 0.001 mol L^{-1} Ag^+ and 1 mol L^{-1} NH_3; $k = 5 \times 10^3$ s^{-1} for decay of the complex by intramolecular oxidation.	80A307
1.9.3	**α-Aminoisobutyrate negative ion**							
	$Ag(NH_3)_4^{2+} + (CH_3)_2C(NH_2)CO_2^- \rightarrow Ag(NH_3)_3[(CH_3)_2C(NH_2)CO_2]^+ + NH_3$	2×10^6	11.5			p.r.	D.k. in N_2O-satd. soln. contg. 0.001 mol L^{-1} $AgClO_4$ and 1 mol L^{-1} NH_3; reaction product assigned as a complex which decays by intramolecular oxidation, $k = 5 \times 10^3$ s^{-1}.	80A307
1.9.4	**Aspartate monoanion**							
	$Ag(NH_3)_4^{2+} + Asp^- \rightarrow Ag(NH_3)_3(Asp)^+ + NH_3$	1.2×10^6	11.5			p.r.	D.k. at 270-280 nm; $k = 4 \times 10^3$ s^{-1} for decay of the complex by intramolecular oxidation.	80A307
1.9.5	**Glycine, negative ion**							
	$Ag(NH_3)_4^{2+} + Gly^- \rightarrow Ag(NH_3)_3(Gly)^+ + NH_3$	5×10^5	11.5			p.r.	D.k. at 270-280 nm in soln. contg. 0.001 mol L^{-1} Ag^+ and 1 mol L^{-1} NH_3; $k = 3 \times 10^3$ s^{-1} for decay of the complex by intramolecular oxidation.	80A307
1.10	**Diammine(hydroxy)silver(II)**							
1.10.1	**Ammonia**							
	$Ag(NH_3)_2OH^+ + NH_3 \rightarrow Ag(NH_3)_3OH^+$	3×10^7	10.5			p.r.	P.b.k. at 270 nm in N_2O-satd. soln. contg. 0.001 mol L^{-1} Ag^+ and (3-12) × 10^{-3} mol L^{-1} NH_3.	79A304
1.11	**Triammine(hydroxy)silver(II) ion**							
1.11.1	**Ammonia**							
	$Ag(NH_3)_3OH^+ + NH_3 \rightarrow Ag(NH_3)_4^{2+} + OH^-$	8×10^6	10.5			p.r.	P.b.k. at 270 nm in N_2O-satd. soln. contg. 0.001 mol L^{-1} Ag^+ and (1-9) × 10^{-2} mol L^{-1} NH_3; $k_t = 8 \times 10^7$ L mol^{-1} s^{-1}.	79A304
1.12	**Nitrilotriacetatoargentate(II)**							
1.12.1	**First-order reaction**							
	Ag(II)NTA →	2×10^3 s^{-1}	10.7			p.r.	D.k. in N_2O-satd. soln. contg. $AgClO_4$ and NTA; decay suggested to occur by intramolecular oxidation.	80A307
1.13	**Ethylenediaminetetraacetatoargentate(II)**							
1.13.1	**First-order reaction**							
	Ag(II)EDTA →	8 s^{-1}	11.0			p.r.	D.k. in N_2O-satd. soln. contg. $AgClO_4$ and EDTA; decay suggested to occur by intramolecular oxidation.	80A307
1.14	**Silver(II)-succinate complex**							
1.14.1	**First-order reaction**							
	$Ag(II)(^-O_2CCH_2CH_2CO_2^-) \rightarrow$	2×10^2 s^{-1}	5.6			p.r.	D.k. in N_2O-satd. soln. contg. $AgClO_4$ and succinic acid; decay suggested to occur by intramolecular oxidation.	80A307

TABLE 2. Rate constants for aluminum transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
2.1	**Aluminum(III) sulfophthalocyanine, radical anion**							
2.1.1	**Oxygen**							
	$[Al(pts)]^{\bullet-} + O_2 \rightarrow Al(pts) + O_2^{\bullet-}$	1.5×10^8	7			f.p./rq	D.k. in soln. contg. Al(pts) and 5×10^{-3} mol L^{-1} 4-aminophenol (RQ) and varied $[O_2]$.	89R092
2.1.2	**4-Aminophenoxyl**							
	$[Al(pts)]^{\bullet-} + 4\text{-}H_2NC_6H_4O^{\bullet} + H^+ \rightarrow Al(pts) + 4\text{-}H_2NC_6H_4OH$	3.3×10^9	7			f.p./rq	D.k. in N_2-satd. soln. contg. Al(pts) and 10^{-4} mol L^{-1} 4-aminophenol (RQ).	89R092

TABLE 3. Rate constants for gold transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
3.1	**Dicyanoaurate(0) ion**							
3.1.1	**First-order reaction**							
	$Au(CN)_2^{2-} \rightarrow Au^0 + 2\ CN^-$	† 6.7×10^3 s^{-1}	9.5			p.r.	D.k. at 420 nm in soln. contg. 1×10^{-5} mol L^{-1} $KAu(CN)_2$ and 0.1 mol L^{-1} 2-PrOH. † Different d.k. have been reported for the same species, see following entry.	89A310
3.1.2	**Dicyanoaurate(0) ion**							
	$Au(CN)_2^{2-} + Au(CN)_2^{2-} \rightarrow$	† 3.2×10^9	11			p.r.	D.k. at 410 nm in soln. contg. 0.5 and 1×10^{-4} mol L^{-1} $KAu(CN)_2$, 0.002 mol L^{-1} MeOH and 0.001 mol L^{-1} NaOH. Unclear whether k or $2k$.	680302
		† 2.9×10^9	13			p.r.	D.k. at 410 nm in soln. contg. $KAu(CN)_2$ and 0.098 mol L^{-1} H_2. Unclear whether k or $2k$. † Different d.k. have been reported for the same species, see previous entry.	680302
3.1.3	**Ferricyanide ion**							
	$Au(CN)_2^{2-} + Fe(CN)_6^{3-} \rightarrow$	5.5×10^8				p.r.	D.k. at 410 nm.	680302
3.1.4	**Nitrous oxide**							
	$Au(CN)_2^{2-} + N_2O \rightarrow$	5.5×10^8				p.r.	D.k. at 410 nm.	680302
3.1.5	**Oxygen**							
	$Au(CN)_2^{2-} + O_2 \rightarrow$	3.6×10^9				p.r.	D.k. at 410 nm.	680302
3.2	**Hydrogen dicyanoaurate(0) ion**							
3.2.1	**Hydrogen ion**							
	$Au(CN)_2H^- + H^+ \rightarrow Au(CN)_2H_2$	5.9×10^{10}	~4.5-5			p.r.	D.k. at 420 nm in soln. contg. 8×10^{-4} mol L^{-1} $KAu(CN)_2$, 0.1 mol L^{-1} 2-PrOH and ~(1-3) $\times 10^{-5}$ mol L^{-1} H^+.	89A310
3.3	**Dihydrogen dicyanoaurate(0)**							
3.3.1	**First-order reaction**							
	$Au(CN)_2H_2 \rightarrow$	† 5.3×10^4 s^{-1}	3			p.r.	D.k. at 260 nm in soln. contg. 3.6×10^{-5} mol L^{-1} $KAu(CN)_2$ and 5×10^{-3} mol L^{-1} *tert*-BuOH. † Different d.k. have been reported for the same species, see following entry.	89A310
3.3.2	**Dihydrogen dicyanoaurate(0)**							
	$Au(CN)_2H_2 + Au(CN)_2H_2 \rightarrow$	† 5.0×10^9	2			p.r.	D.k. at 270 nm in soln. contg. $KAu(CN)_2$ and MeOH or under 110 atm. H_2. Unclear whether k or $2k$. † Different d.k. have been reported for the same species, see previous entry.	680302
3.4	**Dicyanohydroxyaurate(II) ion**							
3.4.1	**Dicyanohydroxyaurate(II) ion**							
	$(OH)Au(CN)_2^- + (OH)Au(CN)_2^- \rightarrow Au(CN)_2^- + (OH)_2Au(CN)_2^-$	2.5×10^8	7-10			p.r.	D.k. at 270 nm in N_2O-satd. soln. contg. 5×10^{-4} mol L^{-1} $Au(CN)_2^-$. Unclear whether k or $2k$. Au(III) product reported to undergo H_2O elimination, $k = 9.5$ s^{-1}, to give $O{=}Au^{III}(CN)_2^-$.	91A018

TABLE 3. Rate constants for gold transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
3.4	**Dicyanohydroxyaurate(II) ion** — Continued							
3.4.2	**Hydrogen ion**							
	$(OH)Au(CN)_2^- + H^+ \rightarrow [(OH)Au(CN)_2]^-H^+$	2.1×10^{10}	~4.5-5			p.r.	D.k. at 270 nm and condy. change in N_2O-satd. soln. contg. 5×10^{-4} mol L^{-1} $Au(CN)_2^-$ and ~(1-3) $\times 10^{-5}$ mol L^{-1} H^+. Product reported to undergo HCN elimination, $k = 4.8$ s^{-1} at pH 4.4.	91A018
3.5	**Dicyano(hydroxy)aurate(II) ion, protonated**							
3.5.1	**Dicyano(hydroxy)aurate(II) ion, protonated**							
	$[(OH)Au(CN)_2]^-H^+ + [(OH)Au(CN)_2]^-H^+ \rightarrow Au(CN)_2^- + [(OH)_2Au(CN)_2]^-H^+ + H^+$	1.0×10^9	4.6			p.r.	D.k. at 270 nm and condy. change in N_2O-satd. soln. contg. 5×10^{-4} mol L^{-1} $Au(CN)_2^-$. Unclear whether k or $2k$.	91A018
3.6	**Gold(II)**							
3.6.1	**Gold(II)**							
	Au(II) + Au(II) →	1.4×10^9	2		20	p.r.	D.k. at 270 nm in soln. contg. 5.0×10^{-5} mol L^{-1} $NaAuCl_4$ and 0.01 mol L^{-1} $HClO_4$. In the presence of 0.12 mol L^{-1} $NaClO_4$ $k = 1.5 \times 10^9$ L mol^{-1} s^{-1}.	700580
		8.6×10^8	2		20	p.r.	D.k. at 270 nm in soln. contg. 5.0×10^{-5} mol L^{-1} $NaAuCl_4$, 0.01 mol L^{-1} $HClO_4$ and 0.001 mol L^{-1} Cl^-. In the presence of 0.12 mol L^{-1} $NaClO_4$ $k = 1.2 \times 10^9$ L mol^{-1} s^{-1}.	700580
		2.7×10^8	2		20	p.r.	D.k. at 270 nm in soln. contg. 5.0×10^{-5} mol L^{-1} $NaAuCl_4$, 0.01 mol L^{-1} $HClO_4$ and 0.01 mol L^{-1} Cl^-.	700580
		2.5×10^7	2		20	p.r.	D.k. at 270 nm in soln. contg. 5.0×10^{-5} mol L^{-1} $NaAuCl_4$, 0.01 mol L^{-1} $HClO_4$ and 0.1 mol L^{-1} Cl^-.	700580
		2.4×10^8	2			p.r.	D.k. at 330 nm in soln. contg. $Au(CN)_2^-$, N_2O and 0.01 mol L^{-1} HCl. Unclear whether k or $2k$.	680302
		4.8×10^8	4,7			p.r.	D.k. at 330 nm in soln. contg. $HAuCl_4$, MeOH and 0.01 mol L^{-1} KCl. Unclear whether k or $2k$.	680302

TABLE 4. Rate constants for bismuth transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
4.1	**Bismuth(II) ion**							
4.1.1	**Bismuth(II) ion**							
	$Bi^{2+} + Bi^{2+} \rightarrow$	2.5×10^8	~1.5			p.r.	D.k. in Ar-satd. soln. contg. 0.001 mol L^{-1} $Bi(OAc)_3$.	761233
		6×10^8	~1			p.r.	D.k. in aerated soln. contg. 0.01 mol L^{-1} $BiCl_3$.	761233
4.1.2	**Hydroxyl**							
	$Bi^{2+} + {}^{\bullet}OH \rightarrow Bi^{3+} + OH^-$	2×10^9	≤0			p.r.	D.k. in Ar-satd. soln. contg. 1-5 mol L^{-1} $HClO_4$.	88A493
4.1.3	**Perhydroxyl**							
	$Bi^{2+} + HO_2^{\bullet} + H^+ \rightarrow Bi^{3+} + H_2O_2$	2.5×10^9	~1.5			p.r.	D.k. in aerated soln. contg. 0.001 mol L^{-1} $Bi(OAc)_3$.	761233
4.2	**Hydroxymethylbismuth(IV) ion**							
4.2.1	**First-order reaction**							
	$BiCH_2OH^{3+} \rightarrow$	4.8×10^3 s^{-1}	≤0			p.r.	D.k. in Ar-satd. soln. contg. 1-5 mol L^{-1} $HClO_4$ and MeOH.	88A493
4.3	**1-Hydroxyethylbismuth(IV) ion**							
4.3.1	**First-order reaction**							
	$BiCH(CH_3)OH^{3+} \rightarrow$	3.6×10^4 s^{-1}	≤0			p.r.	D.k. in Ar-satd. soln. contg. 1-5 mol L^{-1} $HClO_4$ and EtOH.	88A493
4.4	**1-Hydroxy-1-methylethylbismuth(IV) ion**							
4.4.1	**First-order reaction**							
	$BiC(CH_3)_2OH^{3+} \rightarrow$	1×10^3 s^{-1}	≤0			p.r.	D.k. in Ar-satd. soln. contg. 1-5 mol L^{-1} $HClO_4$ and 2-PrOH.	88A493
4.5	**2-Hydroxy-2-dimethylethylbismuth(IV) ion**							
4.5.1	**First-order reaction**							
	$BiCH_2C(CH_3)_2OH^{3+} \rightarrow$	1.0×10^5 s^{-1}	≤0			p.r.	D.k. in Ar-satd. soln. contg. 1-5 mol L^{-1} $HClO_4$ and *tert*-BuOH.	88A493
4.6	**Carboxybismuth(IV) ion**							
4.6.1	**First-order reaction**							
	$BiCOOH^{3+} \rightarrow$	$<10^3$ s^{-1}	≤0			p.r.	D.k. in Ar-satd. soln. contg. 1-5 mol L^{-1} $HClO_4$ and HCO_2H.	88A493

TABLE 5. Rate constants for cadmium transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
5.1	**Cadmium(I) ions**							
5.1.1	**Cadmium(I) ions**							
	$Cd^+ + Cd^+ \rightarrow Cd_2^{2+}$	2.1×10^9				p.r.	D.k. in soln. contg. $Cd(ClO_4)_2$ and *tert*-BuOH; value cor. for $\varepsilon = 1.4 \times 10^4$ L mol^{-1} cm^{-1} [92A182].	88A124
		1.5×10^9				p.r.	D.k. at 300 nm and condy. change in soln. contg. 5×10^{-4} mol L^{-1} $CdSO_4$ and MeOH, EtOH or 2-PrOH; value obtained by computer fit.	751064
		2.5×10^9				p.r.	D.k. in Ar-satd. soln. contg. 1×10^{-3} mol L^{-1} Cd^{2+} and 0.025 mol L^{-1} EtOH, ethylene glycol or *tert*-BuOH.	751153
5.1.2	**Hydroxyl**							
	$Cd^+ + {}^{\bullet}OH \rightarrow Cd^{2+} + OH^-$	$\sim 1.3 \times 10^{10}$			25	p.r.	D.k.; value cor. for $\varepsilon = 1.4 \times 10^4$ L mol^{-1} cm^{-1} [92A182].	751027
		2×10^{10}				p.r.	D.k. at 300 nm, p.b.k. at 240 nm and condy. change in soln. contg. 5×10^{-4} mol L^{-1} $CdSO_4$; value obtained by computer fit.	751064
5.1.3	**Hydroxymethyl**							
	$Cd^+ + {}^{\bullet}CH_2OH \rightarrow CdCH_2OH^+$	2×10^8				p.r.	D.k. at 300 nm, p.b.k. at 240 nm and condy. change in soln. contg. 5×10^{-4} mol L^{-1} $CdSO_4$ and MeOH; value obtained by computer fit.	751064
5.1.4	**1-Hydroxyethyl**							
	$Cd^+ + CH_3\dot{C}HOH \rightarrow CdCHOHCH_3^+$	1.3×10^9				p.r.	D.k. at 300 nm, p.b.k. at 240 nm and condy. change in soln. contg. 5×10^{-4} mol L^{-1} $CdSO_4$ and EtOH; value obtained by computer fit.	751064
5.1.5	**1-Hydroxy-1-methylethyl**							
	$Cd^+ + (CH_3)_2\dot{C}OH \rightarrow CdC(CH_3)_2OH^+$	2.4×10^9				p.r.	D.k. at 300 nm, p.b.k. at 240 nm and condy. change in soln. contg. 5×10^{-4} mol L^{-1} $CdSO_4$ and 2-PrOH; value obtained by computer fit.	751064
5.1.6	**2-Hydroxy-2,2-dimethylethyl**							
	$Cd^+ + {}^{\bullet}CH_2C(CH_3)_2OH \rightarrow Cd^{2+} + CH_2{=}C(CH_3)_2 + OH^-$	$\sim 1 \times 10^9$				p.r.	D.k. at 300 nm, p.b.k. at 240 nm and condy. change in soln. contg. 5×10^{-4} mol L^{-1} $CdSO_4$ and 0.5 mol L^{-1} *tert*-BuOH; $k(Cd_2^{2+} + {}^{\bullet}CH_2C(CH_3)_2OH \rightarrow Cd^+ + Cd^{2+} + (CH_3)_2C{=}CH_2 + OH^-) = \sim 1 \times 10^9$ L mol^{-1} s^{-1}; both values obtained by computer fit.	751064
5.1.7	**Carbon dioxide radical anion**							
	$Cd^+ + CO_2^{\bullet -} \rightarrow Cd^0 + CO_2$	2×10^9				p.r.	D.k. in deaerated soln. contg. 5×10^{-4} mol L^{-1} $Cd(ClO_4)_2$ and 10^{-3} mol L^{-1} formate.	92N098
5.1.8	**Bromate ion**							
	$Cd^+ + BrO_3^- \rightarrow$	1.3×10^8		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and varied $[BrO_3^-]$; studied at 3-90 °C. E_a = 13.4 kJ mol^{-1} [701228].	68G855
5.1.9	**Tris(ethylenediamine)cobalt(III) ion**							
	$Cd^+ + Co(en)_3^{3+} \rightarrow Cd^{2+} + Co(en)_3^{2+}$	1.6×10^7	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and $(0.5\text{-}3.0) \times 10^{-4}$ mol L^{-1} complex.	690428

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
5.1	**Cadmium(I) ions** — Continued							
5.1.10	***cis*-Dichlorobis(ethylenediamine)cobalt(III) ion**							
	$Cd^+ + cis\text{-}Co(en)_2Cl_2^+ \rightarrow Cd^{2+} + cis\text{-}Co(en)_2Cl_2$	2.3×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.11	***trans*-Dichlorobis(ethylenediamine)cobalt(III) ion**							
	$Cd^+ + trans\text{-}Co(en)_2Cl_2^+ \rightarrow Cd^{2+} + trans\text{-}Co(en)_2Cl_2$	2.6×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.12	**Carbonatobis(ethylenediamine)cobalt(III) ion**							
	$Cd^+ + Co(en)_2CO_3^+ \rightarrow Cd^{2+} + Co(en)_2CO_3$	6.7×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.13	***cis*-Bis(ethylenediamine)difluorocobalt(III) ion**							
	$Cd^+ + cis\text{-}Co(en)_2F_2^+ \rightarrow Cd^{2+} + cis\text{-}Co(en)_2F_2$	6.0×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.14	**Aquabis(ethylenediamine)fluorocobalt(III) ion**							
	$Cd^+ + Co(en)_2(H_2O)F^{2+} \rightarrow Cd^{2+} + Co(en)_2(H_2O)F^+$	4.1×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.15	***cis*-Amminechlorobis(ethylenediamine)cobalt(III) ion**							
	$Cd^+ + cis\text{-}Co(en)_2(NH_3)Cl^{2+} \rightarrow Cd^{2+} + cis\text{-}Co(en)_2(NH_3)Cl^+$	1.8×10^9	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.16	***cis*-Nitroamminebis(ethylenediamine)cobalt(III) ion**							
	$Cd^+ + cis\text{-}Co(en)_2(NH_3)NO_2^{2+} \rightarrow Cd^{2+} + cis\text{-}Co(en)_2(NH_3)NO_2^+$	2.8×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.17	**Hexaamminecobalt(III) ion**							
	$Cd^+ + Co(NH_3)_6^{3+} \rightarrow Cd^{2+} + Co(NH_3)_6^{2+}$	1.7×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.18	**Pentaammine(bromo)cobalt(III) ion**							
	$Cd^+ + Co(NH_3)_5Br^{2+} \rightarrow Cd^{2+} + Co(NH_3)_5Br^+$	2.5×10^9	4.0	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.19	**Pentaammine(chloro)cobalt(III) ion**							
	$Cd^+ + Co(NH_3)_5Cl^{2+} \rightarrow Cd^{2+} + Co(NH_3)_5Cl^+$	2.2×10^9	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.20	**Pentaammine(cyano)cobalt(III) ion**							
	$Cd^+ + Co(NH_3)_5(CN)^{2+} \rightarrow Cd^{2+} + Co(NH_3)_5(CN)^+$	9.1×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.21	**Pentaammine(fluoro)cobalt(III) ion**							
	$Cd^+ + Co(NH_3)_5F^{2+} \rightarrow Cd^{2+} + Co(NH_3)_5F^+$	5.4×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.22	**Pentaammine(fumarato)cobalt(III) ion**							
	$Cd^+ + Co(NH_3)_5fumarate^+ \rightarrow Cd^{2+} + Co(NH_3)_5fumarate$	8.3×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
5.1	**Cadmium(I) ions** — Continued							
5.1.23	**Pentaammine(aqua)cobalt(III) ion**							
	$Cd^+ + Co(NH_3)_5(H_2O)^{3+} \rightarrow Cd^{2+} + Co(NH_3)_5(H_2O)^{2+}$	6.2×10^8	4.0	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.24	**Pentaammine(hydroxy)cobalt(III) ion**							
	$Cd^+ + Co(NH_3)_5OH^{2+} \rightarrow Cd^{2+} + Co(NH_3)_5OH^+$	9.0×10^8	7.1	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.25	**Pentaammine(azido)cobalt(III) ion**							
	$Cd^+ + Co(NH_3)_5(N_3)^{2+} \rightarrow Cd^{2+} + Co(NH_3)_5(N_3)^+$	1.4×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.26	**Pentaammine(thiocyanato-*N*)cobalt(III) ion**							
	$Cd^+ + Co(NH_3)_5(NCS)^{2+} \rightarrow Cd^{2+} + Co(NH_3)_5(NCS)^+$	1.3×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.27	**(Acetato)pentaamminecobalt(III) ion**							
	$Cd^+ + Co(NH_3)_5(OAc)^{2+} \rightarrow Cd^{2+} + Co(NH_3)_5(OAc)^+$	9.0×10^7	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) × 10^{-4} mol L^{-1} complex.	690428
5.1.28	**μ-Amido-μ-superoxidotetrakis(ethylenediamine)dicobalt(III) ion**							
	$Cd^+ + NH_2[Co(en)_2]_2(O_2)^{4+} \rightarrow Cd^{2+} + NH_2[Co(en)_2]_2(O_2)^{3+}$	4×10^9				p.r.	D.k. at 310 nm and p.b.k. at 380 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$ and 0.01 mol L^{-1} MeOH; an intermediate Cd(II) adduct forms the peroxo complex with $k = 2.4 \times 10^3$ s^{-1}.	80A069
5.1.29	**Hexaamminebis(μ-hydroxy)-μ-(trifluoroacetato)dicobalt(III) ion**							
	$Cd^+ + CF_3CO_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	4.1×10^8			22	p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} $CdSO_4$ and 0.1 mol L^{-1} *tert*-BuOH.	83A140
5.1.30	**Hexaammine-μ-(difluoroacetato)bis(μ-hydroxy)dicobalt(III) ion**							
	$Cd^+ + CHF_2CO_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	3.6×10^8			22	p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} $CdSO_4$ and 0.1 mol L^{-1} *tert*-BuOH.	83A140
5.1.31	**Hexaammine-μ-(fluoroacetato)bis(μ-hydroxy)dicobalt(III) ion**							
	$Cd^+ + CH_2FCO_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	3.0×10^8			22	p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} $CdSO_4$ and 0.1 mol L^{-1} *tert*-BuOH.	83A140
5.1.32	**μ-Acetatohexaamminebis(μ-hydroxy)dicobalt(III) ion**							
	$Cd^+ + CH_3CO_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	2.2×10^8			22	p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} $CdSO_4$ and 0.1 mol L^{-1} *tert*-BuOH.	83A140
5.1.33	**Tris(2,2'-bipyridine)chromium(III) ion**							
	$Cd^+ + Cr(bpy)_3^{3+} \rightarrow Cd^{2+} + Cr(bpy)_3^{2+}$	1.8×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L^{-1} *tert*-BuOH, 0.01 mol L^{-1} $CdSO_4$ and varied concentrations Cr complex.	87A309
5.1.34	**Tris(1,10-phenanthroline)chromium(III) ion**							
	$Cd^+ + Cr(phen)_3^{3+} \rightarrow Cd^{2+} + Cr(phen)_3^{2+}$	1.7×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L^{-1} *tert*-BuOH, 0.01 mol L^{-1} $CdSO_4$ and varied concentrations Cr complex.	87A309
5.1.35	**Bis(2,2'-bipyridine)oxalatochromium(III)ion**							
	$Cd^+ + Cr(bpy)_2(C_2O_4)^+ \rightarrow Cd^{2+} + Cr(bpy)_2(C_2O_4)$	2.3×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L^{-1} *tert*-BuOH, 0.01 mol L^{-1} $CdSO_4$ and varied concentrations Cr complex.	87A309

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
5.1	**Cadmium(I) ions** — Continued							
5.1.36	**Bis(1,10-phenanthroline)(oxalato)chromium(III) ion**							
	$Cd^+ + Cr(phen)_2(C_2O_4)^+ \rightarrow Cd^{2+} + Cr(phen)_2(C_2O_4)$	2.5×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L^{-1} *tert*-BuOH, 0.01 mol L^{-1} $CdSO_4$ and varied concentrations Cr complex.	87A309
5.1.37	**2,2'-Bipyridinebis(oxalato)chromate(III) ion**							
	$Cd^+ + Cr(bpy)(C_2O_4)_2^- \rightarrow Cd^{2+} + Cr(bpy)(C_2O_4)_2^{2-}$	2.2×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L^{-1} *tert*-BuOH, 0.01 mol L^{-1} $CdSO_4$ and varied concentrations Cr complex.	87A309
5.1.38	**Bis(oxalato)phenanthrolinechromate(III) ion**							
	$Cd^+ + Cr(phen)(C_2O_4)_2^- \rightarrow Cd^{2+} + Cr(phen)(C_2O_4)_2^{2-}$	2.4×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L^{-1} *tert*-BuOH, 0.01 mol L^{-1} $CdSO_4$ and varied concentrations Cr complex.	87A309
5.1.39	**Chromate(VI) ion**							
	$Cd^+ + CrO_4^{2-} \rightarrow$	9.8×10^9		0.02	25	p.r.	D.k. in soln. contg. Cd^{2+}.	761072
5.1.40	**Dichromate(VI) ion**							
	$Cd^+ + Cr_2O_7^{2-} \rightarrow$	1.6×10^{10}		0.02	25	p.r.	D.k. in soln. contg. Cd^{2+}.	761072
5.1.41	**Copper(II) ion**							
	$Cd^+ + Cu^{2+} \rightarrow$	1.2×10^8		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and varied [Cu^{2+}].	68G855
5.1.42	**Hydrogen peroxide**							
	$Cd^+ + H_2O_2 \rightarrow Cd^{2+} + {}^{\bullet}OH + OH^-$	2.2×10^9			25	p.r.	D.k.; $E_a = 9.2$ kJ mol^{-1}.	761072
		1.6×10^9				p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$ and 0.001 mol L^{-1} MeOH.	68G855
5.1.43	**Iodate ion**							
	$Cd^+ + IO_3^- \rightarrow$	2.3×10^9		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and varied [IO_3^-].	68G855
5.1.44	**Permanganate ion**							
	$Cd^+ + MnO_4^- \rightarrow Cd^{2+} + MnO_4^{2-}$	7.8×10^9	7.0		~22	p.r.	D.k. in Ar-satd. soln. contg. ~1 mol L^{-1} *tert*-BuOH.	731104
		1.3×10^{10}			~20	p.r.	D.k. in deaerated soln. contg. 0.64, 1.35, or 2.25×10^{-3} mol L^{-1} Cd^{2+} and 1×10^{-5} mol L^{-1} MnO_4^-.	650385
5.1.45	**Nitrite ion**							
	$Cd^+ + NO_2^- \rightarrow$	2.0×10^9		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and varied [NO_2^-]; studied at 3-90 °C, E_a = 12.5 kJ mol^{-1} [701228].	68G855
5.1.46	**Nitrate ion**							
	$Cd^+ + NO_3^- \rightarrow$	3.5×10^8		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and varied [NO_3^-].	68G855
5.1.47	**Nitrous oxide**							
	$Cd^+ + N_2O \rightarrow CdO^+ + N_2$	3.5×10^6			25	p.r.	D.k. in N_2O-satd. soln.; $E_a = 45.6$ kJ mol^{-1}.	761072
		$\leq 2 \times 10^6$				p.r.	D.k. at 313 nm in soln. contg. 1 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and varied [N_2O].	68G855
5.1.48	**Oxygen**							
	$Cd^+ + O_2 \rightarrow$	3.6×10^9			25	p.r.	D.k. in O_2-satd. soln. contg. 0.1 mol L^{-1} Cd^{2+} and 0.1 mol L^{-1} formate ion.	761072

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
5.1	**Cadmium(I) ions** — Continued							
5.1.48	**Oxygen** — Continued							
		2.4×10^9		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $CdSO_4$, 0.001 mol L^{-1} MeOH and varied [O_2].	68G855
		3.3×10^9			18	p.r.	D.k.	66A001
5.1.49	**Lead(II) ions**							
	$Cd^+ + Pb^{2+} \rightarrow$	7.5×10^8				p.r.	D.k.	66A001
5.1.50	**Hexaamminerutheniumm(III) ion**							
	$Cd^+ + Ru(NH_3)_6^{3+} \rightarrow Cd^{2+} + Ru(NH_3)_6^{2+}$	2.2×10^9		0.08		p.r.	D.k. in soln. contg. 0.02 mol L^{-1} $CdSO_4$ and (0.5-10) × 10^{-4} mol L^{-1} $Ru(NH_3)_6^{3+}$.	701229
5.1.51	**Tris(2,2'-bipyridine)ruthenium(II) ion**							
	$Cd^+ + Ru(bpy)_3^{2+} \rightarrow Cd^{2+} + Ru(bpy)_3^{+}$	6.1×10^8	5.9		24	p.r.	P.b.k. at 510 nm in soln. contg. 4.0 × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and 0.03 mol L^{-1} $CdSO_4$.	78A002 771093
5.1.52	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$Cd^+ + Ru(bpy)_3^{3+} \rightarrow Cd^{2+} + Ru(bpy)_3^{2+}$	2.8×10^9	4.6		24	p.r.	P.b.k. at 455 nm in Ar-satd. soln. contg. (2-8) × 10^{-4} mol L^{-1} $Ru(bpy)_3^{3+}$, 0.5 mol L^{-1} *tert*-BuOH and 0.5 mol L^{-1} $CdSO_4$.	78A070
5.1.53	**Peroxodisulfate ion**							
	$Cd^+ + S_2O_8^{2-} \rightarrow Cd^{2+} + SO_4^{\cdot -} + SO_4^{2-}$	2.4×10^9		0.02	25	p.r.	D.k. in deaerated soln. contg. 0.01 mol L^{-1} $CdSO_4$ and (0.5-10) × 10^{-4} mol L^{-1} $S_2O_8^{2-}$.	761072
5.1.54	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) ion**							
	$Cd^+ + ZnTPPS^{4-} \rightarrow [ZnTPPS]^{\cdot 5-} + Cd^{2+}$	1×10^{10}				p.r.	P.b.k. in deaerated soln.	82A279
5.1.55	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) ion, triplet state**							
	$Cd^+ + {}^3(ZnTPPS^{4-})^* \rightarrow [ZnTPPS]^{\cdot 5-} + Cd^{2+}$	1×10^{10}				p.r.	P.b.k. in deaerated soln. Combined pulse radiolysis and photolysis.	82A279
5.1.56	**Acetophenone**							
	$Cd^+ + C_6H_5COCH_3 \rightarrow Cd^{2+} + C_6H_5\dot{C}O^-CH_3$	2.5×10^8				p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, $Cd(ClO_4)_2$ and acetophenone.	93A362
5.1.57	**9,10-Anthraquinone**							
	$Cd^+ + AQ \rightarrow Cd^{2+} + [AQ]^{\cdot -}$	1.0×10^9	7.0		~22	p.r.	P.b.k. in Ar-satd. soln. contg. $CdSO_4$ and ~1 mol L^{-1} *tert*-BuOH.	731104
5.1.58	**Benzil**							
	$Cd^+ + C_6H_5COCOC_6H_5 \rightarrow Cd^{2+} + C_6H_5\dot{C}OCO^-C_6H_5$	2.1×10^9				p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, $Cd(ClO_4)_2$ and benzil.	93A362
5.1.59	**Benzophenone**							
	$Cd^+ + (C_6H_5)_2CO \rightarrow Cd^{2+} + (C_6H_5)_2\dot{C}O^-$	1.2×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, $Cd(ClO_4)_2$ and benzophenone.	93A362
		1.0×10^9	7.0			p.r.	P.b.k. in soln. contg. 5 × 10^{-3} mol L^{-1} $CdSO_4$, 5 × 10^{-5} mol L^{-1} benzophenone, ~1 mol L^{-1} *tert*-BuOH and 0.001 mol L^{-1} phosphate.	751032
5.1.60	**1,4-Benzoquinone**							
	$Cd^+ + Q \rightarrow Cd^{2+} + Q^{\cdot -}$	3.9×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, $Cd(ClO_4)_2$ and benzoquinone.	93A362

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
5.1	**Cadmium(I) ions** — Continued							
5.1.60	**1,4-Benzoquinone** — Continued							
		4.1×10^9	5.4		25	p.r.	P.b.k. at 430 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 1 mol L^{-1} *tert*-BuOH and (2-4) × 10^{-5} mol L^{-1} benzoquinone.	761134
		4.4×10^9	7.0			p.r.	P.b.k. in soln. contg. 5 × 10^{-3} mol L^{-1} $CdSO_4$, 5 × 10^{-5} mol L^{-1} benzoquinone, ~1 mol L^{-1} *tert*-BuOH and 0.001 mol L^{-1} phosphate.	751032
5.1.61	**4,4'-Dimethoxybenzophenone**							
	$Cd^+ + (4\text{-}CH_3OC_6H_4)_2CO \rightarrow Cd^{2+} + (4\text{-}CH_3OC_6H_4)_2\dot{C}O^-$	8×10^8				p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, $Cd(ClO_4)_2$ and 4,4'-dimethoxybenzophenone.	93A362
5.1.62	**Duroquinone**							
	$Cd^+ + DQ \rightarrow Cd^{2+} + [DQ]^{\cdot -}$	2.0×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, $Cd(ClO_4)_2$ and duroquinone.	93A362
5.1.63	**9-Fluorenone**							
	$Cd^+ + C_{13}H_8O \rightarrow Cd^{2+} + [C_{13}H_8O]^{\cdot -}$	1.8×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, $Cd(ClO_4)_2$ and fluorenone.	93A362
5.1.64	**2-Hydroxy-1,4-naphthoquinone**							
	$Cd^+ + 2\text{-}(OH)NQ \rightarrow Cd^{2+} + [2\text{-}(OH)NQ]^{\cdot -}$	3.6×10^9	7.0		~22	p.r.	P.b.k. in Ar-satd. soln. contg. $CdSO_4$ and ~1 mol L^{-1} *tert*-BuOH.	731104
5.1.65	**2-Methyl-1,4-naphthoquinone**							
	$Cd^+ + 2\text{-}CH_3NQ \rightarrow Cd^{2+} + [2\text{-}CH_3NQ]^{\cdot -}$	4.7×10^9	7.0		~22	p.r.	P.b.k. in soln. contg. 5 × 10^{-3} mol L^{-1} $CdSO_4$, 5 × 10^{-5} mol L^{-1} 2-methylnaphthoquinone, ~1 mol L^{-1} *tert*-BuOH and 0.001 mol L^{-1} phosphate.	731104 731047 751032
5.1.66	**Nicotinamide adenine dinucleotide**							
	$Cd^+ + NAD^+ \rightarrow Cd^{2+} + NAD^{\cdot}$	2.9×10^9	7.0		~22	p.r.	P.b.k. in Ar-satd. soln. contg. $CdSO_4$ and ~1 mol L^{-1} *tert*-BuOH.	731104
5.1.67	**1,4-Naphthoquinone-2-sulfonate ion**							
	$Cd^+ + 2\text{-}SO_3NQ^- \rightarrow Cd^{2+} + [2\text{-}SO_3NQ]^{\cdot 2-}$	7.4×10^9	7.0		~22	p.r.	P.b.k. in Ar-satd. soln. contg. $CdSO_4$ and ~1 mol L^{-1} *tert*-BuOH.	731104
5.1.68	***N,N*-Dimethyl-4-nitrosoaniline**							
	$Cd^+ + 4\text{-}Me_2NC_6H_4NO \rightarrow$	$\sim 1.4 \times 10^{10}$				p.r.	D.k. at 440 nm in Ar-satd. soln. contg. Cd^{2+}.	680066
5.1.69	**Riboflavine**							
	$Cd^+ + RF \rightarrow Cd^{2+} + [RF]^{\cdot -}$	5.1×10^9	7.0		~22	p.r.	P.b.k. in Ar-satd. soln. contg. $CdSO_4$ and ~1 mol L^{-1} *tert*-BuOH.	731104
5.2	**1,4,10-Trioxa-7,13-diazacyclopentadecanecadmium(I) ion**							
5.2.1	**Benzil**							
	$Cd^+\,21 + C_6H_5COCOC_6H_5 \rightarrow C_6H_5COCO^-C_6H_5 + Cd^{2+}\,21$	2.2×10^9				p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, coronand (21), $Cd(ClO_4)_2$ and benzil.	93A362
5.2.2	**Benzophenone**							
	$Cd^+\,21 + (C_6H_5)_2CO \rightarrow Cd^{2+}\,21 + (C_6H_5)_2\dot{C}O^-$	1.3×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, coronand (21), $Cd(ClO_4)_2$ and benzophenone.	93A362

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
5.2	**1,4,10-Trioxa-7,13-diazacyclopentadecanecadmium(I) ion** — Continued							
5.2.3	**4,4'-Dimethoxybenzophenone**							
	Cd^+ 21 + $(4\text{-}CH_3OC_6H_4)_2CO \rightarrow (4\text{-}CH_3OC_6H_4)_2\dot{C}O^- + Cd^{2+}$ 21	8×10^8				p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, coronand (21), $Cd(ClO_4)_2$ and 4,4'-dimethoxybenzophenone.	93A362
5.2.4	**Duroquinone**							
	Cd^+ 21 + DQ → Cd^{2+} 21 + $[DQ]^{\cdot-}$	2.0×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, coronand (21), $Cd(ClO_4)_2$ and duroquinone.	93A362
5.3	**1,4,10,13-Tetraoxa-7,16-diazacycloctadecanecadmium(I) ion**							
5.3.1	**Acetophenone**							
	Cd^+ 22 + $C_6H_5COCH_3 \rightarrow Cd^{2+}$ 22 + $C_6H_5\dot{C}O^-CH_3$	$\sim 4 \times 10^7$				p.r.	C.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, coronand (22), $Cd(ClO_4)_2$ and acetophenone.	93A362
5.3.2	**Benzil**							
	Cd^+ 22 + $C_6H_5COCOC_6H_5 \rightarrow C_6H_5\dot{C}O^-C_6H_5 + Cd^{2+}$ 22	1.6×10^9				p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, coronand (22), $Cd(ClO_4)_2$ and benzil.	93A362
5.3.3	**Benzophenone**							
	Cd^+ 22 + $(C_6H_5)_2CO \rightarrow Cd^{2+}$ 22 + $(C_6H_5)_2\dot{C}O^-$	1.1×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, coronand (22), $Cd(ClO_4)_2$ and benzophenone.	93A362
5.3.4	**4,4'-Dimethoxybenzophenone**							
	Cd^+ 22 + $(4\text{-}CH_3OC_6H_4)_2CO \rightarrow (4\text{-}CH_3OC_6H_4)_2\dot{C}O^- + Cd^{2+}$ 22	4.7×10^8				p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, coronand (22), $Cd(ClO_4)_2$ and 4,4'-dimethoxybenzophenone.	93A362
5.3.5	**Duroquinone**							
	Cd^+ 22 + DQ → Cd^{2+} 22 + $[DQ]^{\cdot-}$	2.0×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, coronand (22), $Cd(ClO_4)_2$ and duroquinone.	93A362
5.3.6	**9-Fluorenone**							
	Cd^+ 22 + $C_{13}H_8O \rightarrow Cd^{2+}$ 22 + $[C_{13}H_8O]^{\cdot-}$	1.9×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, coronand (22), $Cd(ClO_4)_2$ and fluorenone.	93A362
5.4	**4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]tricosanecadmium(I) ion**							
5.4.1	**Benzophenone**							
	Cd^+ 221 + $(C_6H_5)_2CO \rightarrow Cd^{2+}$ 221 + $(C_6H_5)_2\dot{C}O^-$	2.7×10^8				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, cryptand (221), $Cd(ClO_4)_2$ and benzophenone.	93A362
5.4.2	**4,4'-Dimethoxybenzophenone**							
	Cd^+ 221 + $(4\text{-}CH_3OC_6H_4)_2CO \rightarrow (4\text{-}CH_3OC_6H_4)_2\dot{C}O^- + Cd^{2+}$ 221	2.5×10^8				p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, cryptand (221), $Cd(ClO_4)_2$ and 4,4'-dimethoxybenzophenone.	93A362
5.4.3	**Duroquinone**							
	Cd^+ 221 + DQ → Cd^{2+} 221 + $[DQ]^{\cdot-}$	1.8×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, cryptand (221), $Cd(ClO_4)_2$ and duroquinone.	93A362
5.4.4	**9-Fluorenone**							
	Cd^+ 221 + $C_{13}H_8O \rightarrow Cd^{2+}$ 221 + $[C_{13}H_8O]^{\cdot-}$	1.8×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, cryptand (221), $Cd(ClO_4)_2$ and fluorenone.	93A362

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
5.5	**4,7,13,16,21,24-Hexaoxa-1,10-diazabicyclo[8.8.8]hexacosanecadmium(I) ion**							
5.5.1	**Benzophenone**							
	Cd^+ 222 + $(C_6H_5)_2CO \rightarrow Cd^{2+}$ 222 + $(C_6H_5)_2\dot{C}O^-$	1.3×10^8				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, cryptand (222), $Cd(ClO_4)_2$ and benzophenone.	93A362
5.5.2	**Duroquinone**							
	Cd^+ 222 + DQ $\rightarrow Cd^{2+}$ 222 + $[DQ]^{\cdot-}$	1.0×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, cryptand (222), $Cd(ClO_4)_2$ and duroquinone.	93A362
5.5.3	**9-Fluorenone**							
	Cd^+ 222 + $C_{13}H_8O \rightarrow Cd^{2+}$ 222 + $[C_{13}H_8O]^{\cdot-}$	1.1×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, cryptand (222), $Cd(ClO_4)_2$ and fluorenone.	93A362
5.6	**1,4,8,11-Tetrazacyclotetradecanecadmium(I) ion**							
5.6.1	**Nitrous oxide**							
	$Cd(cyclam)^+ + N_2O \rightarrow$	4.5×10^7	5-7		23	p.r.	D.k. in 0-36% N_2O-satd. soln. contg. 0.4 mol L^{-1} *tert*-BuOH and 0.01 mol L^{-1} $Cd(cyclam)^{2+}$.	80A380
5.7	**Ethylenediaminetetraacetatocadmate(I) ion**							
5.7.1	**Ethylenediaminetetraacetatocadmate(I) ion**							
	$CdEDTA^{3-} + CdEDTA^{3-} \rightarrow$	4×10^7	11.3	0.16		p.r.	D.k at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$ and 0.02 mol L^{-1} EDTA.	701228
5.7.2	**Bromate ion**							
	$CdEDTA^{3-} + BrO_3^- \rightarrow$	8.9×10^6	11.3	0.16		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} EDTA and (5-20) × 10^{-5} mol L^{-1} BrO_3^-; studied at 3-90 °C, E_a = 4.6 kJ mol^{-1}.	701228
5.7.3	**Iodate ion**							
	$CdEDTA^{3-} + IO_3^- \rightarrow$	2.7×10^8	11.3	0.16		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} EDTA and (5-20) × 10^{-5} mol L^{-1} IO_3^-.	701228
5.7.4	**Hydrogen peroxide**							
	$CdEDTA^{3-} + H_2O_2 \rightarrow CdEDTA^{2-} + {}^{\cdot}OH + OH^-$	2×10^9	11.5			p.r.	D.k. in soln. contg. $CdEDTA^{2-}$. Value obtained by computer fit.	80A072
5.7.5	**Nitrite ion**							
	$CdEDTA^{3-} + NO_2^- \rightarrow$	3.2×10^6	11.3	0.16		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} EDTA and (5-20) × 10^{-5} mol L^{-1} NO_2^-; studied at 3-90 °C; E_a = 8.4 kJ mol^{-1}.	701228
5.7.6	**Nitrate ion**							
	$CdEDTA^{3-} + NO_3^- \rightarrow$	1.7×10^7	11.3	0.16		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} EDTA and (5-20) × 10^{-5} mol L^{-1} NO_3^-.	701228
5.7.7	**Ethylenediaminetetraacetatoplumbate(II) ion**							
	$CdEDTA^{3-} + PbEDTA^{2-} \rightarrow$	4×10^6	11.5	0.25		p.r.	D.k.; value obtained by computer fit.	80A072
5.8	**Ethylenediaminecadmium(I) ion**							
5.8.1	**Bromate ion**							
	$Cd(en)_n^+ + BrO_3^- \rightarrow$	1.3×10^8	11.4	0.64		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} $enSO_4$ and (5-20) × 10^{-5} mol L^{-1} BrO_3^-.	701228

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
5.8	**Ethylenediaminecadmium(I) ion** — Continued							
5.8.2	**Iodate ion**							
	$Cd(en)_n^+ + IO_3^- \rightarrow$	2.5×10^9	11.4	0.64		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} $enSO_4$ and (5-20) × 10^{-5} mol L^{-1} IO_3^-.	701228
5.8.3	**Nitrite ion**							
	$Cd(en)_n^+ + NO_2^- \rightarrow$	1.1×10^9	11.4	0.64		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} $enSO_4$ and (5-20) × 10^{-5} mol L^{-1} NO_2^-.	701228
5.8.4	**Nitrate ion**							
	$Cd(en)_n^+ + NO_3^- \rightarrow$	4.5×10^8	11.4	0.64		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} $enSO_4$ and (5-20) × 10^{-5} mol L^{-1} NO_3^-.	701228
5.9	**Glycinatocadmium(I) ion**							
5.9.1	**Bromate ion**							
	$CdGly + BrO_3^- \rightarrow$	6.1×10^7	10.5	0.21		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} glycine and (5-20) × 10^{-5} mol L^{-1} BrO_3^-.	701228
5.9.2	**Iodate ion**							
	$CdGly + IO_3^- \rightarrow$	1.8×10^9	10.5	0.21		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} glycine and (5-20) × 10^{-5} mol L^{-1} IO_3^-.	701228
5.9.3	**Nitrite ion**							
	$CdGly + NO_2^- \rightarrow$	8.5×10^8	10.5	0.21		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} glycine and (5-20) × 10^{-5} mol L^{-1} NO_2^-.	701228
5.9.4	**Nitrate ion**							
	$CdGly + NO_3^- \rightarrow$	2.4×10^8	10.5	0.21		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} glycine and (5-20) × 10^{-5} mol L^{-1} NO_3^-.	701228
5.10	**Nitrilotriacetatocadmium(I) ion**							
5.10.1	**Nitrilotriacetatocadmium(I) ion**							
	$CdNTA^{2-} + CdNTA^{2-} \rightarrow$	8×10^8	10.7	0.10		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} NTA.	701228
5.10.2	**Bromate ion**							
	$CdNTA^{2-} + BrO_3^- \rightarrow$	1.0×10^7	10.7	0.10		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} NTA and (5-20) × 10^{-5} mol L^{-1} BrO_3^-.	701228
5.10.3	**Iodate ion**							
	$CdNTA^{2-} + IO_3^- \rightarrow$	6.1×10^8	10.7	0.10		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} NTA and (5-20) × 10^{-5} mol L^{-1} IO_3^-.	701228
5.10.4	**Nitrite ion**							
	$CdNTA^{2-} + NO_2^- \rightarrow$	4.2×10^7	10.7	0.10		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} NTA and (5-20) × 10^{-5} mol L^{-1} NO_2^-.	701228
5.10.5	**Nitrate ion**							
	$CdNTA^{2-} + NO_3^- \rightarrow$	4.5×10^7	10.7	0.10		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L^{-1} $CdSO_4$, 0.02 mol L^{-1} NTA and (5-20) × 10^{-5} mol L^{-1} NO_3^-.	701228

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
5.11	**1-Hydroxyethylcadmium(II) ion**							
5.11.1	**Water**							
	$CdCHOHCH_3^+ + H_2O \rightarrow Cd^{2+} + EtOH + OH^-$	$2.6 \times 10^2 s^{-1}$				p.r.	Condy. change in soln. contg. 5×10^{-4} mol L^{-1} $CdSO_4$ and EtOH.	751064
5.12	**1-Hydroxy-1-methylethylcadmium(II) ion**							
5.12.1	**Water**							
	$CdC(CH_3)_2OH^+ + H_2O \rightarrow Cd^{2+} + 2\text{-PrOH} + OH^-$	1.6×10^2 s^{-1}				p.r.	Condy. change in soln. contg. 5×10^{-4} mol L^{-1} $CdSO_4$ and 2-PrOH.	751064
5.13	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocadmate(II) radical anion**							
5.13.1	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocadmate(II) radical anion**							
	$[CdTPPS]^{\cdot 5-} + [CdTPPS]^{\cdot 5-} \rightarrow$	5.2×10^8	12			p.r.	D.k. in N_2-satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and $CdTPPS^{4-}$; reaction suggested to be disproportionation; ΔG = 29 kJ mol^{-1}.	83C026

TABLE 6. Rate constants for cobalt transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.1	**Cobalt(I) ion**							
6.1.1	**Dibromine radical ion**							
	$Co^+ + Br_2^{\cdot-} \rightarrow 2\,Br^- + Co^{2+}$	1.0×10^{10}				f.p./pi	D.k. in deaerated soln. contg. 0.001 mol L^{-1} NaBr and 0.01-0.05 mol L^{-1} Co^{2+}.	707726
6.1.2	**Bromate ion**							
	$Co^+ + BrO_3^- \rightarrow$	4.8×10^9 7.1×10^9		0.019 →0	25	p.r.	D.k. at 320 nm in deaerated soln. contg. 0.001-0.01 mol L^{-1} Co^{2+}, 0.1 mol L^{-1} *tert*-BuOH, 2.5×10^{-5} mol L^{-1} BrO_3^- and 0-0.1 mol L^{-1} $NaClO_4$.	761072
6.1.3	**Cobalt(I) ion**							
	$Co^+ + Co^+ \rightarrow$	$\leq 2 \times 10^9$		0.019	25	p.r.	D.k. at 370 nm in soln. contg. 0.1 mol L^{-1} Co^{2+} and 0.1 mol L^{-1} MeOH, 2-PrOH or *tert*-BuOH.	751027
6.1.4	**Tris(ethylenediamine)cobalt(III) ion**							
	$Co^+ + Co(en)_3^{3+} \rightarrow Co^{2+} + Co(en)_3^{2+}$	2.9×10^8		→0	29	p.r.	D.k. at 320 nm in deaerated soln. contg. 0.01-0.05 mol L^{-1} $CoSO_4$, 0.001 mol L^{-1} MeOH and (0.5-1.0) × 10^{-4} mol L^{-1} Co(III) complex.	761136
6.1.5	**Hexaamminecobalt(III) ion**							
	$Co^+ + Co(NH_3)_6^{3+} \rightarrow Co^{2+} + Co(NH_3)_6^{3+}$	3.3×10^8		→0	29	p.r.	D.k. in deaerated soln. contg. 0.01-0.05 mol L^{-1} $CoSO_4$, 0.001 mol L^{-1} MeOH and (0.5-1.0) × 10^{-4} mol L^{-1} Co(III) complex.	761136
6.1.6	**Pentaammine(aqua)cobalt(III) ion**							
	$Co^+ + Co(NH_3)_5(H_2O)^{3+} \rightarrow Co^{2+} + Co(NH_3)_5(H_2O)^{2+}$	3.7×10^8		→0	29	p.r.	D.k. in deaerated soln. contg. 0.01-0.05 mol L^{-1} $CoSO_4$, 0.001 mol L^{-1} MeOH and (0.5-1.0) × 10^{-4} mol L^{-1} Co(III) complex.	761136
6.1.7	**Pentaammine(fluoro)cobalt(III) ion**							
	$Co^+ + Co(NH_3)_5F^{2+} \rightarrow Co^{2+} + Co(NH_3)_5F^+$	6.8×10^8		→0	29	p.r.	D.k. in deaerated soln. contg. 0.01-0.05 mol L^{-1} $CoSO_4$, 0.001 mol L^{-1} MeOH and (0.5-1.0) × 10^{-4} mol L^{-1} Co(III) complex.	761136
6.1.8	**Pentaammine(chloro)cobalt(III) ion**							
	$Co^+ + Co(NH_3)_5Cl^{2+} \rightarrow Co^{2+} + Co(NH_3)_5Cl^+$	8.5×10^8		→0	29	p.r.	D.k. in deaerated soln. contg. 0.01-0.05 mol L^{-1} $CoSO_4$, 0.001 mol L^{-1} MeOH and (0.5-1.0) × 10^{-4} mol L^{-1} Co(III) complex.	761136
6.1.9	**Pentaammine(bromo)cobalt(III) ion**							
	$Co^+ + Co(NH_3)_5Br^{2+} \rightarrow Co^{2+} + Co(NH_3)_5Br^+$	1.1×10^9		→0	29	p.r.	D.k. in deaerated soln. contg. 0.01-0.05 mol L^{-1} $CoSO_4$, 0.001 mol L^{-1} MeOH and (0.5-1.0) × 10^{-4} mol L^{-1} Co(III) complex.	761136
6.1.10	**Tetraamminediaquacobalt(III) ion**							
	$Co^+ + Co(NH_3)_4(H_2O)_2^{3+} \rightarrow Co^{2+} + Co(NH_3)_4(H_2O)_2^{2+}$	4.4×10^8		→0	29	p.r.	D.k. in deaerated soln. contg. 0.01-0.05 mol L^{-1} $CoSO_4$, 0.001 mol L^{-1} MeOH and (0.5-1.0) × 10^{-4} mol L^{-1} Co(III) complex.	761136
6.1.11	**Trioxalatocobaltate(III) ion**							
	$Co^+ + Co(C_2O_4)_3^{3-} \rightarrow Co^{2+} + Co(C_2O_4)_3^{4-}$	1.8×10^{10}		→0	29	p.r.	D.k. in deaerated soln. contg. 0.01-0.05 mol L^{-1} $CoSO_4$, 0.001 mol L^{-1} MeOH and (0.5-1.0) × 10^{-4} mol L^{-1} Co(III) complex.	761136

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.1	**Cobalt(I) ion** — Continued							
6.1.12	**Trinitrotrisamminecobalt(III)**							
	$Co^+ + Co(NH_3)_3(NO_2)_3 \rightarrow Co^{2+} + Co(NH_3)_3(NO_2)_3^-$	7.6×10^9		→0	29	p.r.	D.k. in deaerated soln. contg. 0.01-0.05 mol L^{-1} $CoSO_4$, 0.001 mol L^{-1} MeOH and (0.5-1.0) × 10^{-4} mol L^{-1} Co(III) complex.	761136
6.1.13	**2,2'-Bipyridinecobalt(II) ion**							
	$Co^+ + Co(bpy)^{2+} \rightarrow Co^{2+} + Co(bpy)^+$	1.2×10^9		0.2	25	p.r.	D.k. in deaerated soln. contg. *tert*-BuOH, Co^{2+} and 2,2'-bipyridine.	85A034
6.1.14	**4,4'-Dimethyl-2,2'-bipyridinecobalt(II) ion**							
	$Co^+ + Co(4,4'\text{-}Me_2bpy)^{2+} \rightarrow Co^{2+} + Co(4,4'\text{-}Me_2bpy)^+$	1.0×10^9		0.2	25	p.r.	D.k. in deaerated soln. contg. *tert*-BuOH, Co^{2+} and 4,4'-dimethyl-2,2'-bipyridine.	85A034
6.1.15	**Copper(II) ion**							
	$Co^+ + Cu^{2+} \rightarrow$	4.1×10^8		0.019	25	p.r.	D.k. at 320 nm in soln. contg. 0.01 mol L^{-1} Co^{2+} and 0.1 mol L^{-1} *tert*-BuOH.	761072
6.1.16	**Hydrogen peroxide**							
	$Co^+ + H_2O_2 \rightarrow Co^{2+} + {}^{\bullet}OH + OH^-$	1.6×10^9			25	p.r.	D.k.; studied at 1-30 °C, E_a = 13.0 kJ mol^{-1}.	761072
6.1.17	**Iodate ion**							
	$Co^+ + IO_3^- \rightarrow$	4.3×10^9		0.019	25	p.r.	D.k. at 320 nm in soln. contg. 0.01 mol L^{-1} Co^{2+} and 0.1 mol L^{-1} *tert*-BuOH.	761072
6.1.18	**Permanganate ion**							
	$Co^+ + MnO_4^- \rightarrow$	1.0×10^{10}		~0.004	20	p.r.	D.k. in soln. contg. 0.2, 0.72 or 1.38 × 10^{-3} mol L^{-1} Co^{2+} and 10^{-5} mol L^{-1} MnO_4^-.	650385
6.1.19	**Nitrous oxide**							
	$Co^+ + N_2O \rightarrow CoO^+ + N_2$	1.0×10^9			25	p.r.	D.k. at 320 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} Co^{2+}.	761072
6.1.20	**Nitrate ion**							
	$Co^+ + NO_3^- \rightarrow$	1.8×10^9		0.019	25	p.r.	D.k. at 320 nm in soln. contg. 0.01 mol L^{-1} Co^{2+} and 0.1 mol L^{-1} *tert*-BuOH.	761072
6.1.21	**Oxygen**							
	$Co^+ + O_2 \rightarrow$	6.0×10^9			25	p.r.	D.k. at 320 nm in O_2-satd. soln. contg. 0.1 mol L^{-1} Co^{2+} and 0.1 mol L^{-1} formate. Evidence indicates product may be CoO_2^+.	761072
6.1.22	**Hydroxyl**							
	$Co^+ + {}^{\bullet}OH \rightarrow$	~8 × 10^9			25	p.r.	Estimated from decay of Co^+ in absence of ${}^{\bullet}OH$ scavengers.	751027
6.1.23	**Peroxodisulfate ion**							
	$Co^+ + S_2O_8^{2-} \rightarrow Co^{2+} + SO_4^{\bullet-} + SO_4^{2-}$	2.8×10^9		0.019	25	p.r.	D.k. in deaerated soln. contg. 0.01 mol L^{-1} Co^{2+} and (0.5-10) × 10^{-4} mol L^{-1} $S_2O_8^{2-}$.	761072
6.1.24	**Tris(2,2'-bipyridine)ruthenium(II) ion**							
	$Co^+ + Ru(bpy)_3^{2+} \rightarrow Co^{2+} + Ru(bpy)_3^+$	1.8×10^9	6.9		24	p.r.	P.b.k. at 510 nm in soln. contg. 1.6 or 4.0 × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.0025 mol L^{-1} $CoSO_4$ and 0.17 mol L^{-1} *tert*-BuOH.	78A002 771093
6.1.25	**Allyl alcohol**							
	$Co^+ + H_2C{=}CHCH_2OH \rightarrow Co(\text{allyl alcohol})^+$	~10^8			25	p.r.	D.k. at 320 nm in deaerated soln. contg. 0.01 mol L^{-1} Co^{2+}, 0.0012 mol L^{-1} allyl alcohol and 1.24 mol L^{-1} MeOH.	761072

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.1	**Cobalt(I) ion** — Continued							
6.1.26	**9,10-Anthraquinone**							
	$Co^{+} + AQ \rightarrow Co^{2+} + [AQ]^{\cdot -}$	1.1×10^{9}	7.0		~22	p.r.	P.b.k. at ~400 nm in deaerated soln. contg. ~1 mol L^{-1} *tert*-BuOH and ~5 × 10^{-5} mol L^{-1} AQ.	731104
6.1.27	**Benzophenone**							
	$Co^{+} + (C_6H_5)_2CO \rightarrow Co^{2+} + (C_6H_5)_2\dot{C}O^{-}$	2.5×10^{9}	7.0			p.r.	P.b.k. in soln. contg. ~1 mol L^{-1} *tert*-BuOH and ~5 × 10^{-5} mol L^{-1} benzophenone.	751032
6.1.28	**1,4-Benzoquinone**							
	$Co^{+} + Q \rightarrow Co^{2+} + Q^{\cdot -}$	5.1×10^{9}	4.7		25	p.r.	P.b.k. at 430 nm in deaerated soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.1 mol L^{-1} $CoSO_4$ and (2-4) × 10^{-5} mol L^{-1} Q.	761134
		4.8×10^{9}	7.0			p.r.	P.b.k. in soln. contg. ~1 mol L^{-1} *tert*-BuOH and ~5 × 10^{-5} mol L^{-1} Q.	751032
6.1.29	**2-Methyl-1,4-naphthoquinone**							
	$Co^{+} + 2\text{-}CH_3NQ \rightarrow Co^{2+} + [2\text{-}CH_3NQ]^{\cdot -}$	4.1×10^{9}	7.0, 7.3		~22	p.r.	P.b.k. at ~400 nm in deaerated soln. contg. ~1 mol L^{-1} *tert*-BuOH and ~5 × 10^{-5} mol L^{-1} 2-CH_3-NQ.	751032 731047 731104
6.1.30	**1,4-Naphthoquinone-2-sulfonate ion**							
	$Co^{+} + 2\text{-}SO_3NQ^{-} \rightarrow Co^{2+} + [2\text{-}SO_3NQ]^{\cdot 2-}$	6.8×10^{9}	7.0		~22	p.r.	P.b.k. at ~400 nm in deaerated soln. contg. ~1 mol L^{-1} *tert*-BuOH and ~5 × 10^{-5} mol L^{-1} 2-SO_3NQ^{-}.	731104
6.1.31	**Riboflavine**							
	$Co^{+} + RF \rightarrow Co^{2+} + [RF]^{\cdot -}$	2.6×10^{9}	7.0		~22	p.r.	P.b.k. at 560 nm in deaerated soln. contg. ~1 mol L^{-1} *tert*-BuOH and ~10^{-4} mol L^{-1} RF.	731104
6.2	**Pentakis(cyano-*C*)cobaltate(I) ion**							
6.2.1	**Water**							
	$Co(CN)_5^{4-} + H_2O \rightarrow Co(CN)_5(H)^{3-} + OH^{-}$	1.1×10^{5} s^{-1}	~13		20	p.r.	D.k. at 280-330 nm in soln. contg. 100 atm (0.1 mol L^{-1}) H_2; $k = 1.9 \times 10^{4}$ s^{-1} in D_2O supports proton transfer mechanism.	710097
6.3	**Nitrilotriacetatocobaltate(I) ion**							
6.3.1	**Nitrilotriacetatocobaltate(I) ion**							
	$CoNTA^{2-} + CoNTA^{2-} \rightarrow [CoNTA]_2^{4-}$	2.8×10^{8}	7			p.r.	D.k. at 360 nm in deaerated soln. contg. $CoNTA^{-}$, *tert*-BuOH and 0.001 mol L^{-1} phosphate.	79A255
6.4	**2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(I) ion**							
6.4.1	**Tris(2,2'-bipyridine)cobalt(III) ion**							
	$Co(Me_4tetraeneN_4)^{+} + Co(bpy)_3^{3+} \rightarrow$	8.5×10^{7}	6.5	0.002		p.r.	D.k. at 700 nm in soln. contg. 1 mol L^{-1} *tert*-BuOH, 5 × 10^{-4} mol L^{-1} CoL^{2+} and (2.5-5.0) × 10^{-5} mol L^{-1} $Co(bpy)_3^{3+}$.	761001
6.4.2	**Tris(2,2'-bipyridine)chromium(III) ion**							
	$Co(Me_4tetraeneN_4)^{+} + Cr(bpy)_3^{3+} \rightarrow$	1.6×10^{8}	6.5	0.002		p.r.	D.k. at 700 nm in soln. contg. 1 mol L^{-1} *tert*-BuOH, 5 × 10^{-4} mol L^{-1} CoL^{2+} and (2.5-5.0) × 10^{-5} mol L^{-1} $Cr(bpy)_3^{3+}$.	761001

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.4	**2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(I) ion** — Continued							
6.4.3	**Hydrogen ion**							
	$Co(Me_4tetraeneN_4)^+ + H^+ \rightarrow Co(Me_4tetraeneN_4)(H)^{2+}$	1.6×10^5	0.25-1.25	0.06-0.6		p.r.	D.k. at 700 nm in Ar-satd. soln. contg. 2 mol L^{-1} 2-PrOH and 0.001 mol L^{-1} CoL^{2+}.	761001
6.4.4	**Oxygen**							
	$Co(Me_4tetraeneN_4)^+ + O_2 \rightarrow Co(Me_4tetraeneN_4)(O_2)^+$	1.1×10^9	6.5	0.02		p.r.	D.k. at 700 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.007 mol L^{-1} CoL^{2+} and (7.5-25) × 10^{-5} mol L^{-1} O_2.	761001
6.4.5	**Acetic acid**							
	$Co(Me_4tetraeneN_4)^+ + CH_3CO_2H \rightarrow Co(Me_4tetraeneN_4)(H)^{2+} + CH_3CO_2^-$	6.2×10^4	4.8	0.01-0.05		p.r.	D.k. at 700 nm in Ar-satd. soln. contg. 2 mol L^{-1} 2-PrOH, 0.002 mol L^{-1} CoL^{2+} and 0.002-0.01 mol L^{-1} acetate.	761001
6.4.6	**9,10-Anthraquinone-2,6-disulfonate ion**							
	$Co(Me_4tetraeneN_4)^+ + 2,6\text{-}diSO_3AQ^{2-} \rightarrow Co(Me_4tetraeneN_4)^{2+} + [2,6\text{-}diSO_3AQ]^{\cdot 3-}$	3.8×10^9	6.5	0.004		p.r.	D.k. at 700 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} CoL^{2+} and (1.25-5.0) × 10^{-5} mol L^{-1} 2,6-$diSO_3AQ^{2-}$.	761001
6.4.7	**Indigomonosulfonate ion**							
	$Co(Me_4tetraeneN_4)^+ + IMS^- \rightarrow Co(Me_4tetraeneN_4)^{2+} + [IMS]^{\cdot 2-}$	4.9×10^9	6.5	0.004		p.r.	D.k. at 700 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} CoL^{2+} and (1.25-5.0) × 10^{-5} mol L^{-1} IMS^-.	761001
6.4.8	**Riboflavine**							
	$Co(Me_4tetraeneN_4)^+ + RF \rightarrow Co(Me_4tetraeneN_4)^{2+} + [RF]^{\cdot -}$	1.0×10^9	6.5	0.004		p.r.	D.k. at 700 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} CoL^{2+} and (1.25-5.0) × 10^{-5} mol L^{-1} RF.	761001
6.5	***N-meso*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion**							
6.5.1	**Water**							
	N-meso-$Co(4,11\text{-}dieneN_4)^+ + H_2O \rightarrow$	1.8×10^4 s^{-1}			25	p.r.	D.k. in soln. contg. 0.5 mol L^{-1} *tert*-BuOH; reaction suggested to proceed via Co-N bond rupture.	91A513
6.5.2	***N-rac*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(II) ion**							
	N-meso-$Co(4,11\text{-}dieneN_4)^+$ + *N-rac*-$Co(4,11\text{-}dieneN_4)^{2+} \rightarrow$ *N-meso*-$Co(4,11\text{-}dieneN_4)^{2+}$ + *N-rac*-$Co(4,11\text{-}dieneN_4)^+$	$\geq 1 \times 10^7$	7		25	p.r.	Calcd. from study of d.k. in soln. contg. mixtures of *N-rac*-CoL^{2+} and *N-meso*-CoL^{2+} (0.2-1.8) × 10^{-3} mol L^{-1} total, 0.5 mol L^{-1} *tert*-BuOH and 0.02 mol L^{-1} phosphate buffer.	91A513
6.5.3	**Carbon dioxide**							
	N-meso-$Co(4,11\text{-}dieneN_4)^+ + CO_2 \rightarrow$ *N-meso*-$Co(4,11\text{-}dieneN_4)(CO_2)^+$	1.6×10^7	5.8		25	p.r.	D.k. at 630 nm in soln. satd. with 1-100% CO_2 in N_2 contg. (0.4-1.0) × 10^{-3} mol L^{-1} CoL^{2+}, 0.5 mol L^{-1} *tert*-BuOH and $NaHCO_3$; $k_r = 2.7$ s^{-1}.	91A513
6.5.4	**Carbon monoxide**							
	N-meso-$Co(4,11\text{-}dieneN_4)^+ + CO \rightarrow$ *N-meso*-$Co(4,11\text{-}dieneN_4)(CO)^+$	8.3×10^8			25	p.r.	D.k. at 630 nm in soln. contg. *N-meso*-CoL^{2+}, 9.5 × 10^{-4} mol L^{-1} CO and 0.5 mol L^{-1} *tert*-BuOH; $k_r = 11$ s^{-1}.	91A513
6.5.5	**Hydrogen ion**							
	N-meso-$Co(4,11\text{-}dieneN_4)^+ + H^+ \rightarrow$ *N-meso*-$Co(4,11\text{-}dieneN_4)(H)^{2+}$	2.3×10^9		0.015	25	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 0.5 mol L^{-1} *tert*-BuOH; $k_r = <10^{-4}$ s^{-1}.	91A513
6.5.6	**Formic acid**							
	N-meso-$Co(4,11\text{-}dieneN_4)^+ + HCO_2H \rightarrow$ *N-meso*-$Co(4,11\text{-}dieneN_4)(H)^{2+} + HCO_2^-$	1.8×10^8		0.02	25	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 0.5 mol L^{-1} *tert*-BuOH.	91A513

TABLE 6. Rate constants for cobalt transients — Continued

Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.5 *N-meso*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion — Continued							
6.5.7 Acetic acid							
N-meso-Co(4,11-dieneN$_4$)$^+$ + CH_3CO_2H → *N-meso*-Co(4,11-dieneN$_4$)(H)$^{2+}$ + $CH_3CO_2^-$	8×10^7		0.1	25	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 0.5 mol L^{-1} *tert*-BuOH.	91A513
6.5.8 Dihydrogen phosphate ion							
N-meso-Co(4,11-dieneN$_4$)$^+$ + $H_2PO_4^-$ → *N-meso*-Co(4,11-dieneN$_4$)(H)$^{2+}$ + HPO_4^{2-}	1.2×10^8		0.1	25	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 0.5 mol L^{-1} *tert*-BuOH.	91A513
6.5.9 Nitrous oxide							
N-meso-Co(4,11-dieneN$_4$)$^+$ + N_2O →	1×10^7			25	p.r.		91A513
6.6 *N-rac*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion							
6.6.1 First-order reaction							
N-rac-Co(4,11-dieneN$_4$)$^+$ →	2.3×10^3 s^{-1}			25	p.r.	D.k. in soln. contg. 0.5 mol L^{-1} *tert*-BuOH; reaction suggested to proceed via Co-N bond rupture. At pH 12.7 k = 6.6×10^2 s^{-1}.	91A513
	2.7×10^3 s^{-1}	9-10	0.001		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH and 5×10^{-4} mol L^{-1} CoL^{2+}. Authors reported k = 48 L mol^{-1} s^{-1}. Reaction assumed to be proton transfer from water to form the hydride.	761001
6.6.2 Boric acid							
N-rac-Co(4,11-dieneN$_4$)$^+$ + H_3BO_3 → Co(4,11-dieneN$_4$)(H)$^{2+}$ + $H_2BO_3^-$	7×10^4		0.1	25	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. (1-10) × 10^{-4} mol L^{-1} CoL^{2+} and 0.5 mol L^{-1} *tert*-BuOH.	91A513 89A098
6.6.3 Carbon monoxide							
N-rac-Co(4,11-dieneN$_4$)$^+$ + CO → *prim-N-rac*-Co(4,11-dieneN$_4$)(CO)$^+$	5.0×10^8	6		25	p.r.	D.k. at 630 nm in soln. contg. 0.001 mol L^{-1} CoL^{2+}, 9.5×10^{-4} mol L^{-1} CO and 0.5 mol L^{-1} *tert*-BuOH; k_r = 3.1 s^{-1}.	91A513 89A098
6.6.4 Carbon dioxide							
N-rac-Co(4,11-dieneN$_4$)$^+$ + CO_2 → *prim-N-rac*-Co(4,11-dieneN$_4$)(CO_2)$^+$	1.7×10^8	3.5-6		25	p.r.	D.k. at 630 nm in soln. satd. with 1-100% CO_2 in N_2 contg. (0.4-1.0) × 10^{-3} mol L^{-1} CoL^{2+} and 0.5 mol L^{-1} *tert*-BuOH; $\Delta H^{\ddagger}$ = 29 kJ mol^{-1}, $\Delta S^{\ddagger}$ = 10.5 J K^{-1} mol^{-1}; k_r = 0.38 s^{-1}. For *sec*-isomer, formed via addition of $CO_2^{\bullet-}$ to *N-rac*-Co(4,11-dieneN$_4$)$^{2+}$, k_r = 1.6 s^{-1}.	91A513 89A098
6.6.5 Bicarbonate ion							
N-rac-Co(4,11-dieneN$_4$)$^+$ + HCO_3^- → Co(4,11-dieneN$_4$)(H)$^{2+}$ + CO_3^{2-}	2.5×10^6		0.1	25	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. (1-10) × 10^{-4} mol L^{-1} CoL^{2+} and 0.5 mol L^{-1} *tert*-BuOH.	91A513 89A098
6.6.6 Tris(2,2'-bipyridine)cobalt(III) ion							
N-rac-Co(4,11-dieneN$_4$)$^+$ + Co(bpy)$_3^{3+}$ →	1.2×10^9	9.2	0.016-0.028		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.005 mol L^{-1} CoL^{2+} and (2-10) × 10^{-4} mol L^{-1} Co(bpy)$_3^{3+}$.	761001
6.6.7 Tris(ethylenediamine)cobalt(III) ion							
N-rac-Co(4,11-dieneN$_4$)$^+$ + Co(en)$_3^{3+}$ →	7.9×10^6	9.2	0.016-0.028		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.005 mol L^{-1} CoL^{2+} and (2-10) × 10^{-4} mol L^{-1} Co(en)$_3^{3+}$.	761001

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.6	***N-rac*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion** — Continued							
6.6.8	**Hexaamminecobalt(III) ion**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + Co(NH$_3$)$_6^{3+}$ →	7.5×10^6	9.2	0.016-0.028		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.005 mol L^{-1} CoL^{2+} and (2-10) × 10^{-4} mol L^{-1} Co(NH$_3$)$_6^{3+}$.	761001
6.6.9	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienedihydroxycobalt(III) ion**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + Co(4,11-dieneN$_4$)(OH)$_2^+$ →	4.0×10^6	9.2	0.016-0.028		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.005 mol L^{-1} CoL^{2+} and (2-10) × 10^{-4} mol L^{-1} Co(4,11-dieneN$_4$)(OH)$_2^+$.	761001
6.6.10	**Dihydroxy(2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene)cobalt(III) ion**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + Co(Me$_4$tetraeneN$_4$)(OH)$_2^+$ →	6.7×10^6	9.2	0.016-0.028		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.005 mol L^{-1} CoL^{2+} and (2-10) × 10^{-4} mol L^{-1} Co(Me$_4$tetraeneN$_4$)(OH)$_2^+$.	761001
6.6.11	**Tris(2,2'-bipyridine)chromium(III) ion**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + Cr(bpy)$_3^{3+}$ →	1.2×10^9	9.2	0.016-0.028		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.005 mol L^{-1} CoL^{2+} and (2-10) × 10^{-4} mol L^{-1} Cr(bpy)$_3^{3+}$.	761001
6.6.12	**Tris(2,2'-bipyridine)iron(III) ion**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + Fe(bpy)$_3^{3+}$ →	2.3×10^7	9.2	0.016-0.028		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.005 mol L^{-1} CoL^{2+} and (2-10) × 10^{-4} mol L^{-1} Fe(bpy)$_3^{3+}$.	761001
6.6.13	**Hydrogen ion**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + H$^+$ → *prim-N-rac*-Co(4,11-dieneN$_4$)(H)$^{2+}$	3.1×10^9	3.5-4.2	0.015		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH and 0.005 mol L^{-1} CoL^{2+}; $k_r = 1.2 \times 10^{-2}$ s^{-1} [91A513]. For *sec*-isomer formed by addition of H to *N-rac*-Co(4,11-dieneN$_4$)$^+$, $K = 3.2 \times 10^{11}$ L mol^{-1} [91A513].	761001
6.6.14	**Ammonium ion**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + NH$_4^+$ → Co(4,11-dieneN$_4$)(H)$^{2+}$ + NH$_3$	6.8×10^5	7.0	0.015-0.1		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 1.5×10^{-3} mol L^{-1} CoL^{2+} and 0.01-0.1 mol L^{-1} NH$_4^+$.	761001
6.6.15	**Nitrous oxide**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + N$_2$O →	2×10^7			25	p.r.		*91A513*
		2.5×10^7				p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 0.002-0.008 mol L^{-1} N$_2$O, 0.005 mol L^{-1} Co(4,11-dieneN$_4$)$^{2+}$ and 1 mol L^{-1} *tert*-BuOH. Product suggested to be Co(III) complex.	78A200
		3.9×10^7	9.2	0.01		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 0.003 mol L^{-1} CoL^{2+}, (7.5-25) × 10^{-4} mol L^{-1} N$_2$O and 0.001 mol L^{-1} tetraborate. Product suggested to be Co(III) complex.	761001
6.6.16	**Oxygen**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + O$_2$ → Co(4,11-dieneN$_4$)(O$_2$)$^+$	1.7×10^9	9.2	0.02		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.007 mol L^{-1} CoL^{2+} and (7.5-25) × 10^{-5} mol L^{-1} O$_2$.	761001

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.6	***N-rac*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion** — Continued							
6.6.17	**Hydrogen phosphate ion**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + HPO$_4^{2-}$ → Co(4,11-dieneN$_4$)(H)$^{2+}$ + PO$_4^{3-}$	1.0×10^5	10.0	0.06-0.3		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 5×10^{-4} mol L^{-1} CoL^{2+} and 0.02-0.1 mol L^{-1} HPO$_4^{2-}$.	761001
6.6.18	**Dihydrogen phosphate ion**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + H$_2$PO$_4^-$ → *prim-N-rac*-Co(4,11-dieneN$_4$)(H)$^{2+}$ + HPO$_4^{2-}$	8×10^7 1.2×10^8		0.1 0.008	25	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. (1-10) × 10^{-4} mol L^{-1} CoL^{2+} and 0.5 mol L^{-1} *tert*-BuOH.	91A513 89A098
		9.8×10^7	5.5	0.005-0.01		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 5×10^{-4} mol L^{-1} CoL^{2+} and 0.001-0.01 mol L^{-1} H$_2$PO$_4^-$.	761001
6.6.19	**Hexaammineruthenium(II) ion**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + Ru(NH$_3$)$_6^{2+}$ →	4.0×10^8	9.2	0.016-0.028		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.005 mol L^{-1} CoL^{2+} and (2-10) × 10^{-4} mol L^{-1} Ru(NH$_3$)$_6^{2+}$.	761001
6.6.20	**Pentaammine(nitroso)ruthenium(III) ion**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + Ru(NH$_3$)$_5$NO^{3+} →	3.9×10^7	9.2	0.016-0.028		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.005 mol L^{-1} CoL^{2+} and (2-10) × 10^{-4} mol L^{-1} mol L^{-1} Ru(NH$_3$)$_5$NO^{3+}.	761001
6.6.21	**Acetic acid**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + CH$_3$CO$_2$H → Co(4,11-dieneN$_4$)(H)$^{2+}$ + CH$_3$CO$_2^-$	1.1×10^8		0.1	25	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. (1-10) × 10^{-4} mol L^{-1} CoL^{2+} and 0.5 mol L^{-1} *tert*-BuOH.	91A513 89A098
		7.5×10^7	4.8	0.01-0.05		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.002 mol L^{-1} CoL^{2+} and 0.002-0.01 mol L^{-1} acetate.	761001
6.6.22	**9,10-Anthraquinone-2-sulfonate ion**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + 2-SO$_3$AQ$^-$ → *N-rac*-Co(4,11-dieneN$_4$)$^{2+}$ + [2-SO$_3$AQ]$^{\cdot 2-}$	4.4×10^9	9.2	0.004		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} CoL^{2+} and (1.25-5.0) × 10^{-5} mol L^{-1} 2-SO$_3$AQ$^-$.	761001
6.6.23	**3-Benzoylpyridine**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + 3-C$_6$H$_5$COpy →	4.6×10^8	9.2	0.004		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} CoL^{2+} and (1.25-5.0) × 10^{-5} mol L^{-1} 3-C$_6$H$_5$COpy.	761001
6.6.24	**9-Fluorenone**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + C$_{13}$H$_8$O → *N-rac*-Co(4,11-dieneN$_4$)$^{2+}$ + [C$_{13}$H$_8$O]$^{\cdot -}$	4.3×10^9	9.2	0.004		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} CoL^{2+} and (1.25-5.0) × 10^{-5} mol L^{-1} fluorenone.	761001
6.6.25	**Formic acid**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + HCO$_2$H → Co(4,11-dieneN$_4$)(H)$^{2+}$ + HCO$_2^-$	1.7×10^8		0.1	25	p.r.	D.k. at 630 nm in soln. contg. (1-10) × 10^{-4} mol L^{-1} CoL^{2+} and *tert*-BuOH.	89A098
6.6.26	**2-Hydroxy-2,2-dimethylethyl**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + $^{\cdot}$CH$_2$C(CH$_3$)$_2$OH →	2×10^8			25	p.r.	D.k. in soln. contg. 0.5 mol L^{-1} *tert*-BuOH.	91A513

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.6	***N-rac*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion** — Continued							
6.6.27	**Iodomethane**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + CH_3I →	4.7×10^8	9.2	0.015		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} CoL^{2+} and (1.25-5.0) × 10^{-5} mol L^{-1} CH_3I.	761001
6.6.28	**2-Methyl-1,4-naphthoquinone**							
	N-rac-Co(4,11-dieneN$_4$)$^+$ + 2-CH_3NQ → *N-rac*-Co(4,11-dieneN$_4$)$^{2+}$ + [2-CH_3NQ]$^{\cdot-}$	4.6×10^9	9.2	0.004		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} CoL^{2+} and (1.25-5.0) × 10^{-5} mol L^{-1} 2-CH_3-NQ.	761001
6.7	**5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,14-dienecobalt(I) ion**							
6.7.1	**Water**							
	Co(4,14-dieneN$_4$)$^+$ + H_2O → Co(4,14-dieneN$_4$)(H)$^{2+}$ + OH^-	1.1×10^3 s^{-1}	9-10	0.001		p.r.	D.k. at 590 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH and 5 × 10^{-4} mol L^{-1} CoL^{2+}. Authors reported k = 20 L mol^{-1} s^{-1}.	761001
6.7.2	**Hydrogen ion**							
	Co(4,14-dieneN$_4$)$^+$ + H^+ → Co(4,14-dieneN$_4$)(H)$^{2+}$	1.2×10^9	3.5-4.2	0.015		p.r.	D.k. at 590 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH and 5 × 10^{-3} mol L^{-1} CoL^{2+}.	761001
6.7.3	**Nitrous oxide**							
	Co(4,14-dieneN$_4$)$^+$ + N_2O →	9.0×10^6	9.2	0.01		p.r.	D.k. at 590 nm in soln. contg. 0.003 mol L^{-1} CoL^{2+} and (7.5-25) × 10^{-4} mol L^{-1} N_2O. Product suggested to be Co(III) complex.	761001
6.7.4	**Oxygen**							
	Co(4,14-dieneN$_4$)$^+$ + O_2 → Co(4,14-dieneN$_4$)(O_2)$^+$	9.0×10^8	9.2	0.02		p.r.	D.k. at 590 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.007 mol L^{-1} CoL^{2+} and (7.5-25) × 10^{-4} mol L^{-1} O_2.	761001
6.7.5	**Dihydrogen phosphate ion**							
	Co(4,14-dieneN$_4$)$^+$ + $H_2PO_4^-$ → Co(4,14-dieneN$_4$)(H)$^{2+}$ + HPO_4^{2-}	3.0×10^7	5.5	0.005-0.01		p.r.	D.k. at 590 nm in Ar-satd. soln. contg. 1 mol L^{-1} *tert*-BuOH, 5 × 10^{-4} mol L^{-1} CoL^{2+} and 0.001-0.01 mol L^{-1} $H_2PO_4^-$.	761001
6.8	**2,2'-Bipyridinecobalt(I) ion**							
6.8.1	**Ascorbate radical anion**							
	Co(bpy)$_n^+$ + $^{\cdot}A^-$ + H^+ → Co(bpy)$_n^{2+}$ + AH^-	1×10^{10}	5-7		25	p.r.	D.k. in soln. contg. (0.3-10) × 10^{-4} mol L^{-1} of both $CoSO_4$ and 2,2'-bipyridine, and 0.001 mol L^{-1} ascorbate; n = 1 or 2.	82A278
6.9	**2,2'-Bipyridinecobalt(I) ion**							
6.9.1	**Bis(2,2'-bipyridine)cobalt(II) ion**							
	Co(bpy)$^+$ + Co(bpy)$_2^{2+}$ → Co(bpy)$^{2+}$ + Co(bpy)$_2^+$	2.1×10^9		0.2	25	p.r.	D.k. in deaerated soln. contg. *tert*-BuOH, Co^{2+} and 2,2'-bipyridine. k_r = 1.1 × 10^7 L mol^{-1} s^{-1}; K = 225.	85A034
6.10	**Bis(2,2'-bipyridine)cobalt(I) ion**							
6.10.1	**Tris(2,2'-bipyridine)cobalt(II) ion**							
	Co(bpy)$_2^+$ + Co(bpy)$_3^{2+}$ → Co(bpy)$_2^{2+}$ + Co(bpy)$_3^+$	2.0×10^9		0.2	25	p.r.	D.k. in deaerated soln. contg. *tert*-BuOH, Co^{2+} and 2,2'-bipyridine; K = 200.	85A034

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.10	**Bis(2,2'-bipyridine)cobalt(I) ion** — Continued							
6.10.2	**Hydrogen ion**							
	$Co(bpy)_2^+ + H^+ \rightarrow Co(bpy)_2(H)^{2+}$	$\sim 1 \times 10^7$			25	p.r.	D.k. at 610 nm in soln. contg. $CoSO_4$ and 2,2'-bipyridine; pK_a of $Co(bpy)_2(H)^{2+}$ = 6.9 [84A112].	82A278
6.11	**Tris(2,2'-bipyridine)cobalt(I) ion**							
6.11.1	**2,2'-Bipyridine, conjugate acid**							
	$Co(bpy)_3^+ + bpyH^+ \rightarrow Co(bpy)_3^{2+} + [bpyH]^\bullet$	1.8×10^8		~0.25	25	p.r.	D.k. at 610 nm in soln. contg. Co^{2+}, $(0.5\text{-}1.9) \times 10^{-3}$ mol L^{-1} 2,2'-bipyridine and 0.1 mol L^{-1} formate; $k_r = 4.5 \times 10^9$ L mol^{-1} s^{-1}; $K = 4.1 \times 10^{-2}$.	83C017
6.12	**4,4'-Dimethyl-2,2'-bipyridinecobalt(I) ion**							
6.12.1	**Bis(4,4'-dimethyl-2,2'-bipyridine)cobalt(II) ion**							
	$Co(4,4'\text{-}Me_2bpy)^+ + Co(4,4'\text{-}Me_2bpy)_2^{2+} \rightarrow Co(4,4'\text{-}Me_2bpy)^{2+} + Co(4,4'\text{-}Me_2bpy)_2^+$	1.8×10^9		0.2	25	p.r.	D.k. in deaerated soln. contg. *tert*-BuOH, Co^{2+} and 4,4'-dimethyl-2,2'-bipyridine. $k_r = 2.0 \times 10^7$ L mol^{-1} s^{-1}; $K = 125$.	85A034
6.13	**4,4'-Dimethyl-2,2'-bipyridinecobalt(I) ions**							
6.13.1	**Ascorbate radical anion**							
	$Co(4,4'\text{-}Me_2bpy)_n^+ + {}^\bullet A^- + H^+ \rightarrow Co(4,4'\text{-}Me_2bpy)_n^{2+} + AH^-$	1×10^{10}	5-7		25	p.r.	D.k. in soln. contg. $(0.3\text{-}10) \times 10^{-4}$ mol L^{-1} of both $CoSO_4$ and 4,4'-dimethyl-2,2'-bipyridine, and 0.001 mol L^{-1} ascorbate; n = 1 or 2.	82A278
6.14	**4,4'-Dimethyl-2,2'-bipyridinecobalt(I) ion, protonated**							
6.14.1	**Ascorbate radical anion**							
	$Co(4,4'\text{-}Me_2bpy)_n(H)^{2+} + {}^\bullet A^- \rightarrow Co(4,4'\text{-}Me_2bpy)_n^{2+} + AH^-$	$\sim 1 \times 10^9$	5-7		25	p.r.	n = 1 or 2.	82A278
6.15	**Bis(4,4'-dimethyl-2,2'-bipyridine)cobalt(I) ion**							
6.15.1	**Tris(4,4'-dimethyl-2,2'-bipyridine)cobalt(II) ion**							
	$Co(4,4'\text{-}Me_2bpy)_2^+ + Co(4,4'\text{-}Me_2bpy)_3^{2+} \rightarrow Co(4,4'\text{-}Me_2bpy)_2^{2+} + Co(4,4'\text{-}Me_2bpy)_3^+$	2.5×10^9		0.2	25	p.r.	D.k. in deaerated soln. contg. *tert*-BuOH, Co^{2+} and 4,4'-dimethyl-2,2'-bipyridine. $k_r = 7.5 \times 10^7$ L mol^{-1} s^{-1}; $K = 50$ at $I = 0.1$.	85A034
6.15.2	**Hydrogen ion**							
	$Co(4,4'\text{-}Me_2bpy)_2^+ + H^+ \rightarrow Co(4,4'\text{-}Me_2bpy)_2(H)^{2+}$	$\sim 2 \times 10^8$			25	p.r.		82A278
6.16	**Tris(4,4'-dimethyl-2,2'-bispyridine)cobalt(I) ion**							
6.16.1	**Tris(4,4'-dimethyl-2,2'-bipyridine)cobalt(III) ion**							
	$Co(4,4'\text{-}Me_2bpy)_3^+ + Co(4,4'\text{-}Me_2bpy)_3^{3+} \rightarrow$	$\sim 1 \times 10^9$	5-7		25	p.r.	D.k. in soln. contg. 1×10^{-4} mol L^{-1} of Co(II) complex, 1×10^{-5} mol L^{-1} Co(III) complex and 0.1 mol L^{-1} 2-PrOH.	82A278
6.16.2	**4,4'-Dimethyl-2,2'-bipyridine, conjugate monoacid**							
	$Co(4,4'\text{-}Me_2bpy)_3^+ + 4,4'\text{-}Me_2bpyH^+ \rightarrow Co(4,4'\text{-}Me_2bpy)_3^{2+} + [4,4'\text{-}Me_2bpyH]^\bullet$	4.3×10^8	4.4		25	p.r.	D.k. at 610 nm in soln. contg. 0.13 mol L^{-1} 2-PrOH, 0.03 mol L^{-1} acetic acid, 0.001 mol L^{-1} $CoSO_4$ and 0.003-0.004 mol L^{-1} 4,4'-dimethyl-2,2'-bipyridine; $k_r = 3.3 \times 10^9$ L mol^{-1} s^{-1} at pH 10.2.	83C017

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.17	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocobaltate(I) ion**							
6.17.1	**Nitrous oxide**							
	$CoTPPS^{5-} + N_2O \rightarrow$	$\leq 3 \times 10^2$	13		21	p.r.	D.k. in N_2O-satd. soln. contg. 1.5 mol L^{-1} 2-PrOH.	83A088
6.17.2	**Iodomethane**							
	$CoTPPS^{5-} + CH_3I \rightarrow CoTPPS^{4-} + {}^{\bullet}CH_3 + I^-$	3×10^5	8		21	p.r.	D.k. at 495 and 510 nm and p.b.k. at 550 nm in N_2O-satd. soln. contg. 1.5 mol L^{-1} 2-PrOH, (0.5-1) × 10^{-3} mol L^{-1} methyl iodide, (2-7) × 10^{-5} mol L^{-1} $CoTPPS^{4-}$ and 3 × 10^{-4} mol L^{-1} borate.	83A088
6.18	**Cobal(I)amin**							
6.18.1	**Nitrous oxide**							
	B12s + $N_2O \rightarrow$	2.3×10^2 1.6×10^2	6.1 8.0		18-22	p.r.	D.k. at 385 nm and p.b.k. at 313 nm in N_2O-satd. soln. contg. 2 × 10^{-5} mol L^{-1} cob(II)alamin, 0.1 mol L^{-1} formate and 0.01 mol L^{-1} phosphate buffer. Effect of [buffer] on k reported.	771018
6.18.2	**Hydroxocob(III)alamin**							
	B12s + B12a → B12r + B12r	1.5×10^7	3.9-4.2		22	p.r.	D.k. at 390 and 460 nm in He- or CO_2-satd. soln. contg. 6 × 10^{-5} mol L^{-1} cob(II)alamin, (0.6-2.4) × 10^{-5} mol L^{-1} cob(III) alamin and 0.1 mol L^{-1} 2-PrOH; k decreases from 1.0 × 10^7 to 2.9 × 10^4 L mol^{-1} s^{-1} as pH increases from 7.8 to 11.1.	78A373
6.19	**3,10,17,24-Tetrasulfophthalocyaninecobaltate(I) ion**							
6.19.1	**Hydrogen peroxide**							
	$Co(tspc)^{5-} + H_2O_2 \rightarrow$	~2.5 × 10^6				p.r.	D.k. in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate, 4 × 10^{-7} mol L^{-1} H_2O_2 and 6 × 10^{-5} mol L^{-1} $Co(tspc)^{4-}$	83A238
6.19.2	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$Co(tspc)^{5-} + Ru(bpy)_3^{3+} \rightarrow Co(tspc)^{4-} + Ru(bpy)_3^{2+}$	2.9×10^8	1-3			f.p./oq	D.k. at 520 nm in deaerated soln. contg. 0.001-0.1 mol L^{-1} HCl, 0.001-0.01 mol L^{-1} $Ru(bpy)_3^{2+}$ and $Co(tspc)^{4-}$ (OQ).	79A090
6.20	**3,10,17,24-Tetrasulfophthalocyaninecobaltate(I) ion dimer**							
6.20.1	**First-order reaction**							
	$[Co(tspc)]_2^{10-} \rightarrow 2\ Co(tspc)^{5-}$	4.4 s^{-1}	1			f.p.	D.k. at 535 nm in deaerated soln. contg. $Co(tspc)^{4-}$, 2-PrOH and $HClO_4$.	78A300
6.21	***N*-Methyltetrakis(4-sulfonatophenyl)porphinatocobaltate(II) radical anion**							
6.21.1	**First-order reaction**							
	$[Co(N\text{-}Me)TPPS]^{\cdot 4-} \rightarrow CH_3CoTPPS^{4-}$	2.0 × 10^2 s^{-1}				p.r.	D.k. and p.b.k. at 530 nm in Ar-satd. soln. contg. (1-10) × 10^{-5} mol L^{-1} $Co(N\text{-}Me)TPPS^{3-}$ and 1% 2-PrOH.	92G183
6.22	**Pentaamminecobalt(II) ion**							
6.22.1	**First-order reaction**							
	$Co(NH_3)_5^{2+} \rightarrow Co(NH_3)_4^{2+} + NH_3$	4.1 × 10^6 s^{-1}	3			f.p.	Condy. change in Ar-satd. soln. contg. $Co(NH_3)_5Cl^{2+}$ and 0.001 mol L^{-1} HCl. Reaction preceded by fast elimination of Cl from $Co(NH_3)_5Cl^{2+}$.	79A168

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.23	**Tetraamminecobalt(II) ion**							
6.23.1	**First-order reaction**							
	$Co(NH_3)_4^{2+} \rightarrow Co(NH_3)_3^{2+} + NH_3$	4.8×10^5 s^{-1}	3			f.p.	Condy. change in Ar-satd. soln. contg. $Co(NH_3)_5Cl^{2+}$ and 0.001 mol L^{-1} HCl.	79A168
6.24	**Tris(ammine)cobalt(II) ion**							
6.24.1	**First-order reaction**							
	$Co(NH_3)_3^{2+} \rightarrow Co(NH_3)_2^{2+} + NH_3$	6.4×10^4 s^{-1}	3-4.5			p.r.	Condy. change in Ar-satd. soln. contg. $Co(NH_3)_6^{3+}$ or $Co(NH_3)_5Cl^{2+}$ or $Co(NH_3)_5F^{2+}$ or $Co(NH_3)_4Cl_2^{+}$ or $Co(NH_3)_4Cl(H_2O)^{2+}$ and *tert*-BuOH.	77A234 761149
6.25	**Bis(ammine)cobalt(II) ion**							
6.25.1	**First-order reaction**							
	$Co(NH_3)_2^{2+} \rightarrow Co(NH_3)^{2+} + NH_3$	8.6×10^3 s^{-1}	3-4.5			p.r.	Condy. change in Ar-satd. soln. contg. $Co(NH_3)_6^{3+}$ or $Co(NH_3)_5Cl^{2+}$ or $Co(NH_3)_5F^{2+}$ or $Co(NH_3)_4Cl_2^{+}$ or $Co(NH_3)_4Cl(H_2O)^{2+}$ and *tert*-BuOH.	761149
6.26	**Amminecobalt(II) ion**							
6.26.1	**First-order reaction**							
	$Co(NH_3)^{2+} \rightarrow Co^{2+} + NH_3$	1.1×10^3 s^{-1}	3-4.5			p.r.	Condy. change in Ar-satd. soln. contg. $Co(NH_3)_6^{3+}$ or $Co(NH_3)_5Cl^{2+}$ or $Co(NH_3)_5F^{2+}$ or $Co(NH_3)_4Cl_2^{+}$ or $Co(NH_3)_4Cl(H_2O)^{2+}$ and *tert*-BuOH.	761149
6.27	**Tris(ethylenediamine)cobalt(II) ion**							
6.27.1	**First-order reaction**							
	$Co(en)_3^{2+} \rightarrow Co(en)_2^{2+} + en$	6.8×10^2 s^{-1}	2.3-4.6		25	p.r.	Condy. change in Ar-satd. soln. contg. $Co(en)_3^{3+}$ and 0.2 mol L^{-1} *tert*-BuOH; $k = 1.5 \times 10^4$ s^{-1} calcd. for N-Co(II) bond rupture [77A234].	90A303
6.27.2	**Hydrogen ion**							
	$Co(en)_3^{2+} + H^+ \rightarrow Co(en)_2^{2+} + enH^+$	6.6×10^6	2.3-4.6		25	p.r.	Condy. change in Ar-satd. soln. contg. $Co(en)_3^{3+}$ and 0.2 mol L^{-1} *tert*-BuOH.	90A303
6.28	**Bis(ethylenediamine)cobalt(II) ion**							
6.28.1	**First-order reaction**							
	$Co(en)_2^{2+} \rightarrow Co(en)^{2+} + en$	50 s^{-1}	2.3-4.6		25	p.r.	Condy. change in Ar-satd. soln. contg. $Co(en)_3^{3+}$ and 0.2 mol L^{-1} *tert*-BuOH; $k = 1.4 \times 10^3$ s^{-1} calcd. for N-Co(II) bond rupture [77A234].	90A303
6.28.2	**Hydrogen ion**							
	$Co(en)_2^{2+} + H^+ \rightarrow Co(en)^{2+} + enH^+$	1.4×10^6	2.3-4.6		25	p.r.	Condy. change in Ar-satd. soln. contg. $Co(en)_3^{3+}$ and 0.2 mol L^{-1} *tert*-BuOH.	90A303
6.29	**Ethylenediaminecobalt(II) ion**							
6.29.1	**First-order reaction**							
	$Co(en)^{2+} \rightarrow Co^{2+} + en$	14 s^{-1}	2.3-4.6		25	p.r.	Condy. change in Ar-satd. soln. contg. $Co(en)_3^{3+}$ and 0.2 mol L^{-1} *tert*-BuOH; $k = 1.7 \times 10^2$ s^{-1} calcd. for N-Co(II) bond rupture [77A234].	90A303
6.29.2	**Hydrogen ion**							
	$Co(en)^{2+} + H^+ \rightarrow Co^{2+} + enH^+$	3.2×10^5	2.3-4.6		25	p.r.	Condy. change in Ar-satd. soln. contg. $Co(en)_3^{3+}$ and 0.2 mol L^{-1} *tert*-BuOH.	90A303

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.30	**Bis(diethylenetriamine)cobalt(II) ion**							
6.30.1	**First-order reaction**							
	$Co(dien)_2^{2+} \rightarrow$	1.8×10^4 s^{-1}	2.5-4.5		25	p.r.	Condy. change in Ar-satd. soln. contg. $Co(dien)_2^{3+}$ and 0.2 mol L^{-1} *tert*-BuOH. Rate constant refers to N-Co(II) bond rupture.	77A234
6.31	**Diethylenetriaminecobalt(II) ion**							
6.31.1	**First-order reaction**							
	$Co(dien)^{2+} \rightarrow$	8.7×10^2 s^{-1}	2.5-4.5		25	p.r.	Condy. change in Ar-satd. soln. contg. $Co(dien)_2^{3+}$ and 0.2 mol L^{-1} *tert*-BuOH. Rate constant refers to N-Co(II) bond rupture.	77A234
6.32	**Triethylenetetraminecobalt(II) ion**							
6.32.1	**First-order reaction**							
	$Co(trien)^{2+} \rightarrow$	2.1×10^3 s^{-1}	2.5-4.5		25	p.r.	Condy. change in Ar-satd. soln. contg. $Co(trien)^{3+}$ and 0.2 mol L^{-1} *tert*-BuOH. Rate constant refers to N-Co(II) bond rupture.	77A234
6.32.2	**Oxygen**							
	$Co(trien)^{2+} + O_2 + OH^- \rightarrow Co(trien)(O_2)(OH)^+$	2.2×10^5	9.1-12.6	0.2		f.p.	P.b.k. at 310 nm in soln. contg. 2×10^{-5} mol L^{-1} (trien)Co(μ-OH,μ-O_2)Co(trien)$^{3+}$. Product suggested to react with $Co(trien)(H_2O)_2^{2+}$ to give (trien)Co(OH)O_2Co(H_2O)(trien)$^{3+}$ which gives (trien)Co(μ-OH,μ-O_2)Co(trien)$^{3+}$ with $k = 2$ s^{-1}.	91A065
6.33	**Hydroxytriethylenetetraminecobalt(II) ion**							
6.33.1	**Oxygen**							
	$Co(trien)(OH)^+ + O_2 \rightarrow Co(trien)(O_2)(OH)^+$	2.1×10^4	9.1-12.6	0.2		f.p.	P.b.k. at 310 nm in soln. contg. 2×10^{-5} mol L^{-1} (trien)Co(μ-OH,μ-O_2)Co(trien)$^{3+}$. Product suggested to react with $Co(OH)(trien)(H_2O)_2^+$ to give (trien)Co(OH)O_2Co(OH)(trien)$^{2+}$ which gives (trien)Co(μ-OH,μ-O_2)Co(trien)$^{3+}$ with $k = 4 \times 10^{-2}$ s^{-1}.	91A065
6.34	**Nitrito(triethylenetetramine)cobalt(II) ion**							
6.34.1	**Oxygen**							
	$Co(trien)(NO_2)^+ + O_2 \rightarrow Co(trien)(NO_2)(O_2)^+$	3.2×10^2	6.3		25	f.p.	Spectral changes in soln. contg. $Co(trien)(NO_2)_2^+$. Product suggested to react with $Co(trien)(NO_2)_2^+$, $k = 9 \times 10^2$ L mol^{-1} s^{-1}, to give (trien)Co(NO_2)(μ-O_2)Co(NO_2)(trien)$^{3+}$; the latter superoxo complex gives the peroxo complex with $k = <0.1$ s^{-1}.	92A191

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.35	**Tetraethyldiethylenetriaminecobalt(II) ion**							
6.35.1	**Oxygen**							
	$Co(tetraen)^{2+} + O_2 \rightarrow Co(tetraen)(O_2)^{2+}$	1.0×10^5	6.3		25	f.p.	Spectral changes in soln. contg. $Co(tetraen)(NO_2)^{2+}$. Product suggested to react with $Co(tetraen)(NO_2)^{2+}$, $k = 8.2 \times 10^4$ L mol^{-1} s^{-1} to give $(tetraen)Co(\mu\text{-}O_2)Co(tetraen)^{5+}$; the latter superoxo complex gives the peroxo complex with $k < 0.1$ s^{-1}.	92A191
6.36	**Tris(acetylacetonato)cobaltate(II) ion**							
6.36.1	**First-order reaction**							
	$Co(acac)_3^- \rightarrow Co(acac)_2 + acac^-$	8×10^3 s^{-1}			25	p.r.	Condy. change in He-satd. soln. contg. 5×10^{-4} mol L^{-1} $Co(acac)_3$, 0.1 mol L^{-1} *tert*-BuOH and varied [H$^+$].	79A297
6.36.2	**Hydrogen ion**							
	$Co(acac)_3^- + H^+ \rightarrow Co(acac)_2 + acacH$	7.2×10^8			25	p.r.	Condy. change in He-satd. soln. contg. 5×10^{-4} mol L^{-1} $Co(acac)_3$, 0.1 mol L^{-1} *tert*-BuOH and varied [H$^+$].	79A297
6.37	**Bis(acetylacetonato)cobalt(II)**							
6.37.1	**First-order reaction**							
	$Co(acac)_2 \rightarrow Co(acac)^+ + acac^-$	30 s^{-1}			25	p.r.	Condy. change in He-satd. soln. contg. 5×10^{-4} mol L^{-1} $Co(acac)_3$, 0.1 mol L^{-1} *tert*-BuOH and varied [H$^+$]; $k_r \sim 4.1 \times 10^5$ L mol^{-1} s^{-1}.	79A297
6.37.2	**Hydrogen ion**							
	$Co(acac)_2 + H^+ \rightarrow Co(acac)^+ + acacH$	3.1×10^6			25	p.r.	Condy. change in He-satd. soln. contg. 5×10^{-4} mol L^{-1} $Co(acac)_3$, 0.1 mol L^{-1} *tert*-BuOH and varied [H$^+$]; $k_r \sim 7.5 \times 10^5$ L mol^{-1} s^{-1}.	79A297
6.38	**Acetylacetonatocobalt(II) ion**							
6.38.1	**First-order reaction**							
	$Co(acac)^+ \rightarrow Co^{2+} + acac^-$	3 s^{-1}			25	p.r.	Condy. change in He-satd. soln. contg. 5×10^{-4} mol L^{-1} $Co(acac)_3$, 0.1 mol L^{-1} *tert*-BuOH and varied [H$^+$].	79A297
6.38.2	**Hydrogen ion**							
	$Co(acac)^+ + H^+ \rightarrow Co^{2+} + acacH$	7.5×10^4			25	p.r.	Condy. change in He-satd. soln. contg. 5×10^{-4} mol L^{-1} $Co(acac)_3$, 0.1 mol L^{-1} *tert*-BuOH and varied [H$^+$].	79A297
6.39	**Tris(2,2'-bipyridine)cobalt(II) ion**							
6.39.1	**First-order reaction**							
	$Co(bpy)_3^{2+} \rightarrow Co(bpy)_2^{2+} + bpy$	3.4 s^{-1}	0.5-10.5			p.r.	D.k. at 270-340 nm in Ar- or N_2O-satd. soln. contg. (1-5) $\times 10^{-5}$ mol L^{-1} $Co(bpy)_3^{3+}$ and MeOH, 2-PrOH, *tert*-BuOH or formate; $k_r = 1.4 \times 10^5$ L mol^{-1} s^{-1}. At pH 0.3 $k = 8$ s^{-1}.	79A034
6.39.2	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$Co(bpy)_3^{2+} + Ru(bpy)_3^{3+} \rightarrow Co(bpy)_3^{3+} + Ru(bpy)_3^{2+}$	1.3×10^8		1.0		f.p./oq	Soln. contg. $Ru(bpy)_3^{2+}$ and $Co(bpy)_3^{3+}$ (OQ).	82F048

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.39	**Tris(2,2'-bipyridine)cobalt(II) ion** — Continued							
6.39.2	**Tris(2,2'-bipyridine)ruthenium(III) ion** — Continued							
		2.4×10^8		1.0	25	f.p./oq	D.k. at 675 nm in soln. contg. 7.5×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.5 or 1.0) $\times 10^{-3}$ mol L^{-1} $Co(bpy)_3^{3+}$ (OQ); studied at 5-25 °C, $E_a = -11.8$ kJ mol^{-1}.	80A003
6.39.3	**Tris(4-triethylphosphonio-2,2'-bipyridine)ruthenium(III) ion**							
	$Co(bpy)_3^{2+} + Ru[4\text{-}(Et_3P)bpy]_3^{6+} \rightarrow Co(bpy)_3^{3+} + Ru[4\text{-}(Et_3P)bpy]_3^{5+}$	2.2×10^8		1.0		f.p.	Soln. contg. $Ru([4\text{-}(Et_3P)bpy]_3^{5+}$ and $Co(bpy)_3^{3+}$ (OQ).	82F048
6.39.4	**Tris(1,10-phenanthroline)ruthenium(III) ion**							
	$Co(bpy)_3^{2+} + Ru(phen)_3^{3+} \rightarrow Co(bpy)_3^{3+} + Ru(phen)_3^{2+}$	1.9×10^8		0.25		f.p./oq	P.b.k. at 420-450 nm in soln. contg. 1×10^{-4} mol L^{-1} $Ru(phen)_3^{2+}$, 0.25 mol L^{-1} LiCl and (2-6) $\times 10^{-4}$ mol L^{-1} $Co(bpy)_3^{3+}$ (OQ); $k = 2.5 \times 10^8$ in presence of 0.166 mol L^{-1} Na_2SO_4 and 4.8×10^7 L mol^{-1} s^{-1} in 50% aqueous acetonitrile contg. 0.25 mol L^{-1} LiCl.	85S022
6.39.5	**Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion**							
	$Co(bpy)_3^{2+} + Ru(4,7\text{-}Me_2phen)_3^{3+} \rightarrow Co(bpy)_3^{3+} + Ru(4,7\text{-}Me_2phen)_3^{2+}$	3.1×10^8		0.25		f.p./oq	P.b.k. at 420-450 nm in soln. contg. 1×10^{-4} mol L^{-1} $Ru(4,7\text{-}Me_2phen)_3^{2+}$, 0.25 mol L^{-1} LiCl and (2-6) $\times 10^{-4}$ mol L^{-1} $Co(bpy)_3^{3+}$ (OQ); $k = 5.1 \times 10^8$ in presence of 0.166 mol L^{-1} Na_2SO_4 and 2.2×10^7 L mol^{-1} s^{-1} in 50% aqueous acetonitrile contg. 0.25 mol L^{-1} LiCl.	85S022
6.39.6	**Tris(3,4,7,8-tetramethyl-1,10-phenanthroline)ruthenium(III) ion**							
	$Co(bpy)_3^{2+} + Ru(3,4,7,8\text{-}Me_4phen)_3^{3+} \rightarrow Co(bpy)_3^{3+} + Ru(3,4,7,8\text{-}Me_4phen)_3^{2+}$	2.0×10^7		0.25		f.p./oq	P.b.k. at 420-450 nm in 50% aqueous acetonitrile soln. contg. 1×10^{-4} mol L^{-1} $Ru(3,4,7,8\text{-}Me_4phen)_3^{2+}$, 0.25 mol L^{-1} LiCl and (2-6) $\times 10^{-4}$ mol L^{-1} $Co(bpy)_3^{3+}$ (OQ).	85S022
6.40	**Tris(1,10-phenanthroline)cobalt(II) ion**							
6.40.1	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$Co(phen)_3^{2+} + Ru(bpy)_3^{3+} \rightarrow Co(phen)_3^{3+} + Ru(bpy)_3^{2+}$	1.4×10^8		1.0	25	f.p./oq	D.k. at 675 nm in soln. contg. 7.5×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.25-2.0) $\times 10^{-3}$ mol L^{-1} $Co(phen)_3^{3+}$ (OQ); the same value was obtained under pseudo-first order conditions with addn. of 1.0×10^{-4} mol L^{-1} $Co(phen)_3^{2+}$; studied at 5-25 °C, $E_a = -4.6 \pm 3.7$ kJ mol^{-1}.	80A003
6.40.2	**Methylene Blue, radical cation**							
	$Co(phen)_3^{2+} + [MB]^{\cdot 2+} + H^+ \rightarrow Co(phen)_3^{3+} + MBH^{2+}$	1.3×10^8				f.p./oq	D.k. at 520 nm in soln. contg. methylene blue and $Co(phen)_3^{3+}$ (OQ).	82A290
6.41	**3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) ion**							
6.41.1	**Diiodine radical ion**							
	$Co(tspc)^{4-} + I_2^{\cdot -} \rightarrow$	6.7×10^9	1	1.0		f.p.	D.k. at ≤420 nm in soln. contg. $Co(tspc)(H_2O)_{2-n}(I)^{(3+n)-}$ (n = 1, 2), 0.1 mol L^{-1} NaI and 0.1 mol L^{-1} $HClO_4$.	79A090
6.41.2	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$Co(tspc)^{4-} + Ru(bpy)_3^{3+} \rightarrow Co(tspc)^{3-} + Ru(bpy)_3^{2+}$	4.5×10^7				f.p./oq	D.k. at 580 nm; mixed dimer contg. 0.005-0.01 mol L^{-1} $Ru(bpy)_3^{2+}$ and (1-5) $\times 10^{-6}$ mol L^{-1} $Co(tspc)^{3-}$ (OQ).	79A090

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.42	**Chloro(pentacyano)cobaltate(II) ion**							
6.42.1	**First-order reaction**							
	$Co(CN)_5Cl^{4-} \rightarrow Co(CN)_5^{3-} + Cl^-$	$>1 \times 10^6$ s^{-1}	4.5-5.5			p.r.	Condy. change in soln. contg. $Co(CN)_5Cl^{3-}$ and 0.5 mol L^{-1} *tert*-BuOH.	771003
6.43	**Pentacyanocobaltate(II) ion**							
6.43.1	**First-order reaction**							
	$Co(CN)_5^{3-} \rightarrow Co(CN)_4^{2-} + CN^-$	1.1×10^4 s^{-1}	4.5-5.5			p.r.	Condy. change in soln. contg. $Co(CN)_6^{3-}$ or $Co(CN)_5Cl^{3-}$ and 0.5 mol L^{-1} *tert*-BuOH.	771003
6.44	**Tetracyanocobaltate(II) ion**							
6.44.1	**First-order reaction**							
	$Co(CN)_4^{2-} \rightarrow Co(CN)_3^- + CN^-$	28 s^{-1}	4.5-5.5			p.r.	Condy. change in soln. contg. $Co(CN)_6^{3-}$ or $Co(CN)_5Cl^{3-}$ and 0.5 mol L^{-1} *tert*-BuOH.	771003
6.45	**Tris(glycinato)cobaltate(II) ion**							
6.45.1	**First-order reaction**							
	$Co(Gly)_3^- \rightarrow Co(Gly)_2 + Gly^-$	4.2×10^3 s^{-1}	3.0-4.5, 8.5		~25	p.r.	Condy. change in Ar-satd. soln. contg. 0.003 mol L^{-1} $Co(Gly)_3$ and 0.2 mol L^{-1} *tert*-BuOH.	90A303
6.45.2	**Hydrogen ion**							
	$Co(Gly)_3^- + H^+ \rightarrow Co(Gly)_2 + GlyH$	2.7×10^7	3.0-4.5		~25	p.r.	Condy. change in Ar-satd. soln. contg. 0.003 mol L^{-1} $Co(Gly)_3$ and 0.2 mol L^{-1} *tert*-BuOH.	90A303
6.46	**Bis(glycinato)cobalt(II)**							
6.46.1	**First-order reaction**							
	$Co(Gly)_2 \rightarrow Co(Gly)^+ + Gly^-$	3.5×10^2 s^{-1}	3.0-4.5, 8.5		~25	p.r.	Condy. change in Ar-satd. soln. contg. 0.003 mol L^{-1} $Co(Gly)_3$ and 0.2 mol L^{-1} *tert*-BuOH.	90A303
6.46.2	**Hydrogen ion**							
	$Co(Gly)_2 + H^+ \rightarrow Co(Gly)^+ + GlyH$	8.1×10^5	3.0-4.5		~25	p.r.	Condy. change in Ar-satd. soln. contg. 0.003 mol L^{-1} $Co(Gly)_3$ and 0.2 mol L^{-1} *tert*-BuOH.	90A303
6.47	**Glycinatocobalt(II) ion**							
6.47.1	**First-order reaction**							
	$Co(Gly)^+ \rightarrow Co^{2+} + Gly^-$	49 s^{-1}	3.0-4.5		~25	p.r.	Condy. change in Ar-satd. soln. contg. 0.003 mol L^{-1} $Co(Gly)_3$ and 0.2 mol L^{-1} *tert*-BuOH.	90A303
6.47.2	**Hydrogen ion**							
	$Co(Gly)^+ + H^+ \rightarrow Co^{2+} + GlyH$	2.1×10^4	3.0-4.5		~25	p.r.	Condy. change in Ar-satd. soln. contg. 0.003 mol L^{-1} $Co(Gly)_3$ and 0.2 mol L^{-1} *tert*-BuOH.	90A303
6.48	**Ethylenediaminetetraacetatocobaltate(II) ion**							
6.48.1	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$CoEDTA^{2-} + Ru(bpy)_3^{3+} \rightarrow CoEDTA^- + Ru(bpy)_3^{2+}$	9×10^3	4.75		25		In 0.05 mol L^{-1} acetate buffer.	85F089
6.48.2	**5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) ion, radical cation**							
	$CoEDTA^{2-} + [ZnTMpyP]^{\cdot 5+} \rightarrow CoEDTA^- + ZnTMpyP^{4+}$	$\sim 2.2 \times 10^9$				f.p./oq	D.k. at 700 nm in Ar-satd. soln. contg. $ZnTMpyP^{4+}$ and $CoEDTA^-$ (OQ).	85A430

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.49	**1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion**							
6.49.1	**Oxygen**							
	$Co(cyclam)^{2+} + O_2 \rightarrow Co(cyclam)(O_2)^{2+}$	1.2×10^7	1-7	0.001-0.1	25	f.p.	P.b.k. at 360 nm in soln. contg. (1-5) × 10^{-4} mol L^{-1} $CH_3Co(cyclam)^{2+}$ or $Co(cyclam)(O_2)^{2+}$ or $CH_3CH_2CH_2Co(cyclam)^{2+}$ and (0.25-1.26) × 10^{-3} mol L^{-1} O_2; $k_r = 63$ s^{-1} at $I = 1.0$ [80M397].	90A079
6.50	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecobalt(II) ion**							
6.50.1	**Oxygen**							
	$Co(aneN_4)^{2+} + O_2 \rightarrow Co(aneN_4)(O_2)^{2+}$	5.0×10^6	1-7	0.001-0.1	25	f.p.	P.b.k. at 360 nm in soln. contg. 2 × 10^{-4} mol L^{-1} $CH_3Co(aneN_4)^{2+}$ or $Co(aneN_4)(O_2)^{2+}$ and (0.25-1.26) × 10^{-3} mol L^{-1} O_2; $k_r = 1.7 \times 10^4$ s^{-1}.	90A079
6.51	**1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosanecobalt(II) ion, conjugate diacid**							
6.51.1	**Tris(1,10-phenanthroline)ruthenium(III) ion**							
	$Co(diamsarH_2)^{4+} + Ru(phen)_3^{3+} \rightarrow Co(diamsarH_2)^{5+} + Ru(phen)_3^{2+}$	7.9×10^6	1	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) × 10^{-5} mol L^{-1} $Ru(phen)_3^{2+}$, 0.001-0.007 mol L^{-1} $Co(diamsar)^{3+}$ (OQ), and 0.1 mol L^{-1} HCl.	84A238
6.52	**1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosanecobalt(II) ion**							
6.52.1	**Tris(1,10-phenanthroline)ruthenium(III) ion**							
	$Co(diamsar)^{2+} + Ru(phen)_3^{3+} \rightarrow Co(diamsar)^{3+} + Ru(phen)_3^{2+}$	9.6×10^7	8.3	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) × 10^{-5} mol L^{-1} $Ru(phen)_3^{2+}$, 0.001-0.007 mol L^{-1} $Co(diamsar)^{3+}$ (OQ), 0.1 mol L^{-1} LiCl and 0.05 mol L^{-1} *N*-ethylmorpholine.	84A238
6.52.2	**Tris(5-chloro-1,10-phenanthroline)ruthenium(III) ion**							
	$Co(diamsar)^{2+} + Ru(5\text{-}Clphen)_3^{3+} \rightarrow Co(diamsar)^{3+} + Ru(5\text{-}Clphen)_3^{2+}$	1.7×10^8	8.1	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 0.2 mol L^{-1} LiCl, 0.05 mol L^{-1} *N*-ethylmorpholine, (2-5) × 10^{-5} mol L^{-1} $Ru(5\text{-}Clphen)_3^{2+}$ and 0.001-0.007 mol L^{-1} $Co(diamsar)^{3+}$ (OQ).	84A238
6.52.3	**Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion**							
	$Co(diamsar)^{2+} + Ru(4,7\text{-}Me_2phen)_3^{3+} \rightarrow Co(diamsar)^{3+} + Ru(4,7\text{-}Me_2phen)_3^{2+}$	3.1×10^7	8.3	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 0.2 mol L^{-1} LiCl, 0.05 mol L^{-1} *N*-ethylmorpholine, (2-5) × 10^{-5} mol L^{-1} $Ru(5\text{-}Clphen)_3^{2+}$ and 0.001-0.007 mol L^{-1} $Co(diamsar)^{3+}$ (OQ).	84A238
6.53	**8-Methyl-1,3,13,16-tetraaza-6,10,19-trithiabicyclo[6.6.6]eicosanecobalt(II) ion**							
6.53.1	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$Co(AZAcapten)^{2+} + Ru(bpy)_3^{3+} \rightarrow Co(AZAcapten)^{3+} + Ru(bpy)_3^{2+}$	~5×10^8				f.p./oq	P.b.k. at 470 nm in soln. contg. $Ru(bpy)_3^{2+}$ and $Co(AZAcapten)^{3+}$ (OQ).	85F222
6.54	**1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(II) ion**							
6.54.1	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$Co(sep)^{2+} + Ru(bpy)_3^{3+} \rightarrow Co(sep)^{3+} + Ru(bpy)_3^{2+}$	5.5×10^8		0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and 0.001-0.007 mol L^{-1} $Co(sep)^{3+}$ (OQ).	84A238

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.54	**1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(II) ion** — Continued							
6.54.2	**Tris(1,10-phenanthroline)ruthenium(III) ion**							
	$Co(sep)^{2+} + Ru(phen)_3^{3+} \rightarrow Co(sep)^{3+} + Ru(phen)_3^{2+}$	6.4×10^8		0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) × 10^{-5} mol L^{-1} $Ru(phen)_3^{2+}$ and 0.001-0.007 mol L^{-1} $Co(sep)^{3+}$ (OQ).	84A238
6.54.3	**Tris(5-chloro-1,10-phenanthroline)ruthenium(III) ion**							
	$Co(sep)^{2+} + Ru(5\text{-}Clphen)_3^{3+} \rightarrow Co(sep)^{3+} + Ru(5\text{-}Clphen)_3^{2+}$	8.2×10^8		0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) × 10^{-5} mol L^{-1} $Ru(5\text{-}Clphen)_3^{2+}$ and 0.001-0.007 mol L^{-1} $Co(sep)^{3+}$ (OQ).	84A238
6.54.4	**Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion**							
	$Co(sep)^{2+} + Ru(4,7\text{-}Me_2phen)_3^{3+} \rightarrow Co(sep)^{3+} + Ru(4,7\text{-}Me_2phen)_3^{2+}$	5.4×10^8		0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) × 10^{-5} mol L^{-1} $Ru(5\text{-}Clphen)_3^{2+}$ and 0.001-0.007 mol L^{-1} $Co(sep)^{3+}$ (OQ).	84A238
6.55	**2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion**							
6.55.1	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$Co(Me_4tetraeneN_4)^{2+} + Ru(bpy)_3^{3+} \rightarrow Co(Me_4tetraeneN_4)^{3+} + Ru(bpy)_3^{2+}$	2.1×10^7		0.1	25	f.p./oq	P.b.k. at 443 nm in soln. contg. $Ru(bpy)_3^{2+}$ and $Co(Me_4tetraeneN_4)^{3+}$ (OQ).	90A221
6.56	**2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion, superoxide adduct**							
6.56.1	**2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion, superoxide adduct**							
	$Co(Me_4tetraeneN_4)(O_2)^+ + Co(Me_4tetraeneN_4)(O_2)^+ \rightarrow$	2.1×10^3	8.0			p.r.	D.k. in soln. contg. 4×10^{-5} mol L^{-1} $Co(Me_4tetraeneN_4)^{2+}$, 0.0013 mol L^{-1} O_2 and 0.25 mol L^{-1} *tert*-BuOH.	771028
6.57	**Iminodiacetatocobaltate(II) ion, superoxide adduct**							
6.57.1	**Iminodiacetatocobalt(II)**							
	$CoIDA(O_2)^- + CoIDA \rightarrow IDACo(O_2)CoIDA^-$	2.4×10^6	7			p.r.	D.k. in O_2-satd. soln. contg. 0.001 mol L^{-1} CoIDA, 0.05 mol L^{-1} formate and 0.001 mol L^{-1} phosphate.	84A284
6.58	**Ethylenediaminetetraacetatocobaltate(II) ion, superoxide adduct**							
6.58.1	**Ethylenediaminetetraacetatocobaltate(II) ion, superoxide adduct**							
	$CoEDTA(O_2)^{3-} + CoEDTA(O_2)^{3-} \rightarrow$	2×10^5	9			p.r.	D.k. at 330 nm in O_2-satd. soln. contg. 0.1 mol L^{-1} formate, 0.01 mol L^{-1} borate and 2.5×10^{-4} mol L^{-1} $CoEDTA^{2-}$. Reaction suggested to generate $(Co(II)EDTA^{2-}, O_2^{2-})$ which decays with $k = 3 \times 10^{-3}$ s^{-1} to give $Co(III)EDTA^- + {}^{\bullet}OH + OH^-$.	84A249
6.59	**Iminodiacetatocobalt(II), H-abstraction product**							
6.59.1	**Iminodiacetatocobalt(II)**							
	$Co[IDA\text{-}H]^{\bullet} + CoIDA \rightarrow$	3.5×10^6	7			p.r.	D.k. in N_2O-satd. soln. contg. CoIDA and 0.001 mol L^{-1} phosphate.	84A284
6.60	**Nitrilotriacetatocobaltate(II) ion, H-abstraction product**							
6.60.1	**First-order reaction**							
	$Co[NTA\text{-}H]^{\bullet -} \rightarrow$	5×10^3 s^{-1}				p.r.	D.k. in N_2O satd. soln. contg. 4×10^{-4} mol L^{-1} $Co(NTA)^-$. Reaction followed or paralleled by second-order decay, $k = 2.5 \times 10^7$, 1×10^6, 3.8×10^5, 2×10^6 L mol^{-1} s^{-1} at pH 3.7, 5.0, 6.5 and 10.0, respectively. *For different results see the following entry.	78A436

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.60	**Nitrilotriacetatocobaltate(II) ion, H-abstraction product** — Continued							
6.60.2	**Nitrilotriacetatocobaltate(II) ion, H-abstraction product**							
	$Co[NTA\text{-}H]^{\bullet -} + Co[NTA\text{-}H]^{\bullet -} \rightarrow$	4.7×10^4	7			p.r.	D.k. at 250 nm in N_2O-satd. soln. contg. $CoNTA^-$ and 0.001 mol L^{-1} phosphate. *For different results see the preceding entry.	79A255
6.61	**Ethylenediaminetetraacetatocobaltate(II) ion, H-abstraction product**							
6.61.1	**First-order reaction**							
	$Co[EDTA\text{-}H]^{\bullet 2-} \rightarrow$	9×10^3 s^{-1}				p.r.	D.k. in N_2O-satd. soln. contg. 4×10^{-4} mol L^{-1} $Co(EDTA)^{2-}$. Reaction followed or paralleled by pH-dependent second-order decay, $k \sim 1.5 \times 10^4$, 3.8×10^3 and 2.5×10^4 L mol^{-1} s^{-1} at pH ~3.5, 6 and 10, respectively; values obtained from graph.	78A436
6.62	**3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) ion, superoxide adduct**							
6.62.1	**3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) ion, superoxide adduct**							
	$Co(tspc)(O_2)^{5-} + Co(tspc)(O_2)^{5-} \rightarrow$	3.4×10^2	7.5			p.r.	D.k. in O_2-satd. soln. contg. (1-10) × 10^{-6} mol L^{-1} $Co(tspc)^{4-}$ and phospshate buffer; unclear whether k or $2k$.	89A497
6.63	**1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion, dioxygen adduct**							
6.63.1	**Iron(II) ion**							
	$Co(cyclam)(O_2)^{2+} + Fe^{2+} \rightarrow$	6.3×10^2	1		25	f.p.	D.k. at 360 nm in soln. contg. O_2, $CH_3Co(cyclam)^{2+}$, Fe^{2+} and 0.1 mol L^{-1} $HClO_4$.	90A079
6.64	**5,10,15,10-Tetrakis(1-methylpyridyl)porphinato(thiocyanato)cobalt(II) ion**							
6.64.1	**First-order reaction**							
	$CoTMpyP(SCN)^{3+} \rightarrow SCN^- + CoTMpyP^{4+}$	7×10^4 s^{-1}				p.r.	D.k. in N_2-satd. soln. contg. $Co(III)TMpyP(SCN)^{4+}$ and 5% 2-PrOH.	90B077
6.65	**Cobaltocene**							
6.65.1	**Hydrogen ion**							
	$CoCp_2 + H^+ \rightarrow$	42	0.3-2.1			p.r.	D.k. at 340 nm in Ar-satd. soln. contg. ~10^{-5} mol L^{-1} $CoCp_2^+$ and 0.0081-0.47 mol L^{-1} H^+.	88A066
6.66	**Pentaammine(1-methyl-4,4'-bipyridinium)cobalt(III) ion, electron adduct**							
6.66.1	**Pentaammine(1-methyl-4,4'-bipyridinium)cobalt(III) ion**							
	$[Co(NH_3)_5(mbpy)]^{\bullet 3+} + Co(NH_3)_5(mbpy)^{4+} \rightarrow Co(NH_3)_5(mbpy)^{4+} + Co(NH_3)_5(mbpy)^{3+}$	5.4×10^7	7.2		25	p.r.	D.k. at 600 nm in N_2O-satd. soln. contg. (5-200) × 10^{-5} mol L^{-1} $Co(NH_3)_5(mbpy)^{4+}$ and 0.1 mol L^{-1} formate.	89A115
6.66.2	**Pentaammine(1-methyl-4,4'-bipyridinium)cobalt(III) ion, electron adduct**							
	$[Co(NH_3)_5(mbpy)]^{\bullet 3+} + [Co(NH_3)_5(mbpy)]^{\bullet 3+} \rightarrow Co(NH_3)_5(mbpy)^{4+} + [Co(NH_3)_5(mbpy)]^{\bullet 2+}$	1.2×10^8	7.2		25	p.r.	D.k. at 600 nm in N_2O-satd. soln. contg. (5-200) × 10^{-5} mol L^{-1} $Co(NH_3)_5(mbpy)^{4+}$ and 0.1 mol L^{-1} formate.	89A115

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.67	**Pentaammine(4-nitrobenzoato)cobalt(III) ion, electron adduct**							
6.67.1	**Oxygen**							
	$[Co(NH_3)_5O_2CC_6H_4\text{-}4\text{-}NO_2]^{\cdot+} + O_2 \rightarrow$	2.2×10^9	6.9			p.r.	D.k. in soln. contg. 0.001 mol L^{-1} pentaammine(4-nitrobenzoato)cobalt(III) ion, 0.1 mol L^{-1} formate, 1×10^{-4} mol L^{-1} O_2 and 0.023 mol L^{-1} N_2O.	771027
6.67.2	**2-Methyl-1,4-naphthoquinone**							
	$[Co(NH_3)_5O_2CC_6H_4\text{-}4\text{-}NO_2]^{\cdot+} + 2\text{-}CH_3NQ \rightarrow Co(NH_3)_5O_2CC_6H_4\text{-}4\text{-}NO_2^{2+} + [2\text{-}CH_3NQ]^{\cdot-}$	1.6×10^9	6.7			p.r.	D.k. and p.b.k. in soln. contg. 0.002 mol L^{-1} pentaammine(4-nitrobenzoato)cobalt(III) ion, 0.1 mol L^{-1} formate, 5×10^{-5} mol L^{-1} menaquinone and 0.025 mol L^{-1} N_2O.	771027
6.68	**Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) radical anion**							
6.68.1	**Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) ion**							
	$[Co(NH_3)_5(O_2CCH_2py\text{-}4\text{-}CONH_2)]^{\cdot 2+} + Co(NH_3)_5(O_2CCH_2py\text{-}4\text{-}CONH_2)^{3+} \rightarrow Co(NH_3)_5(O_2CCH_2py\text{-}4\text{-}CONH_2)^{3+} + Co(NH_3)_5(O_2CCH_2py\text{-}4\text{-}CONH_2)^{2+}$	1.5×10^9	4.5-5.5	22	p.r.	D.k. in N_2O-satd. soln. contg. (5-30) × 10^{-5} mol L^{-1} CoL^{3+} and 0.1 mol L^{-1} 2-PrOH or formate.	83B029
6.69	**Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) radical, protonated**							
6.69.1	**Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) ion**							
	$[Co(NH_3)_5(HO_2CCH_2py\text{-}4\text{-}CONH_2)]^{\cdot 3+} + Co(NH_3)_5(O_2CCH_2py\text{-}4\text{-}CONH_2)^{3+} \rightarrow Co(NH_3)_5(O_2CCH_2py\text{-}4\text{-}CONH_2)^{3+} + Co(NH_3)_5(O_2CCH_2py\text{-}4\text{-}CONH_2)^{2+} + H^+$	1.6×10^8	1	22	p.r.	D.k. in N_2O-satd. soln. contg. (5-30) × 10^{-5} mol L^{-1} CoL^{3+} and 0.1 mol L^{-1} 2-PrOH or formate.	83B029
6.70	**Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) radical anion**							
6.70.1	**Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) ion**							
	$[Co(NH_3)_5(O_2CCH(CH_3)py\text{-}4\text{-}CONH_2)]^{\cdot 2+} + Co(NH_3)_5(O_2CCH(CH_3)py\text{-}4\text{-}CONH_2)^{3+} \rightarrow Co(NH_3)_5(O_2CCH(CH_3)py\text{-}4\text{-}CONH_2)^{3+} + Co(NH_3)_5(O_2CCH(CH_3)py\text{-}4\text{-}CONH_2)^{2+}$	1.4×10^9	4.5-5.5	22	p.r.	D.k. in N_2O-satd. soln. contg. (5-30) × 10^{-5} mol L^{-1} CoL^{3+} and 0.1 mol L^{-1} 2-PrOH or formate.	83B029
6.71	**Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) radical, protonated**							
6.71.1	**Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) ion**							
	$[Co(NH_3)_5(HO_2CCH(CH_3)py\text{-}4\text{-}CONH_2)]^{\cdot 3+} + Co(NH_3)_5(O_2CCH(CH_3)py\text{-}4\text{-}CONH_2)^{3+} \rightarrow Co(NH_3)_5(O_2CCH(CH_3)py\text{-}4\text{-}CONH_2)^{3+} + Co(NH_3)_5(O_2CCH(CH_3)py\text{-}4\text{-}CONH_2)^{2+} + H^+$	1.5×10^8	1	22	p.r.	D.k. in N_2O-satd. soln. contg. (5-30) × 10^{-5} mol L^{-1} CoL^{3+} and 0.1 mol L^{-1} 2-PrOH or formate.	83B029
6.72	**Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) radical anion**							
6.72.1	**Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) ion**							
	$[Co(NH_3)_5(O_2C(CH_2)_3py\text{-}4\text{-}CONH_2)]^{\cdot 2+} + Co(NH_3)_5(O_2C(CH_2)_3py\text{-}4\text{-}CONH_2)^{3+} \rightarrow Co(NH_3)_5(O_2C(CH_2)_3py\text{-}4\text{-}CONH_2)^{3+} + Co(NH_3)_5(O_2C(CH_2)_3py\text{-}4\text{-}CONH_2)^{2+}$	1.0×10^8	4.5-5.5	22	p.r.	D.k. in N_2O-satd. soln. contg. (5-30) × 10^{-5} mol L^{-1} CoL^{3+} and 0.1 mol L^{-1} 2-PrOH or formate.	83B029
6.73	**Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) radical, protonated**							
6.73.1	**Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) ion**							
	$[Co(NH_3)_5(HO_2C(CH_2)_3py\text{-}4\text{-}CONH_2)]^{\cdot 3+} + Co(NH_3)_5(O_2C(CH_2)_3py\text{-}4\text{-}CONH_2)^{3+} \rightarrow Co(NH_3)_5(O_2C(CH_2)_3py\text{-}4\text{-}CONH_2)^{3+} + Co(NH_3)_5(O_2C(CH_2)_3py\text{-}4\text{-}CONH_2)^{2+} + H^+$	3.0×10^7	1	22	p.r.	D.k. in N_2O-satd. soln. contg. (5-30) × 10^{-5} mol L^{-1} CoL^{3+} and 0.1 mol L^{-1} 2-PrOH or formate.	83B029

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.74	**3,10,17,24-Tetrasulfophthalocyaninecobaltate(III) radical anion (reduced ligand)**							
6.74.1	**Oxygen**							
	$[Co(tspc)]^{\cdot 4-} + O_2 \rightarrow$	1.7×10^5	1-3			f.p.	D.k. at 520 nm in soln. contg. $[Co(tspc)]_2^{6-}$, 4.8 and 16×10^{-4} mol L^{-1} O_2 and 0.001-0.1 mol L^{-1} $HClO_4$.	79A090
6.75	**3,10,17,24-Tetrasulfophthalocyaninecobaltate(III) radical anion (oxidized ligand)**							
6.75.1	**2-Propanol**							
	$[Co(tspc)]^{\cdot 2-}$ + 2-PrOH →	2.6×10^3	1			f.p.	D.k. at 480 nm in soln. contg. $[Co(tspc)]_2^{6-}$, 0.1-0.6 mol L^{-1} 2-PrOH and 0.1 mol L^{-1} $HClO_4$.	79A090
6.76	**Dibromo(iminodiacetato)cobaltate(III) ion**							
6.76.1	**First-order reaction**							
	$CoIDABr_2^- \rightarrow CoIDA(Br) + Br^-$	9.5×10^3 s^{-1}	7			p.r.	P.b.k. at 270 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} NaBr, CoIDA and 0.001 mol L^{-1} phosphate.	84A284
6.77	**Bromo(iminodiacetato)cobalt(III)**							
6.77.1	**First-order reaction**							
	$CoIDA(Br) \rightarrow CoIDA^+ + Br^-$	5.4×10^2 s^{-1}	7			p.r.	D.k. at 270 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} NaBr, CoIDA and 0.001 mol L^{-1} phosphate.	84A284
6.78	**Hydroxy(iminodiacetato)cobalt(III)**							
6.78.1	**First-order reaction**							
	$CoIDA(OH) \rightarrow CoIDA^+ + OH^-$	1.2×10^4 s^{-1}	7			p.r.	D.k. in N_2O-satd. soln. contg. CoIDA and 0.001 mol L^{-1} phosphate.	84A284
6.79	**Ethylenediaminetetraacetatocobaltate(III) ion, superoxide adduct**							
6.79.1	**Ethylenediaminetetraacetatocobaltate(III) ion, superoxide adduct**							
	$CoEDTA(O_2)^{2-} + CoEDTA(O_2)^{2-} + 2\,H_2O \rightarrow O_2 + H_2O_2 + 2\,OH^- + 2\,CoEDTA^-$	3.4×10^2	9			p.r.	D.k. at 330 nm in O_2-satd. soln. contg. 0.1 mol L^{-1} formate, 5×10^{-5} mol L^{-1} $CoEDTA^-$ and 0.01 mol L^{-1} borate.	84A249
6.80	**Hydrido-*N-rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(III) ion**							
6.80.1	**Carbon dioxide radical anion**							
	N-rac-Co(4,11-dieneN$_4$)(H)$^{2+}$ + $CO_2^{\cdot -}$ →	6×10^9			25	p.r.		91A513
6.81	**Hydrido-*prim-N-rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(III) ion**							
6.81.1	**2-Hydroxy-2,2-dimethylethyl**							
	prim-N-rac-Co(4,11-dieneN$_4$)(H)$^{2+}$ + $^{\cdot}CH_2C(CH_3)_2OH$ → *tert*-BuOH + *N-rac*-Co(4,11-dieneN$_4$)$^{2+}$	2×10^8			25	p.r.	Estd. from d.k. in soln. contg. 0.5 mol L^{-1} *tert*-BuOH and $H_2PO_4^-$.	91A513
6.82	**Hydroxymethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion**							
6.82.1	**First-order reaction**							
	$HOCH_2Co(4,11\text{-dieneN}_4)^{2+} \rightarrow$ *N-rac*-Co(4,11-dieneN$_4$)$^+$ + HCHO + H^+	0.1 s^{-1}	1-6			p.r.	D.k. in N_2O-satd. soln. contg. (1-10) × 10^{-4} mol L^{-1} Co(4,11-dieneN$_4$)$^{2+}$ and 1 mol L^{-1} MeOH.	78A200

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.83	**1-Hydroxyethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion**							
6.83.1	**First-order reaction**							
	$HOCH(CH_3)Co(4,11\text{-dieneN}_4)^{2+} \rightarrow$	~2×10^3 s^{-1} 100 s^{-1}	1 7			p.r.	D.k. in N_2O-satd. soln. contg. (1-10) × 10^{-4} mol L^{-1} $Co(4,11\text{-dieneN}_4)^{2+}$ and 1 mol L^{-1} EtOH.	78A200
6.84	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene(2,2,2-trifluoro-1-hydroxyethyl)cobalt(III) ion**							
6.84.1	**First-order reaction**							
	$HOCH(CF_3)Co(4,11\text{-dieneN}_4)^{2+} \rightarrow$	6×10^{-2} s^{-1}	6			p.r.	D.k. in N_2O-satd. soln. contg. (1-10) × 10^{-4} mol L^{-1} $Co(4,11\text{-dieneN}_4)^{2+}$ and 1 mol L^{-1} CF_3CH_2OH.	78A200
6.85	**1,2-Dihydroxyethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion**							
6.85.1	**First-order reaction**							
	$HOCH_2CHOHCo(4,11\text{-dieneN}_4)^{2+} \rightarrow$ $HCOCH_2Co(4,11\text{-dieneN}_4)^{2+} + H_2O$	15 s^{-1} 4 s^{-1}	3.5 5.0			p.r.	D.k. in N_2O-satd. soln. contg. (1-10) × 10^{-4} mol L^{-1} $Co(4,11\text{-dieneN}_4)^{2+}$ and 1 mol L^{-1} ethylene glycol. Product decays to $Co(4,11\text{-dieneN}_4)^{3+}$ + CH_3CHO with $k = 1.3 + 1.5 \times 10^5[H^+]$ s^{-1}.	78A200
6.86	**1-Methylethyltetrakis(4-sulfonatophenyl)porphinatocobaltate(III) ion**							
6.86.1	**First-order reaction**							
	$(CH_3)_2CHCoTPPS^{4-} \rightarrow CoTPPS^{5-} +$ $CH_3CH{=}CH_2 + H^+$	≤3.3×10^{-1} s^{-1} 2.9 s^{-1}	8 13	21		p.r.	D.k. in N_2O-satd. soln. contg. 5×10^{-5} mol L^{-1} $CoTPPS^{4-}$ and 0.02 mol L^{-1} diisopropyl sulfoxide.	83A088
6.87	**Hydroxymethyltetrakis(4-sulfonatophenyl)porphinatocobaltate(III) ion**							
6.87.1	**First-order reaction**							
	$HOCH_2CoTPPS^{4-} \rightarrow CoTPPS^{5-} + HCHO +$ H^+	3.6×10^2 s^{-1}	8	21		p.r.	D.k. at 565 nm and p.b.k. at 450 and 490 nm in N_2O-satd. soln. contg. 5×10^{-5} mol L^{-1} $CoTPPS^{4-}$ and 1.5 mol L^{-1} MeOH.	83A088
6.88	**1-Hydroxy-1-methylethyltetrakis(4-sulfonatophenyl)porphinatocobaltate(III) ion**							
6.88.1	***First-order reaction***							
	$HO(CH_3)_2CCoTPPS^{4-} \rightarrow CoTPPS^{5-} +$ $CH_3COCH_3 + H^+$	6.2×10^3 s^{-1}	8	21		p.r.	D.k. at 555 nm and p.b.k. at 450 and 515 nm in N_2O-satd. soln. contg. 5×10^{-5} mol L^{-1} $CoTPPS^{4-}$ and 1.5 mol L^{-1} 2-PrOH.	83A088
6.89	**(Methyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion**							
6.89.1	**Water**							
	$CH_3Co(tspc)^{4-} + H_2O \rightarrow Co(tspc)^{3-} + CH_4 +$ OH^-	3.0 s^{-1}	6.1			p.r.	D.k. at 450 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} DMSO and 2×10^{-5} mol L^{-1} $Co(tspc)^{4-}$. Reaction preceded by first-order process, $k = 2.5 \times 10^3$ s^{-1}, suggested to represent radical migration from ligand to metal center.	89A150

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.90	**(2-Hydroxy-2,2-dimethylethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion**							
6.90.1	**First-order reaction**							
	$HOC(CH_3)_2CH_2Co(tspc)^{4-} \rightarrow (CH_3)_2C{=}CH_2Co(tspc)^{3-} + OH^-$	15 s^{-1}	6.1			p.r.	D.k. in N_2O-satd. soln. contg. *tert*-BuOH and $Co(tspc)^{4-}$. Reaction preceded by first-order process, $k = 2 \times 10^3$ s^{-1}, suggested to represent radical migration from ligand to metal center. Reaction followed by first-order process, $k = 4$ s^{-1}, suggested to represent formation of $Co(tspc)^{3-}$ and $(CH_3)_2C{=}CH_2$.	89A150
6.91	**(2-Hydroxy-1-methylpropyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion**							
6.91.1	**Water**							
	$CH_3CHOHCH(CH_3)Co(tspc)^{4-} + H_2O \rightarrow Co(tspc)^{3-} + OH^- + CH_3CH{=}CHCH_3$	6 s^{-1}	6.1			p.r.	D.k. in N_2O-satd. soln. contg. 2-butene and $Co(tspc)^{4-}$. Reaction preceded by first-order process, $k = 2.4 \times 10^3$ s^{-1}, suggested to represent radical migration from ligand to metal center.	89A150
6.92	**(2-Hydroxyethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion**							
6.92.1	**First-order reaction**							
	$HOCH_2CH_2Co(tspc)^{4-} \rightarrow Co(tspc)^{3-} + OH^- + H_2C{=}CH_2$	5 s^{-1}	6.1			p.r.	D.k. in N_2O-satd. soln. contg. ethylene and $Co(tspc)^{4-}$. Reaction preceded by first-order process, $k = 1.2 \times 10^3$ s^{-1}, suggested to represent radical migration from ligand to metal center.	89A150
6.93	**(2-Hydroxy-1-methylethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion**							
6.93.1	**First-order reaction**							
	$HOCH_2CH(CH_3)Co(tspc)^{4-} \rightarrow Co(tspc)^{3-} + OH^- + CH_3CH{=}CH_2$	8 s^{-1}	6.1			p.r.	D.k. in N_2O-satd. soln. contg. 2-butene and $Co(tspc)^{4-}$. Reaction preceded by first-order process, $k = 1.0 \times 10^3$ s^{-1}, suggested to represent radical migration from ligand to metal center.	89A150
6.94	**Bromocob(III)alamin**							
6.94.1	**Water**							
	B12-Br + H_2O → B12a + Br^-	6.4×10^2 s^{-1}	~4.5	0.01-0.11	22	p.r.	D.k. at 365 or 380 nm in N_2O-satd. soln. contg. cob(II)alamin and 0.01-0.11 mol L^{-1} bromide ion. Reaction preceded by first-order process, $k = -1 \times 10^4$ s^{-1}, suggested to represent loss of Br^- from initially formed dibromine adduct.	79A046

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.95	**Pentaammine(pyridine)cobalt(III) ion, OH adduct**							
6.95.1	**First-order reaction**							
	* $[Co(NH_3)_5pyOH]^{\cdot 3+}$	8.5×10^3 s^{-1}	2.9-7.2			p.r.	D.k. at 330 nm in N_2O-satd. soln. contg. $Co(NH_3)_5py^{3+}$; suggested to represent ligand modification. Followed by another process which is second-order at pH 3 and pH 9 ($k = 1.8 \times 10^5$ and 1.9×10^7 L mol^{-1} s^{-1}, respectively) and first-order but pH-dependent between pH 5.2 ($k = 6.0$ s^{-1}) and pH 7.8 ($k = 125$ s^{-1}); latter process suggested to represent disproportionation of coordinated radical in competition with intramolecular electron transfer ($k = 2.3 \times 10^{-2}$ s^{-1} at pH 3 and 11 s^{-1} at pH 7) or deprotonation by OH^- of coordinated radical ($k = 1.8 \times 10^8$ L mol^{-1} s^{-1}). *For different observations concerning the decay of $[Co(NH_3)_5pyOH]^{\cdot 3+}$ see the following entry.	79A213
6.95.2	**Pentaammine(pyridine)cobalt(III) ion, OH adduct**							
	* $[Co(NH_3)_5pyOH]^{\cdot 3+} + [Co(NH_3)_5pyOH]^{\cdot 3+}$	6.5×10^8	5.9		22	p.r.	D.k. in N_2O-satd. soln. contg. (1-20) × 10^{-4} mol L^{-1} $Co(NH_3)_5py^{3+}$; followed by two first-order processes, $k = 40$ and 0.3 s^{-1}, respectively. *For different observations concerning the decay of $[Co(NH_3)_5pyOH]^{\cdot 3+}$ see the preceding entry.	76A265
6.95.3	**Oxygen**							
	$[Co(NH_3)_5pyOH]^{\cdot 3+} + O_2 \rightarrow$	4.4×10^8	5.2			p.r.	D.k. at 330 nm in N_2O-satd. soln. contg. $Co(NH_3)_5py^{3+}$.	79A213
6.96	**Pentaammine(nicotinamide)cobalt(III) ion, OH adduct**							
6.96.1	**Pentaammine(nicotinamide)cobalt(III) ion, OH adduct**							
	$[Co(NH_3)_5naOH]^{\cdot 3+} + [Co(NH_3)_5naOH]^{\cdot 3+} \rightarrow$	1.5×10^9	5.9		22	p.r.	D.k. in N_2O-satd. soln. contg. (1-20) × 10^{-4} mol L^{-1} $Co(NH_3)_5na^{3+}$.	76A265
6.97	**Pentaammine(isonicotinamide)cobalt(III) ion, OH adduct**							
6.97.1	**Pentaammine(isonicotinamide)cobalt(III) ion, OH adduct**							
	$[Co(NH_3)_5isnOH]^{\cdot 3+} + [Co(NH_3)_5isnOH]^{\cdot 3+} \rightarrow$	3.0×10^9	5.9		22	p.r.	D.k. in N_2O-satd. soln. contg. (1-20) × 10^{-4} mol L^{-1} $Co(NH_3)_5isn^{3+}$.	76A265
6.98	**Tris(2,2'-bipyridine)cobalt(III) ion, OH adduct**							
6.98.1	**Ferricyanide ion**							
	$[Co(bpy)_2(bpyOH)]^{\cdot 3+} + Fe(CN)_6^{3-} \rightarrow$	2.1×10^8	~6			p.r.	D.k. at 370-440 nm in N_2O-satd. soln. contg. (1-2) × 10^{-4} mol L^{-1} $Co(bpy)_3^{3+}$.	90A015
6.98.2	**Oxygen**							
	$[Co(bpy)_2(bpyOH)]^{\cdot 3+} + O_2 \rightarrow$	5.5×10^5	~6			p.r.	D.k. at 375 and 425 nm in N_2O-satd. soln. contg. 6.0×10^{-4} mol L^{-1} $Co(bpy)_3^{3+}$.	90A015

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.99	**Cobalt(III) ion**							
6.99.1	**Thionine semiquinone, conjugate monoacid**							
	$Co^{3+} + [ThH]^{\cdot+} \rightarrow Co^{2+} + Th^{+} + H^{+}$	3.0×10^{9}	2.5	0.2		f.p./oq	D.k. of semithionine in soln. contg. Co^{2+} and thionine (OQ).	777315
6.100	**Chlorocobalt(III) ion**							
6.100.1	**2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion**							
	$CoCl^{2+} + Co(Me_4tetraeneN_4)^{2+} \rightarrow Co^{2+} + Co(Me_4tetraeneN_4)Cl^{2+}$	1.5×10^{7}	0		25	f.p.	D.k. at 540 nm in deaerated soln.	79A016
6.100.2	***N-rac*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(II) ion**							
	$CoCl^{2+} + N\text{-}rac\text{-}Co(4,11\text{-}dieneN_4)^{2+} \rightarrow Co^{2+} + Co(4,11\text{-}dieneN_4)Cl^{2+}$	1.6×10^{6}	2	0.1	25	f.p.	D.k. at 340 nm in deaerated soln.	79A016
6.100.3	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecopper(II) ion**							
	$CoCl^{2+} + Cu(aneN_4)^{2+} \rightarrow Co^{2+} + Cu(aneN_4)Cl^{2+}$	4.5×10^{3}	0		25	f.p.	P.b.k. at 344 nm in soln. contg. 5×10^{-5} mol L^{-1} $Co(NH_3)_5Cl^{2+}$, 0.01-0.9 mol L^{-1} Cl^- and Co^{2+}.	83A271
6.100.4	**Iron(II) ion**							
	$CoCl^{2+} + Fe^{2+} \rightarrow Co^{2+} + FeCl^{2+}$	1.0×10^{4}	0		25	f.p.	Spectral changes in soln. contg. 5×10^{-5} mol L^{-1} $Co(NH_3)_5Cl^{2+}$, 0.5-0.9 mol L^{-1} Cl^- and Co^{2+}.	83A271
6.100.5	**5,7-Dimethyl-1,4,8,11-tetraazacyclotetradeca-4,7-dienenickel(II) ion**							
	$CoCl^{2+} + Ni(Me_2\text{-}4,7\text{-}dieneN_4)^{2+} \rightarrow Co^{2+} + Ni(Me_2\text{-}4,7\text{-}dieneN_4)Cl^{2+}$	1.2×10^{7}	0		25	f.p.	P.b.k. at 344 nm in soln. contg. 5×10^{-5} mol L^{-1} $Co(NH_3)_5Cl^{2+}$, 0.01-0.9 mol L^{-1} Cl^- and Co^{2+}.	83A013 83A271
6.100.6	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(II) ion**							
	$CoCl^{2+} + Ni(aneN_4)^{2+} \rightarrow Co^{2+} + Ni(aneN_4)Cl^{2+}$	5.3×10^{7}	0		25	f.p.	P.b.k. at 344 nm in soln. contg. 5×10^{-5} mol L^{-1} $Co(NH_3)_5Cl^{2+}$, 0.01-0.9 mol L^{-1} Cl^- and Co^{2+}.	83A271
6.100.7	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(II) ion**							
	$CoCl^{2+} + Ni(4,11\text{-}dieneN_4)^{2+} \rightarrow Co^{2+} + Ni(4,11\text{-}dieneN_4)Cl^{2+}$	7.9×10^{5}	0		25	f.p.	P.b.k. at 344 nm in soln. contg. 5×10^{-5} mol L^{-1} $Co(NH_3)_5Cl^{2+}$, 0.01-0.9 mol L^{-1} Cl^- and Co^{2+}.	83A271
6.100.8	**2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenenickel(II) ion**							
	$CoCl^{2+} + Ni(Me_4tetraeneN_4)^{2+} \rightarrow Co^{2+} + Ni(Me_4tetraeneN_4)Cl^{2+}$	1.6×10^{5}	0		25	f.p.	P.b.k. at 344 nm in soln. contg. 5×10^{-5} mol L^{-1} $Co(NH_3)_5Cl^{2+}$, 0.01-0.9 mol L^{-1} Cl^- and Co^{2+}.	83A271
6.101	**Aqua(methyl)nitrilotriacetatocobaltate(III) ion**							
6.101.1	**Water**							
	$CH_3CoNTA(H_2O)^- + H_2O \rightarrow {}^{\cdot}CH_3 + CoNTA(H_2O)_2^-$	60 s^{-1}	6.2-6.5			p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L^{-1} DMSO, (0.5-4) $\times 10^{-3}$ mol L^{-1} $CoNTA^-$, 5×10^{-5} mol L^{-1} O_2 or (0.1-1) $\times 10^{-4}$ mol L^{-1} O_2 and 0.001 mol L^{-1} $CoNTA^-$. k obtained as intercept from plot of k_{obs}^{-1} vs $[O_2]^{-1}$ or $[CoNTA^-]$; $k_r = 1.6 \times 10^{8}$ L mol^{-1} s^{-1} [88A343].	89A204
6.101.2	**Methyl**							
	$CH_3CoNTA(H_2O)^- + {}^{\cdot}CH_3 + H_2O \rightarrow CoNTA(H_2O)_2^- + C_2H_6$	3.8×10^{7}				p.r.	D.k. in N_2O-satd. soln. contg. $CoSO_4$, NTA and DMSO.	89A204 88A343

TABLE 6. Rate constants for cobalt transients — Continued

Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.102 Aqua(hydroxymethyl)nitrilotriacetatocobaltate(III) ion							
6.102.1 Water							
$HOCH_2CoNTA(H_2O)^- + H_2O \rightarrow {}^{\bullet}CH_2OH + CoNTA(H_2O)_2^-$	6.9×10^3 s^{-1} 3.9×10^4 s^{-1} 5.5×10^5 s^{-1}	4-7		7 25 55	p.r.	D.k. at 260 nm in N_2O-satd. soln. contg. (1-50) × 10^{-4} mol L^{-1} CoNTA$^-$ and 0.2-1 mol L^{-1} MeOH; pK_a = 4.7. $\Delta H\ddagger$ = 66.9 kJ mol^{-1}, $\Delta S\ddagger$ = 68.2 J K^{-1} mol^{-1}. $k_r = 9.7 \times 10^7$, 2.0×10^8 and 4.1×10^8 L mol^{-1} s^{-1} at 7, 25 and 55 °C respectively. $\Delta H\ddagger$ = 20 kJ mol^{-1}, $\Delta S\ddagger$ = −19.2 J K^{-1} mol^{-1}.	88A343
6.102.2 Hydroxymethyl							
$HOCH_2CoNTA(H_2O)^- + {}^{\bullet}CH_2OH + H_2O \rightarrow CoNTA(H_2O)_2^- + HOCH_2CH_2OH$	5×10^8			25	p.r.	Calcd. from d.k. at 260 nm in N_2O-satd. soln. contg. (1-50) × 10^{-4} mol L^{-1} CoNTA$^-$ and 0.2-1 mol L^{-1} MeOH.	88A343
6.103 Aqua(1-hydroxyethyl)nitrilotriacetatocobaltate(III) ion							
6.103.1 1-Hydroxyethyl							
$HOCH(CH_3)CoNTA(H_2O)^- + CH_3\dot{C}HOH + H_2O \rightarrow CoNTA(H_2O)_2^-$ + other products.	3×10^8			25	p.r.	Calcd. from d.k. at 260 nm in N_2O-satd. soln. contg. (1-50) × 10^{-4} mol L^{-1} CoNTA$^-$ and 0.2-1 mol L^{-1} EtOH, CH_3CHO and butane-2,3-diol detected as products.	88A343
6.103.2 Water							
$HOCH(CH_3)CoNTA(H_2O)^- + H_2O \rightarrow CH_3\dot{C}HOH + CoNTA(H_2O)_2^-$	1.0×10^5 s^{-1}	4-7		25	p.r.	D.k. at 260 nm in N_2O-satd. soln. contg. (1-50) × 10^{-4} mol L^{-1} CoNTA$^-$ and 0.2-1 mol L^{-1} EtOH; pK_a = 3.9; $k_r = 9.7 \times 10^7$ L mol^{-1} s^{-1}.	88A343
6.104 Aqua(carboxymethyl)nitrilotriacetatocobaltate(III) ion							
6.104.1 First-order reaction							
$O_2CCH_2CoNTA(H_2O)^{2-} \rightarrow$	8.8×10^2 s^{-1}			25	p.r.	D.k. in N_2O-satd. soln. contg. CoNTA$^-$ and acetate. Reaction suggested to represent an isomerization.	88A343
6.104.2 Water							
$O_2CCH_2CoNTA(H_2O)^{2-} + H_2O \rightarrow {}^{\bullet}CH_2CO_2^- + CoNTA(H_2O)_2^-$	$\leq 1 \times 10^3$ s^{-1}	4-7		25	p.r.	D.k. at 260 nm in N_2O-satd. soln. contg. (1-50) × 10^{-4} mol L^{-1} CoNTA$^-$ and 0.2-1 mol L^{-1} AcOH; $k_r = 1.5 \times 10^7$ L mol^{-1} s^{-1}.	88A343
6.105 Aqua(1-ethoxyethyl)nitrilotriacetatocobaltate(III) ion							
6.105.1 Water							
$C_2H_5OCH(CH_3)CoNTA(H_2O)^- + H_2O \rightarrow CH_3\dot{C}HOC_2H_5 + CoNTA(H_2O)_2^-$	4.0×10^5 s^{-1}	4-7		25	p.r.	D.k. at 260 nm in N_2O-satd. soln. contg. (1-50) × 10^{-4} mol L^{-1} CoNTA$^-$ and 0.2-1 mol L^{-1} Et_2O; $k_r = 4.9 \times 10^7$ L mol^{-1} s^{-1}.	88A343
6.106 Aqua(1-hydroxy-1-methylethyl)nitrilotriacetatocobaltate(III) ion							
6.106.1 Water							
$HOC(CH_3)_2CoNTA(H_2O)^- + H_2O \rightarrow (CH_3)_2\dot{C}OH + CoNTA(H_2O)_2^-$	3.7×10^4 s^{-1}	4-7		25	p.r.	D.k. at 260 nm in N_2O-satd. soln. contg. (1-50) × 10^{-4} mol L^{-1} CoNTA$^-$ and 0.2-1 mol L^{-1} 2-PrOH; pK_a = 4.5; $k_r = 2.3 \times 10^7$ L mol^{-1} s^{-1}.	88A343

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.106	**Aqua(1-hydroxy-1-methylethyl)nitrilotriacetatocobaltate(III) ion — Continued**							
6.106.2	**1-Hydroxy-1-methylethyl**							
	$HOC(CH_3)_2CoNTA(H_2O)^- + (CH_3)_2\dot{C}OH \rightarrow CoNTA(H_2O)_2^- +$ other products	1.5×10^7	6-8		25	p.r.	Calcd. from d.k. at 260 nm in N_2O-satd. soln. contg. (1-50) × 10^{-4} mol L^{-1} $CoNTA^-$ and 0.2-1 mol L^{-1} 2-PrOH; acetone detected as product.	88A343
6.107	**Aqua(bromo)nitrilotriacetatocobaltate(III) ion**							
6.107.1	**Water**							
	$CoNTA(Br)(H_2O)^- + H_2O \rightarrow CoNTA(H_2O)_2 + Br^-$	5.6 s^{-1} 610 s^{-1}	4.9 10.4		25	p.r.	D.k. in N_2O-satd. soln. contg. $CoNTA^-$ and Br^-.	88A343
6.108	**Aqua(hydroxymethyl)[*N*-(2-hydroxyethyl)-*N*,*N*',*N*'-ethylenediaminetriacetato]cobaltate(III) ion**							
6.108.1	**First-order reaction**							
	$HOCH_2CoHEDTA(H_2O)^- \rightarrow$	1.8×10^{-2} s^{-1} 1.0×10^{-2} s^{-1}	4.1 10.3		25	p.r.	D.k.; $pK_a = 9.0$.	88A343
6.108.2	**Water**							
	$HOCH_2CoHEDTA(H_2O)^- + H_2O \rightarrow {}^{\bullet}CH_2OH + CoHEDTA(H_2O)^-$	≤60 s^{-1}			25	p.r.	D.k.; $k_r = 1.25 \times 10^7$ L mol^{-1} s^{-1}.	88A343
6.109	***O*-Sulfito(tetraethylenepentamine)cobalt(III) ion**							
6.109.1	**First-order reaction**							
	$Co(tetren)OSO_2^+ + H^+ \rightarrow Co(tetren)(OH)^{2+} + SO_2$	3.1×10^3 s^{-1}			25	f.p.	D.k. at 290 nm in soln. contg. 3.4 × 10^{-4} mol L^{-1} $Co(tetren)SO_3^+$ and varied [$HClO_4$]. Reaction also investigated as a function of [MeOH], [CH_3CN] and [DMSO].	88A405
6.110	**Decaammine-μ-peroxidodicobalt(III) ion**							
6.110.1	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$[Co(NH_3)_5]_2(O_2)^{4+} + Ru(bpy)_3^{3+} \rightarrow [Co(NH_3)_5]_2(O_2)^{5+} + Ru(bpy)_3^{2+}$	1.3×10^7	0			f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $[(NH_3)_5Co]_2(O_2)^{5+}$ (OQ) and 1 mol L^{-1} HCl.	81A065
6.111	**μ-Amido-μ-peroxidooctakisamminedicobalt(III) ion**							
6.111.1	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$NH_2[Co(NH_3)_4]_2(O_2)^{3+} + Ru(bpy)_3^{3+} \rightarrow NH_2[Co(NH_3)_4]_2(O_2)^{4+} + Ru(bpy)_3^{2+}$	3.4×10^5	0			f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $NH_2[Co(NH_3)_4]_2(O_2)^{4+}$ (OQ) and 1 mol L^{-1} HCl.	81A065
6.112	**μ-Amido-μ-peroxidotetrakis(ethylenediamine)dicobalt(III) ion**							
6.112.1	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$NH_2[Co(en)_2]_2(O_2)^{3+} + Ru(bpy)_3^{3+} \rightarrow NH_2[Co(en)_2]_2(O_2)^{4+} + Ru(bpy)_3^{2+}$	2.5×10^6	0			f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $NH_2[Co(en)_2]_2(O_2)^{4+}$ (OQ) and 1 mol L^{-1} HCl; $k = 7.6 \times 10^5$ L mol^{-1} s^{-1} detd. by s.f.	81A065
6.113	**μ-Amido-μ-peroxidotetrakis(2,2'-bipyridine)dicobalt(III) ion**							
6.113.1	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$NH_2[Co(bpy)_2]_2(O_2)^{3+} + Ru(bpy)_3^{3+} \rightarrow NH_2[Co(bpy)_2]_2(O_2)^{4+} + Ru(bpy)_3^{2+}$	3.0×10^8	0			f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $NH_2[Co(bpy)_2]_2(O_2)^{4+}$ (OQ) and 1 mol L^{-1} HCl.	81A065

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
6.114	**μ-Amido-μ-peroxidotetrakis(1,10-phenanthroline)dicobalt(III) ion**							
6.114.1	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$NH_2[Co(phen)_2]_2(O_2)^{3+} + Ru(bpy)_3^{3+} \rightarrow NH_2[Co(phen)_2]_2(O_2)^{4+} + Ru(bpy)_3^{2+}$	3.6×10^8	0			f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $NH_2[Co(phen)_2]_2(O_2)^{4+}$ (OQ) and 1 mol L^{-1} HCl.	81A065
6.115	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocobaltate(III), radical cation**							
6.115.1	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocobaltate(III), radical cation**							
	$[CoTPPS]^{\cdot 2-} + [CoTPPS]^{\cdot 2-} \rightarrow$	2.1×10^9	7			p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. 0.01 mol L^{-1} KBr.	86S115

TABLE 7. Rate constants for chromium transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
7.1	**Chromium(I) ion**							
7.1.1	**First-order reaction**							
	$Cr^{+} \rightarrow$	$\leq 5 \times 10^{3}$ s^{-1}	3.0-4.3		22	p.r.	D.k. at 350 nm in Ar-satd. soln. contg. Cr(II). Reaction thought to be $Cr^{+} + H_2O$ in competition with $Cr^{+} + H_2O_2$. H_2 detected as product.	741142
7.2	**Chromium(II) ion**							
7.2.1	**Permanganate ion**							
	$Cr^{2+} + MnO_4^{-} \rightarrow$	4×10^{9}			20	p.r.	D.k. at 545 nm in soln. contg. 10^{-5} mol L^{-1} MnO_4^{-} and $(0.2\text{-}1.9) \times 10^{-3}$ mol L^{-1} Cr^{3+}.	650385
7.2.2	**Hydrogen peroxide**							
	$Cr^{2+} + H_2O_2 \rightarrow CrOH^{2+} + {}^{\bullet}OH$	7.1×10^{4}		1.0	25	f.p.	D.k. in soln. contg. $\geq 1 \times 10^{-4}$ mol L^{-1} $CrCHCl_2^{2+}$ (or $CrCH_2OCH_3^{2+}$) and $(0.19\text{-}2.58) \times 10^{-3}$ mol L^{-1} H_2O_2; s.f. experiments gave the same value.	83A047
7.2.3	**Oxygen**							
	$Cr^{2+} + O_2 \rightarrow CrO_2^{2+}$	1.6×10^{8}	2.6-4.3	0.1	25	p.r.	P.b.k at 300 nm in soln. contg. 0.5 mol L^{-1} *tert*-BuOH, (2 or 10) × 10^{-3} mol L^{-1} Cr^{3+} and (2.6 or 13) × 10^{-4} mol L^{-1} O_2.	761134 751063
		1.9×10^{8}	3.4		25	p.r.	C.k. with 1,4-benzoquinone in soln. contg. O_2, 10^{-2} mol L^{-1} Cr^{3+} and 0.5 mol L^{-1} *tert*-BuOH; assumed $k(Cr^{2+}$ + 1,4-benzoquinone) = 3.2×10^{8} L mol^{-1} s^{-1}.	761134
		1.6×10^{8}	1-3			p.r.	P.b.k. at 290 nm in soln. contg. (1-40) × 10^{-3} mol L^{-1} Cr^{3+} and (0.25-1.25) × 10^{-3} mol L^{-1} O_2.	751215
7.2.4	**9,10-Anthraquinone-2,6-disulfonate ion**							
	$Cr^{2+} + 2,6\text{-diSO}_3AQ^{2-} \rightarrow Cr^{3+} + [2,6\text{-diSO}_3AQ]^{\bullet 3-}$	2.8×10^{9}	7.0			p.r.	P.b.k. in soln. contg. ~1 mol L^{-1} *tert*-BuOH, 5×10^{-3} mol L^{-1} $Cr(ClO_4)_3$, 5×10^{-5} mol L^{-1} 2,6-$diSO_3AQ^{2-}$ and ~1 × 10^{-3} mol L^{-1} phosphates.	751032
7.2.5	**1,4-Benzoquinone**							
	$Cr^{2+} + Q \rightarrow Cr^{3+} + Q^{\bullet -}$	* 3.2×10^{8}	3.4	0.1	25	p.r.	P.b.k. at 410 nm in soln. contg. 0.5 mol L^{-1} *tert*-BuOH, 10^{-2} mol L^{-1} Cr^{3+} and (2.5-37.5) × 10^{-5} mol L^{-1} Q.	761134
		* 3.5×10^{9}	7.0			p.r.	P.b.k. in soln. contg. ~1 mol L^{-1} *tert*-BuOH, 5×10^{-3} mol L^{-1} $Cr(ClO_4)_3$, 5×10^{-5} mol L^{-1} Q and ~1 × 10^{-3} mol L^{-1} phosphates.	751032
							* Unexplained discrepancy in these data.	
7.2.6	**Tetranitromethane**							
	$Cr^{2+} + C(NO_2)_4 \rightarrow Cr^{3+} + {}^{\bullet}NO_2 + C(NO_2)_3^{-}$	1.2×10^{8}	3.4	0.1	25	p.r.	P.b.k. at 350 nm in deaerated soln. contg. ~1 mol L^{-1} *tert*-BuOH, 10^{-2} mol L^{-1} Cr^{3+} and (3.18-18.6) × 10^{-5} mol L^{-1} tetranitromethane.	761134

TABLE 7. Rate constants for chromium transients — Continued

No. Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
7.3 *trans*-Diaqua-1,4,8,11-tetraazacyclotetradecanechromium(II) ion							
7.3.1 1,1'-Dimethyl-4,4'-bipyridinium							
trans-Cr(cyclam)$(H_2O)_2^{2+}$ + MV^{2+} → *trans*-Cr(cyclam)$(H_2O)_2^{3+}$ + $MV^{\cdot+}$	4.5×10^5 [Cl^-]	1.3-3	0.05	25	f.p./rq	P.b.k. at 600 nm in soln. contg. *trans*-Cr(cyclam)$(NH_3)_2^{3+}$, $MV^{\cdot+}$ (RQ) and (1-50) × 10^{-3} mol L^{-1} H^+. Reaction preceded by rapid aquation of Cr(cyclam)$(NH_3)_2^{2+}$. Rate proportional to [Cl^-].	90A428
7.3.2 Benzyl bromide							
trans-Cr(cyclam)$(H_2O)_2^{2+}$ + $C_6H_5CH_2Br$ → BrCr(cyclam)$(H_2O)^{2+}$ + $C_6H_5\dot{C}H_2$ + H_2O	9.2×10^3				f.p./rq	Soln. contg. *trans*-Cr(cyclam)$(NH_3)_2^{3+}$ and $MV^{\cdot+}$ (RQ); monitored by reaction of benzyl radical with $MV^{\cdot+}$. Reaction preceded by rapid aquation of Cr(cyclam)$(NH_3)_2^{2+}$.	90A428
7.3.3 *tert*-Butyl hydroperoxide							
trans-Cr(cyclam)$(H_2O)_2^{2+}$ + $(CH_3)_3COOH$ → *trans*-Cr(cyclam)$(H_2O)_2^{3+}$ + $^{\cdot}CH_3$ + CH_3COCH_3 + OH^-	1.5×10^5				f.p./rq	Soln. contg. *trans*-Cr(cyclam)$(NH_3)_2^{3+}$ and $MV^{\cdot+}$ (RQ); monitored by reaction of methyl radical with $MV^{\cdot+}$. Reaction preceded by rapid aquation of Cr(cyclam)$(NH_3)_2^{2+}$.	90A428
7.4 Tris(2,2'-bipyridine)chromium(II) ion							
7.4.1 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanesilver(II) ion							
Cr$(bpy)_3^{2+}$ + Ag$(aneN_4)^{2+}$ → Cr$(bpy)_3^{3+}$ + Ag$(aneN_4)^+$	1.3×10^8	4	0.03		p.r	N_2-satd. soln. contg. alcohol as OH scavenger.	88A334
7.4.2 Tris(2,2'-bipyridine)silver(II) ion							
Cr$(bpy)_3^{2+}$ + Ag$(bpy)_3^{2+}$ → Cr$(bpy)_3^{3+}$ + Ag$(bpy)_3^+$	3.7×10^8	4	0.1		p.r	N_2-satd. soln. contg. alcohol as OH scavenger.	88A334
7.4.3 Tris(2,2'-bipyridine)cobalt(III) ion							
Cr$(bpy)_3^{2+}$ + Co$(bpy)_3^{3+}$ → Cr$(bpy)_3^{3+}$ + Co$(bpy)_3^{2+}$	1.1×10^8	5.8	0.15	23	f.p./rq	D.k. at 560 nm in Ar-satd. soln. contg. Cr$(bpy)_3^{3+}$, EDTA (RQ) or $C_2O_4^{2-}$ (RQ) and Co$(bpy)_3^{3+}$.	88A514
7.4.4 Tris(1,10-phenanthroline)cobalt(III) ion							
Cr$(bpy)_3^{2+}$ + Co$(phen)_3^{3+}$ → Cr$(bpy)_3^{3+}$ + Co$(phen)_3^{2+}$	1.3×10^8	5.8	0.15	23	f.p./rq	D.k. at 560 nm in Ar-satd. soln. contg. Cr$(bpy)_3^{3+}$, EDTA (RQ) or $C_2O_4^{2-}$ (RQ) and Co$(phen)_3^{3+}$.	88A514
7.4.5 1,4,8,11-Tetraazacyclotetradecanecobalt(III) ion							
Cr$(bpy)_3^{2+}$ + Co$(cyclam)^{3+}$ → Cr$(bpy)_3^{3+}$ + Co$(cyclam)^{2+}$	4.4×10^7	~0		25	f.p./rq	D.k. in soln. contg. (0.6-8) × 10^{-4} mol L^{-1} Co$(cyclam)^{3+}$, (0.8-2.5) × 10^{-5} mol L^{-1} Cr$(bpy)_3^{3+}$, Co$(cyclam)^{2+}$ (RQ) and 1.0 mol L^{-1} H_2SO_4.	89A050
7.4.6 3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) radical cation							
Cr$(bpy)_3^{2+}$ + $[Co(tspc)]^{\cdot 3-}$ → Cr$(bpy)_3^{3+}$ + Co$(tspc)^{4-}$	8.2×10^8	2			f.p./rq	P.b.k. at 560 nm in soln. contg. mixed dimer, ≤ 10^{-6} mol L^{-1} Co$(tspc)^{4-}$ (RQ), (5-10) × 10^{-3} mol L^{-1} Cr$(bpy)_3^{3+}$ and 10^{-2} mol L^{-1} $HClO_4$.	79A090
7.4.7 Iron(III) ion							
Cr$(bpy)_3^{2+}$ + Fe^{3+} → Cr$(bpy)_3^{3+}$ + Fe^{2+}	9.2×10^8 9.1×10^8 1.0×10^8	0 1 1	1.0 1.0 0.15	25	f.p./rq	D.k. at 560 nm in Ar-satd. soln. contg. Cr$(bpy)_3^{3+}$, Fe^{2+} (RQ), $HClO_4$ and excess Fe^{3+}.	88A104
	1.0×10^9	0		15	f.p./rq	D.k. in soln. contg. Cr$(bpy)_3^{3+}$, Fe^{2+} (RQ) and 1 mol L^{-1} $HClO_4$.	84E387
7.4.8 Chloroiron(III) complexes							
Cr$(bpy)_3^{2+}$ + $FeCl_x^{(3-x)+}$ → Cr$(bpy)_3^{3+}$ + $FeCl_x^{(2-x)+}$	1.4×10^9	0		15	f.p./rq	D.k. in soln. contg. Cr$(bpy)_3^{3+}$, $FeCl_x^{(2-x)+}$ (RQ) and 1 mol L^{-1} HCl.	84E387

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
7.4	**Tris(2,2'-bipyridine)chromium(II) ion** — Continued							
7.4.8	**Chloroiron(III) complexes** — Continued							
		1.4×10^9	0	1	~23	f.p./rq	D.k. at 420 nm in soln. contg. $Cr(bpy)_3^{3+}$, 1 mol L^{-1} HCl and $FeCl_x^{(2-x)+}$ (RQ).	81A060
7.4.9	**Sulfatoiron(III) ion**							
	$Cr(bpy)_3^{2+} + FeSO_4^+ \rightarrow Cr(bpy)_3^{3+} + FeSO_4$	7.3×10^8	3	0.2		f.p./rq	D.k. in soln. contg. 5×10^{-5} mol L^{-1} $Cr(bpy)_3^{3+}$ and 2×10^{-3} mol L^{-1} $FeSO_4^+$ (RQ).	767517
7.4.10	**Oxygen**							
	$Cr(bpy)_3^{2+} + O_2 \rightarrow Cr(bpy)_3^{3+} + O_2^{\cdot -}$	6.0×10^5	5.8	0.15	22	f.p./rq	D.k. at 560 nm in soln. contg. (1.0-3.3) $\times 10^{-4}$ mol L^{-1} $Cr(bpy)_3^{3+}$, 0.05 or 0.1 mol L^{-1} oxalate (RQ) or 1.4×10^{-3} mol L^{-1} EDTA (RQ) and varied [O_2].	88A233
7.4.11	**Tetraammine(difluoro)platinum(IV) ion**							
	$Cr(bpy)_3^{2+} + Pt(NH_3)_4F_2^{2+} \rightarrow Cr(bpy)_3^{3+} + Pt(NH_3)_4F_2^+$	4.0×10^5		0.1	20	f.p./rq	Air-satd. soln. contg. $Cr(bpy)_3^{3+}$ and EDTA (RQ).	92A471
7.4.12	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$Cr(bpy)_3^{2+} + Ru(bpy)_3^{3+} \rightarrow Cr(bpy)_3^{3+} + Ru(bpy)_3^{2+}$	2.6×10^9	3	0.2		f.p./rq or oq	D.k. in soln. contg. 1×10^{-4} mol L^{-1} $Cr(bpy)_3^{3+}$ (OQ) and 3.3×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ (RQ).	767517
7.4.13	**Sulfur dioxide**							
	$Cr(bpy)_3^{2+} + SO_2 \rightarrow Cr(bpy)_3^{3+} + SO_2^{\cdot -}$	3.0×10^7	~0		25	f.p./rq	D.k. in soln. contg. (1-5) $\times 10^{-3}$ mol L^{-1} $Co(cyclam)^{2+}$ (RQ), (1-7.5) $\times 10^{-3}$ mol L^{-1} SO_2, $Cr(bpy)_3^{3+}$ and 1.0 mol L^{-1} H_2SO_4; $k = 3.4 \times 10^7$ L mol^{-1} s^{-1} in the presence of 1.0 mol L^{-1} $HClO_4$.	89A050
7.4.14	**Uranyl(VI) ion**							
	$Cr(bpy)_3^{2+} + UO_2^{2+} \rightarrow Cr(bpy)_3^{3+} + UO_2^+$	1.6×10^6	1.7	0.1	25	f.p./rq	D.k. at 560 nm in soln. contg. 5×10^{-5} mol L^{-1} $Cr(bpy)_3^{3+}$, ~5×10^{-6} mol L^{-1} $Cr(bpy)_3^{2+}$, (6-15) $\times 10^{-5}$ mol L^{-1} UO_2^+ (RQ) and (2.5-10) $\times 10^{-4}$ mol L^{-1} UO_2^{2+}; [H^+] = 0.02 mol L^{-1}.	88A065
7.4.15	**Tetranitromethane**							
	$Cr(bpy)_3^{2+} + C(NO_2)_4 \rightarrow Cr(bpy)_3^{3+} + C(NO_2)_3^- + {}^{\cdot}NO_2$	~3×10^9	7		22	f.p.		88A233
7.5	**Tris(2,2'-bipyridine)chromium(III), EDTA radical addn. product**							
7.5.1	**Tris(2,2'-bipyridine)chromium(III) ion**							
	$Cr(bpy)_2(bpy\text{-}'EDTA')^+ + Cr(bpy)_3^{3+} \rightarrow Cr(bpy)_2(bpy\text{-}'EDTA')^{2+} + Cr(bpy)_3^{2+}$	1.4×10^9			25	f.p./rq	D.k. at 605 nm in soln. contg. $Cr(bpy)_3^{3+}$ and EDTA (RQ); transient suggested to be ligand addition product (of EDTA radical).	89A289
7.6	**Tris(4,4'-dimethyl-2,2'-bipyridine)chromium(II) ion**							
7.6.1	**Tris(ethylenediamine)cobalt(III) ion**							
	$Cr(4,4'\text{-}Me_2bpy)_3^{2+} + Co(en)_3^{3+} \rightarrow Cr(4,4'\text{-}Me_2bpy)_3^{3+} + Co(en)_3^{2+}$	6.6×10^4	5.8	0.15	23	f.p./rq	D.k. at 560 nm in Ar-satd. soln. contg. $Cr(4,4'\text{-}Me_2bpy)_3^{3+}$, EDTA (RQ) or $C_2O_4^{2-}$ (RQ) and $Co(en)_3^{3+}$.	88A514
7.6.2	**Tris(2,2'-bipyridine)cobalt(III) ion**							
	$Cr(4,4'\text{-}Me_2bpy)_3^{2+} + Co(bpy)_3^{3+} \rightarrow Cr(4,4'\text{-}Me_2bpy)_3^{3+} + Co(bpy)_3^{2+}$	2.8×10^8	5.8	0.15	23	f.p./rq	D.k. at 560 nm in Ar-satd. soln. contg. $Cr(4,4'\text{-}Me_2bpy)_3^{3+}$, EDTA (RQ) or $C_2O_4^{2-}$ (RQ) and $Co(bpy)_3^{3+}$.	88A514

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
7.6	**Tris(4,4'-dimethyl-2,2'-bipyridine)chromium(II) ion** — Continued							
7.6.3	**Tris(1,10-phenanthroline)cobalt(III) ion**							
	$Cr(4,4'\text{-}Me_2bpy)_3^{2+} + Co(phen)_3^{3+} \rightarrow Cr(4,4'\text{-}Me_2bpy)_3^{3+} + Co(phen)_3^{2+}$	3.6×10^8	5.8	0.15	23	f.p./rq	D.k. at 560 nm in Ar-satd. soln. contg. $Cr(4,4'\text{-}Me_2bpy)_3^{3+}$, EDTA (RQ) or $C_2O_4^{2-}$ (RQ) and $Co(phen)_3^{3+}$.	88A514
7.6.4	**1,4,8,11-Tetraazacyclotetradecanecobalt(III) ion**							
	$Cr(4,4'\text{-}Me_2bpy)_3^{2+} + Co(cyclam)^{3+} \rightarrow Cr(4,4'\text{-}Me_2bpy)_3^{3+} + Co(cyclam)^{2+}$	$\sim 7 \times 10^8$	~0		25	f.p./rq	D.k. in soln. contg. $(0.6\text{-}8) \times 10^{-4}$ mol L^{-1} $Co(cyclam)^{3+}$, $(0.8\text{-}2.5) \times 10^{-5}$ mol L^{-1} $Cr(4,4'\text{-}Me_2bpy)_3^{3+}$, $Co(cyclam)^{2+}$ (RQ) and 1.0 mol L^{-1} H_2SO_4.	89A050
7.6.5	**Chloroiron(III) complexes**							
	$Cr(4,4'\text{-}Me_2bpy)_3^{2+} + FeCl_x^{(3-x)+} \rightarrow Cr(4,4'\text{-}Me_2bpy)_3^{3+} + FeCl_x^{(2-x)+}$	1.1×10^{10}	0	1	~23	f.p./rq	D.k. in soln. contg. $Cr(4,4'\text{-}Me_2bpy)_3^{3+}$, 1 mol L^{-1} HCl and $FeCl_x^{(2-x)+}$ (RQ).	81A060
7.6.6	**Sulfatoiron(III) ion**							
	$Cr(4,4'\text{-}Me_2bpy)_3^{2+} + FeSO_4^{+} \rightarrow Cr(4,4'\text{-}Me_2bpy)_3^{3+} + FeSO_4$	7.0×10^8	1.2	0.15	~25	p.r.	D.k. at 420 nm in Ar-satd. soln. contg. $Cr(4,4'\text{-}Me_2bpy)_3^{3+}$, 0.05 mol L^{-1} H_2SO_4, 0.52 mol L^{-1} 2-PrOH and $FeSO_4$.	81A060
7.6.7	**Oxygen**							
	$Cr(4,4'\text{-}Me_2bpy)_3^{2+} + O_2 \rightarrow Cr(4,4'\text{-}Me_2bpy)_3^{3+} + O_2^{\bullet -}$	1.4×10^7	5.8	0.15	22	f.p./rq	D.k. at 560 or 480 nm in soln. contg. $(1.0\text{-}1.6) \times 10^{-4}$ mol L^{-1} $Cr(4,4'\text{-}Me_2bpy)_3^{3+}$, 0.05 mol L^{-1} oxalate (RQ) or 1.4×10^{-3} mol L^{-1} EDTA (RQ) and varied $[O_2]$.	88A233
		1.8×10^7	5.8	0.15	22	f.p./rq	D.k. at 560 nm in soln. contg. $(1.0\text{-}1.6) \times 10^{-4}$ mol L^{-1} $Cr(4,4'\text{-}Me_2bpy)_3^{3+}$, 0.01 mol L^{-1} Fe^{2+} (RQ) and varied $[O_2]$.	88A233
7.6.8	**Tetraammine(difluoro)platinum(IV) ion**							
	$Cr(4,4'\text{-}Me_2bpy)_3^{2+} + Pt(NH_3)_4F_2^{2+} \rightarrow Cr(4,4'\text{-}Me_2bpy)_3^{3+} + Pt(NH_3)_4F_2^{+}$	1.6×10^6		0.1	20	f.p./rq	Air-satd. soln. contg. $Cr(4,4'\text{-}Me_2bpy)_3^{3+}$ and EDTA (RQ).	92A471
7.6.9	**Uranyl(VI) ion**							
	$Cr(4,4'\text{-}Me_2bpy)_3^{2+} + UO_2^{2+} \rightarrow Cr(4,4'\text{-}Me_2bpy)_3^{3+} + UO_2^{+}$	$\sim 1.6 \times 10^7$	2.7	0.1	25	f.p./rq	D.k. at 560 nm in soln. contg. 8×10^{-5} mol L^{-1} $Cr(4,4'\text{-}Me_2bpy)_3^{3+}$, $\sim 8 \times 10^{-6}$ mol L^{-1} $Cr(4,4'\text{-}Me_2bpy)_3^{2+}$, $(1.5\text{-}3) \times 10^{-4}$ mol L^{-1} UO_2^{+} (RQ) and $(0.5\text{-}2.0) \times 10^{-3}$ mol L^{-1} UO_2^{2+}; $[H^+] = 0.002$ mol L^{-1}; k obtained by extrapolation to higher values of the $[UO_2^{+}]/[UO_2^{2+}]$ ratio.	88A065
7.7	**Tris(4,4'-diphenyl-2,2'-bipyridine)chromium(II) ion**							
7.7.1	**Chloroiron(III) complexes**							
	$Cr(4,4'\text{-}Ph_2bpy)_3^{2+} + FeCl_x^{(3-x)+} \rightarrow Cr(4,4'\text{-}Ph_2bpy)_3^{3+} + FeCl_x^{(2-x)+}$	1.6×10^9	0	1	~23	f.p./rq	D.k. in soln. contg. $Cr(4,4'\text{-}Ph_2bpy)_3^{3+}$, 1 mol L^{-1} HCl and $FeCl_x^{(2-x)+}$ (RQ).	81A060
7.8	**Tris(1,10-phenanthroline)chromium(II) ion**							
7.8.1	**Tris(2,2'-bipyridine)cobalt(III) ion**							
	$Cr(phen)_3^{2+} + Co(bpy)_3^{3+} \rightarrow Cr(phen)_3^{3+} + Co(bpy)_3^{2+}$	2.0×10^8	5.8	0.15	23	f.p./rq	D.k. at 430 nm in Ar-satd. soln. contg. $Cr(phen)_3^{3+}$, EDTA (RQ) or $C_2O_4^{2-}$ (RQ) and $Co(bpy)_3^{3+}$.	88A514
7.8.2	**Tris(1,10-phenanthroline)cobalt(III) ion**							
	$Cr(phen)_3^{2+} + Co(phen)_3^{3+} \rightarrow Cr(phen)_3^{3+} + Co(phen)_3^{2+}$	2.0×10^8	5.8	0.15	23	f.p./rq	D.k. at 430 nm in Ar-satd. soln. contg. $Cr(phen)_3^{3+}$, EDTA (RQ) or $C_2O_4^{2-}$ (RQ) and $Co(phen)_3^{3+}$.	88A514

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
7.8	**Tris(1,10-phenanthroline)chromium(II) ion** — Continued							
7.8.3	**1,4,8,11-Tetraazacyclotetradecanecobalt(III) ion**							
	$Cr(phen)_3^{2+} + Co(cyclam)^{3+} \rightarrow Cr(phen)_3^{3+} + Co(cyclam)^{2+}$	1.3×10^8	~0		25	f.p./rq	D.k. in soln. contg. $(0.6\text{-}8) \times 10^{-4}$ mol L^{-1} $Co(cyclam)^{3+}$, $(0.8\text{-}2.5) \times 10^{-5}$ mol L^{-1} $Cr(phen)_3^{3+}$, $Co(cyclam)^{2+}$ (RQ) and 1.0 mol L^{-1} H_2SO_4.	89A050
7.8.4	**Chloroiron(III) complexes**							
	$Cr(phen)_3^{2+} + FeCl_x^{(3-x)+} \rightarrow Cr(phen)_3^{3+} + FeCl_x^{(2-x)+}$	1.3×10^9	0	1	~23	f.p./rq	D.k. in soln. contg. $Cr(phen)_3^{3+}$, 1 mol L^{-1} HCl and $FeCl_x^{(2-x)+}$ (RQ).	81A060
7.8.5	**Oxygen**							
	$Cr(phen)_3^{2+} + O_2 \rightarrow Cr(phen)_3^{3+} + O_2^{\cdot-}$	1.5×10^6	5.8	0.15	22	f.p./rq	D.k. at 430, 450 or 690 nm in soln. contg. $(1.0\text{-}3.3) \times 10^{-4}$ mol L^{-1} $Cr(phen)_3^{3+}$, 0.05 or 0.1 mol L^{-1} oxalate (RQ) or 1.4×10^{-3} mol L^{-1} EDTA (RQ) and varied $[O_2]$.	88A233
7.8.6	**Sulfur dioxide**							
	$Cr(phen)_3^{2+} + SO_2 \rightarrow Cr(phen)_3^{3+} + SO_2^{\cdot-}$	9.5×10^7	~0		25	f.p./rq	D.k. in soln. contg. $(1\text{-}5) \times 10^{-3}$ mol L^{-1} $Co(cyclam)^{2+}$ (RQ), $(1\text{-}2.5) \times 10^{-3}$ mol L^{-1} SO_2, $Cr(phen)_3^{3+}$ and 1.0 mol L^{-1} H_2SO_4.	89A050
7.8.7	**Uranyl(VI) ion**							
	$Cr(phen)_3^{2+} + UO_2^{2+} \rightarrow Cr(phen)_3^{3+} + UO_2^{+}$	2.4×10^6	2.7	0.1	25	f.p./rq	D.k. at 430 nm in soln. contg. 8×10^{-5} mol L^{-1} $Cr(phen)_3^{3+}$, $\sim 8 \times 10^{-6}$ mol L^{-1} $Cr(phen)_3^{2+}$, 1.5×10^{-4} mol L^{-1} UO_2^{+} (RQ) and $1\text{-}2 \times 10^{-3}$ mol L^{-1} UO_2^{2+}; $[H^+] = 0.002$ mol L^{-1}.	88A065
7.9	**Tris(1,10-phenanthroline)chromium(III), EDTA radical addn. product**							
7.9.1	**Tris(1,10-phenanthroline)chromium(III) ion**							
	$Cr(phen)_2(phen\text{-}'EDTA')^{+} + Cr(phen)_3^{3+} \rightarrow Cr(phen)_2(phen\text{-}'EDTA')^{2+} + Cr(phen)_3^{2+}$	1.7×10^9			25	f.p./rq	D.k. at 605 nm in soln. contg. $Cr(phen)_3^{3+}$ and EDTA (RQ); transient suggested to be ligand addition product (of EDTA radical).	89A289
7.10	**Tris(1,10-phenanthroline)chromium(III), carboxyl radical addn. product**							
7.10.1	**Tris(1,10-phenanthroline)chromium(III) ion**							
	$Cr(phen)_2(phen\text{-}CO_2)^{2+} + Cr(phen)_3^{3+} \rightarrow Cr(phen)_2(phen\text{-}CO_2)^{3+} + Cr(phen)_3^{2+}$	8.2×10^8			25	f.p./rq	D.k. at 605 nm in soln. contg. $Cr(phen)_3^{3+}$ and $C_2O_4^{2-}$ (RQ); transient suggested to be ligand addition product (of $^{\cdot}CO_2^{-}$ radical).	89A289
7.11	**Tris(5-chloro-1,10-phenanthroline)chromium(II) ion**							
7.11.1	**Tris(2,2'-bipyridine)cobalt(III) ion**							
	$Cr(5\text{-}Clphen)_3^{2+} + Co(bpy)_3^{3+} \rightarrow Cr(5\text{-}Clphen)_3^{3+} + Co(bpy)_3^{2+}$	1.2×10^8	5.8	0.15	23	f.p./rq	D.k. at 440 nm in Ar-satd. soln. contg. $Cr(5\text{-}Clphen)_3^{3+}$, EDTA (RQ) or $C_2O_4^{2-}$ (RQ) and $Co(bpy)_3^{3+}$.	88A514
7.11.2	**Tris(1,10-phenanthroline)cobalt(III) ion**							
	$Cr(5\text{-}Clphen)_3^{2+} + Co(phen)_3^{3+} \rightarrow Cr(5\text{-}Clphen)_3^{3+} + Co(phen)_3^{2+}$	1.6×10^8	5.8	0.15	23	f.p./rq	D.k. at 440 nm in Ar-satd. soln. contg. $Cr(5\text{-}Clphen)_3^{3+}$, EDTA (RQ) or $C_2O_4^{2-}$ (RQ) and $Co(phen)_3^{3+}$.	88A514
7.11.3	**1,4,8,11-Tetraazacyclotetradecanecobalt(III) ion**							
	$Cr(5\text{-}Clphen)_3^{2+} + Co(cyclam)^{3+} \rightarrow Cr(5\text{-}Clphen)_3^{3+} + Co(cyclam)^{2+}$	1.7×10^7	~0		25	f.p./rq	D.k. in soln. contg. $(0.6\text{-}8) \times 10^{-4}$ mol L^{-1} $Co(cyclam)^{3+}$, $(0.8\text{-}2.5) \times 10^{-5}$ mol L^{-1} $Cr(5\text{-}Clphen)_3^{3+}$, $Co(cyclam)^{2+}$ (RQ) and 1.0 mol L^{-1} H_2SO_4.	89A050

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
7.11	**Tris(5-chloro-1,10-phenanthroline)chromium(II) ion** — Continued							
7.11.4	**Chloroiron(III) complexes**							
	$Cr(5\text{-}Clphen)_3^{2+} + FeCl_x^{(3-x)+} \rightarrow Cr(5\text{-}Clphen)_3^{3+} + FeCl_x^{(2-x)+}$	6.1×10^8	0	1	~23	f.p./rq	D.k. in soln. contg. $Cr(5\text{-}Clphen)_3^{3+}$, 1 mol L^{-1} HCl and $FeCl_x^{(2-x)+}$ (RQ).	81A060
7.11.5	**Oxygen**							
	$Cr(5\text{-}Clphen)_3^{2+} + O_2 \rightarrow Cr(5\text{-}Clphen)_3^{3+} + O_2^{\bullet -}$	2.5×10^5	5.8	0.15	22	f.p./rq	D.k. at 440 nm in soln. contg. (1.0-1.6) $\times 10^{-4}$ mol L^{-1} $Cr(5\text{-}Clphen)_3^{3+}$, 0.05 mol L^{-1} oxalate (RQ) and varied $[O_2]$.	88A233
7.11.6	**Tetraammine(difluoro)platinum(IV) ion**							
	$Cr(5\text{-}Clphen)_3^{2+} + Pt(NH_3)_4F_2^{2+} \rightarrow Cr(5\text{-}Clphen)_3^{3+} + Pt(NH_3)_4F_2^{+}$	1.1×10^5		0.1	20	f.p./rq	Air-satd. soln. contg. $Cr(5\text{-}Clphen)_3^{3+}$ and EDTA (RQ).	92A471
7.11.7	**Sulfur dioxide**							
	$Cr(5\text{-}Clphen)_3^{2+} + SO_2 \rightarrow Cr(5\text{-}Clphen)_3^{3+} + SO_2^{\bullet -}$	6.8×10^6	~0		25	f.p./rq	D.k. in soln. contg. (1-5) $\times 10^{-3}$ mol L^{-1} $Co(cyclam)^{2+}$ (RQ), (1-11) $\times 10^{-3}$ mol L^{-1} SO_2, $Cr(5\text{-}Clphen)_3^{3+}$ and 1.0 mol L^{-1} H_2SO_4.	89A050
7.11.8	**Uranyl(VI) ion**							
	$Cr(5\text{-}Clphen)_3^{2+} + UO_2^{2+} \rightarrow Cr(5\text{-}Clphen)_3^{3+} + UO_2^{+}$	5.4×10^5	2.7	0.1	25	f.p./rq	D.k. at 440 nm in soln. contg. 8×10^{-5} mol L^{-1} $Cr(5\text{-}Clphen)_3^{3+}$, ~$8 \times 10^{-6}$ mol L^{-1} $Cr(5\text{-}Clphen)_3^{2+}$, 1.5×10^{-4} mol L^{-1} UO_2^{+} (RQ) and 1-2 $\times 10^{-3}$ mol L^{-1} UO_2^{2+}; $[H^+] = 0.002$ mol L^{-1}.	88A065
7.12	**Tris(5-chloro-1,10-phenanthroline)chromium(III), EDTA radical addn. product**							
7.12.1	**Tris(5-chloro-1,10-phenanthroline)chromium(III) ion**							
	$Cr(5\text{-}Clphen)_2(5\text{-}Clphen\text{-}'EDTA')^{+} + Cr(5\text{-}Clphen)_3^{3+} \rightarrow Cr(5\text{-}Clphen)_2(5\text{-}Clphen\text{-}'EDTA')^{2+} + Cr(5\text{-}Clphen)_3^{2+}$	1.4×10^9			25	f.p./rq	D.k. at 605 nm in soln. contg. $Cr(5\text{-}Clphen)_3^{3+}$ and EDTA (RQ); transient suggested to be ligand addition product (of EDTA radical).	89A289
7.13	**Tris(5-chloro-1,10-phenanthroline)chromium(III), carboxyl radical addn. product**							
7.13.1	**Tris(5-chloro-1,10-phenanthroline)chromium(III) ion**							
	$Cr(5\text{-}Clphen)_2(5\text{-}Clphen\text{-}CO_2)^{2+} + Cr(5\text{-}Clphen)_3^{3+} \rightarrow Cr(5\text{-}Clphen)_2(5\text{-}Clphen\text{-}CO_2)^{3+} + Cr(5\text{-}Clphen)_3^{2+}$	1.1×10^9			25	f.p./rq	D.k. at 605 nm in soln. contg. $Cr(5\text{-}Clphen)_3^{3+}$ and $C_2O_4^{2-}$ (RQ); transient suggested to be ligand addition product (of $^{\bullet}CO_2^{-}$ radical).	89A289
7.14	**Tris(5-bromo-1,10-phenanthroline)chromium(II) ion**							
7.14.1	**Chloroiron(III) complexes**							
	$Cr(5\text{-}Brphen)_3^{2+} + FeCl_x^{(3-x)+} \rightarrow Cr(5\text{-}Brphen)_3^{3+} + FeCl_x^{(2-x)+}$	1.4×10^9	0	1	~23	f.p./rq	D.k. in soln. contg. $Cr(5\text{-}Brphen)_3^{3+}$, 1 mol L^{-1} HCl and $FeCl_x^{(2-x)+}$ (RQ).	81A060
7.15	**Tris(5-methyl-1,10-phenanthroline)chromium(II) ion**							
7.15.1	**Tris(ethylenediamine)cobalt(III) ion**							
	$Cr(5\text{-}Mephen)_3^{2+} + Co(en)_3^{3+} \rightarrow Cr(5\text{-}Mephen)_3^{3+} + Co(en)_3^{2+}$	1.6×10^4	5.8	0.15	23	f.p./rq	D.k. at 480 or 685 nm in Ar-satd. soln. contg. $Cr(5\text{-}Mephen)_3^{3+}$, EDTA (RQ) or $C_2O_4^{2-}$ (RQ) and $Co(en)_3^{3+}$.	88A514
7.15.2	**1,4,8,11-Tetraazacyclotetradecanecobalt(III) ion**							
	$Cr(5\text{-}Mephen)_3^{2+} + Co(cyclam)^{3+} \rightarrow Cr(5\text{-}Mephen)_3^{3+} + Co(cyclam)^{2+}$	1.1×10^7	~0		25	f.p./rq	D.k. in soln. contg. (0.6-8) $\times 10^{-4}$ mol L^{-1} $Co(cyclam)^{3+}$, (0.8-2.5) $\times 10^{-5}$ mol L^{-1} $Cr(5\text{-}Mephen)_3^{3+}$, $Co(cyclam)^{2+}$ (RQ) and 1.0 mol L^{-1} H_2SO_4.	89A050
7.15.3	**Chloroiron(III) complexes**							
	$Cr(5\text{-}Mephen)_3^{2+} + FeCl_x^{(3-x)+} \rightarrow Cr(5\text{-}Mephen)_3^{3+} + FeCl_x^{(2-x)+}$	2.0×10^9	0	1	~23	f.p./rq	D.k. in soln. contg. $Cr(5\text{-}Mephen)_3^{3+}$, 1 mol L^{-1} HCl and $FeCl_x^{(2-x)+}$ (RQ).	81A060

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
7.15	**Tris(5-methyl-1,10-phenanthroline)chromium(II) ion** — Continued							
7.15.4	**Oxygen**							
	$Cr(5\text{-Mephen})_3^{2+} + O_2 \rightarrow Cr(5\text{-Mephen})_3^{3+} + O_2^{\cdot -}$	2.2×10^6	5.8	0.15	22	f.p./rq	D.k. at 480 nm in soln. contg. (1.0-1.6) $\times 10^{-4}$ mol L^{-1} $Cr(5\text{-Mephen})_3^{3+}$, 0.05 mol L^{-1} oxalate (RQ) and varied [O_2].	88A233
7.15.5	**Sulfur dioxide**							
	$Cr(5\text{-Mephen})_3^{2+} + SO_2 \rightarrow Cr(5\text{-Mephen})_3^{3+} + SO_2^{\cdot -}$	1.7×10^8	~0		25	f.p./rq	D.k. in soln. contg. (1-5) $\times 10^{-3}$ mol L^{-1} $Co(cyclam)^{2+}$ (RQ), SO_2, $Cr(5\text{-Mephen})_3^{3+}$ and 1.0 mol L^{-1} H_2SO_4.	89A050
7.16	**Tris(4,7-dimethyl-1,10-phenanthroline)chromium(II) ion**							
7.16.1	**Tris(ethylenediamine)cobalt(III) ion**							
	$Cr(4,7\text{-}Me_2phen)_3^{2+} + Co(en)_3^{3+} \rightarrow Cr(4,7\text{-}Me_2phen)_3^{3+} + Co(en)_3^{2+}$	1.1×10^5	5.8	0.15	23	f.p./rq	D.k. at 440 nm in Ar-satd. soln. contg. $Cr(4,7\text{-}Me_2phen)_3^{3+}$, EDTA (RQ) or $C_2O_4^{2-}$ (RQ) and $Co(en)_3^{3+}$.	88A514
7.16.2	**Tris(2,2'-bipyridine)cobalt(III) ion**							
	$Cr(4,7\text{-}Me_2phen)_3^{2+} + Co(bpy)_3^{3+} \rightarrow Cr(4,7\text{-}Me_2phen)_3^{3+} + Co(bpy)_3^{2+}$	3.5×10^8	5.8	0.15	23	f.p./rq	D.k. at 440 nm in Ar-satd. soln. contg. $Cr(4,7\text{-}Me_2phen)_3^{3+}$, EDTA (RQ) or $C_2O_4^{2-}$ (RQ) and $Co(bpy)_3^{3+}$.	88A514
7.16.3	**Tris(1,10-phenanthroline)cobalt(III) ion**							
	$Cr(4,7\text{-}Me_2phen)_3^{2+} + Co(phen)_3^{3+} \rightarrow Cr(4,7\text{-}Me_2phen)_3^{3+} + Co(phen)_3^{2+}$	4.1×10^8	5.8	0.15	23	f.p./rq	D.k. at 440 nm in Ar-satd. soln. contg. $Cr(4,7\text{-}Me_2phen)_3^{3+}$, EDTA (RQ) or $C_2O_4^{2-}$ (RQ) and $Co(phen)_3^{3+}$.	88A514
7.16.4	**1,4,8,11-Tetraazacyclotetradecanecobalt(III) ion**							
	$Cr(4,7\text{-}Me_2phen)_3^{2+} + Co(cyclam)^{3+} \rightarrow Cr(4,7\text{-}Me_2phen)_3^{3+} + Co(cyclam)^{2+}$	$\sim 7 \times 10^8$	~0		25	f.p./rq	D.k. in soln. contg. (0.6-8) $\times 10^{-4}$ mol L^{-1} $Co(cyclam)^{3+}$, (0.8-2.5) $\times 10^{-5}$ mol L^{-1} $Cr(4,7\text{-}Me_2phen)_3^{3+}$, $Co(cyclam)^{2+}$ (RQ) and 1.0 mol L^{-1} H_2SO_4.	89A050
7.16.5	**Sulfatoiron(III) ion**							
	$Cr(4,7\text{-}Me_2phen)_3^{2+} + FeSO_4^{+} \rightarrow Cr(4,7\text{-}Me_2phen)_3^{3+} + FeSO_4$	7.1×10^8	1.2	0.15	~25	p.r.	D.k. at 420 nm in Ar-satd. soln. contg. $Cr(4,7\text{-}Me_2phen)_3^{3+}$, 0.05 mol L^{-1} H_2SO_4, 0.52 mol L^{-1} 2-PrOH and $FeSO_4$; $k = 7 \times 10^9$ L mol^{-1} s^{-1} interpolated from quenching rate plot.	81A060
7.16.6	**Oxygen**							
	$Cr(4,7\text{-}Me_2phen)_3^{2+} + O_2 \rightarrow Cr(4,7\text{-}Me_2phen)_3^{3+} + O_2^{\cdot -}$	2.5×10^7	5.8	0.15	22	f.p./rq	D.k. at 430 nm in soln. contg. (1.0-1.6) $\times 10^{-4}$ mol L^{-1} $Cr(4,7\text{-}Me_2phen)_3^{3+}$, 0.05 mol L^{-1} oxalate (RQ) or 1.4×10^{-3} mol L^{-1} EDTA (RQ) and varied [O_2].	88A233
7.17	**Tris(5,6-dimethyl-1,10-phenanthroline)chromium(II) ion**							
7.17.1	**1,4,8,11-Tetraazacyclotetradecanecobalt(III) ion**							
	$Cr(5,6\text{-}Me_2phen)_3^{2+} + Co(cyclam)^{3+} \rightarrow Cr(5,6\text{-}Me_2phen)_3^{3+} + Co(cyclam)^{2+}$	1.6×10^7	~0		25	f.p./rq	D.k. in soln. contg. (0.6-8) $\times 10^{-4}$ mol L^{-1} $Co(cyclam)^{3+}$, (0.8-2.5) $\times 10^{-5}$ mol L^{-1} $Cr(5,6\text{-}Me_2phen)_3^{3+}$, $Co(cyclam)^{2+}$ (RQ) and 1.0 mol L^{-1} H_2SO_4.	89A050
7.17.2	**Chloroiron(III) complexes**							
	$Cr(5,6\text{-}Me_2phen)_3^{2+} + FeCl_x^{(3-x)+} \rightarrow Cr(5,6\text{-}Me_2phen)_3^{3+} + FeCl_x^{(2-x)+}$	2.7×10^9	0	1	~23	f.p./rq	D.k. in soln. contg. $Cr(5,6\text{-}Me_2phen)_3^{3+}$, 1 mol L^{-1} HCl and $FeCl_x^{(2-x)+}$ (RQ).	81A060
7.17.3	**Sulfatoiron(III) ion**							
	$Cr(5,6\text{-}Me_2phen)_3^{2+} + FeSO_4^{+} \rightarrow Cr(5,6\text{-}Me_2phen)_3^{3+} + FeSO_4$	4.8×10^8	1.2	0.15	~25	p.r.	D.k. at 420 nm in Ar-satd. soln. contg. $Cr(5,6\text{-}Me_2phen)_3^{3+}$, 0.05 mol L^{-1} H_2SO_4, 0.52 mol L^{-1} 2-PrOH and $FeSO_4$.	81A060

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
7.17	**Tris(5,6-dimethyl-1,10-phenanthroline)chromium(II) ion** — Continued							
7.17.4	**Sulfur dioxide**							
	$Cr(5,6\text{-}Me_2phen)_3^{2+} + SO_2 \rightarrow Cr(5,6\text{-}Me_2phen)_3^{3+} + SO_2^{\bullet -}$	2.8×10^8	~0		25	f.p./rq	D.k. in soln. contg. (1-5) × 10^{-3} mol L^{-1} Co(cyclam)$^{2+}$ (RQ), SO_2, Cr(5,6-Me$_2$phen)$_3^{3+}$ and 1.0 mol L^{-1} H_2SO_4.	89A050
7.18	**Tris(5-phenyl-1,10-phenanthroline)chromium(II) ion**							
7.18.1	**Chloroiron(III) complexes**							
	$Cr(5\text{-}Phphen)_3^{2+} + FeCl_x^{(3-x)+} \rightarrow Cr(5\text{-}Phphen)_3^{3+} + FeCl_x^{(2-x)+}$	~1.9×10^9	0	1	~23	f.p./rq	D.k. in soln. contg. Cr(5-Phphen)$_3^{3+}$, 1 mol L^{-1} HCl and $FeCl_x^{(2-x)+}$ (RQ).	81A060
7.19	**Tris(4,7-diphenyl-1,10-phenanthroline)chromium(II) ion**							
7.19.1	**Chloroiron(III) complexes**							
	$Cr(4,7\text{-}Ph_2phen)_3^{2+} + FeCl_x^{(3-x)+} \rightarrow Cr(4,7\text{-}Ph_2phen)_3^{3+} + FeCl_x^{(2-x)+}$	1.4×10^9	0	1	~23	f.p./rq	D.k. at 420 nm in soln. contg. Cr(4,7-Ph$_2$phen)$_3^{3+}$, 1 mol L^{-1} HCl and $FeCl_x^{(2-x)+}$ (RQ).	81A060
7.20	**Bis(2,2'-bipyridine(oxalato)chromate(II)**							
7.20.1	**First-order reaction**							
	$Cr(bpy)_2(C_2O_4) \rightarrow$	8.9×10^3 s^{-1}			23	p.r.	D.k. in soln. contg. 10^{-3} mol L^{-1} $Cr(bpy)_2(C_2O_4)^+$ and 0.1 mol L^{-1} *tert*-BuOH; reaction involves ligand loss.	87A309
7.21	**2,2'-Bipyridinebis(oxalato)chromate(II) ion**							
7.21.1	**First-order reaction**							
	$Cr(bpy)(C_2O_4)_2^{2-} \rightarrow$	7.4×10^4 s^{-1}			23	p.r.	D.k. in soln. contg. 10^{-3} mol L^{-1} $Cr(bpy)(C_2O_4)_2^-$ and 0.1 mol L^{-1} *tert*-BuOH; reaction involves ligand loss.	87A309
7.22	**Bis(1,10-phenanthroline)(oxalato)chromate(II)**							
7.22.1	**First-order reaction**							
	$Cr(phen)_2(C_2O_4) \rightarrow$	9.8×10^3 s^{-1}			23	p.r.	D.k. in soln. contg. 10^{-3} mol L^{-1} $Cr(phen)_2(C_2O_4)^+$ and 0.1 mol L^{-1} *tert*-BuOH; reaction involves ligand loss.	87A309
7.23	**Bis(oxalato)phenanthrolinechromate(II) ion**							
7.23.1	**First-order reaction**							
	$Cr(phen)(C_2O_4)_2^{2-} \rightarrow$	8.0×10^4 s^{-1}			23	p.r.	D.k. in soln. contg. 10^{-3} mol L^{-1} $Cr(phen)(C_2O_4)_2^-$ and 0.1 mol L^{-1} *tert*-BuOH; reaction involves ligand loss.	87A309
7.24	**Tris(acetylacetonato)chromate(II) ion**							
7.24.1	**First-order reaction**							
	$Cr(acac)_3^- \rightarrow Cr(acac)_2 + acac^-$	>2×10^5 s^{-1}	<5		25	p.r.	Condy. change in He-satd. soln. contg. (2-5) × 10^{-4} mol L^{-1} Cr(acac)$_3$ and 0.1 mol L^{-1} *tert*-BuOH.	79A297
7.25	**Bis(acetylacetonato)chromate(II)**							
7.25.1	**Hydrogen ion**							
	$Cr(acac)_2 + H^+ \rightarrow Cr(acac)^+ + acacH$	4×10^7	3.2-5		25	p.r.	Condy. change in He-satd. soln. contg. (2-5) × 10^{-4} mol L^{-1} Cr(acac)$_3$ and 0.1 mol L^{-1} *tert*-BuOH.	79A297

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
7.25	**Bis(acetylacetonato)chromate(II)** — Continued							
7.25.2	**First-order reaction**							
	$Cr(acac)_2 \rightarrow Cr(acac)^+ + acac^-$	3×10^3 s^{-1}	3.2-5		25	p.r.	Condy. change in He-satd. soln. contg. (2-5) × 10^{-4} mol L^{-1} $Cr(acac)_3$ and 0.1 mol L^{-1} *tert*-BuOH; $k_r = 1.6 \times 10^9$ L mol^{-1} s^{-1}.	79A297
7.26	**Acetonylacetonatochromium(II) ion**							
7.26.1	**Hydrogen ion**							
	$Cr(acac)^+ + H^+ \rightarrow Cr^{2+} + acacH$	4×10^6	3.2-5		25	p.r.	Condy. change in He-satd. soln. contg. (2-5) × 10^{-4} mol L^{-1} $Cr(acac)_3$ and 0.1 mol L^{-1} *tert*-BuOH.	79A297
7.26.2	**First-order reaction**							
	$Cr(acac)^+ \rightarrow Cr^{2+} + acac^-$	3×10^2 s^{-1}	3.2-5		25	p.r.	Condy. change in He-satd. soln. contg. (2-5) × 10^{-4} mol L^{-1} $Cr(acac)_3$ and 0.1 mol L^{-1} *tert*-BuOH; $k_r = 2.7 \times 10^8$ L mol^{-1} s^{-1}.	79A297
7.27	**Hydridochromium(III) ion**							
7.27.1	**Hydrogen ion**							
	$CrH^{2+} + H^+ \rightarrow Cr^{3+} + H_2$	1.9×10^4	1, 2			p.r.	D.k. in soln. contg. (2-10) × 10^{-4} mol L^{-1} Cr^{2+} and 0.1 mol L^{-1} isobutyric acid.	82A315
		1.0×10^4 3.2×10^3	0.7-2	0.2 →0	26	f.p./pi	D.k. at 330, 380 and 420 nm in soln. contg. 10^{-1} mol L^{-1} $Cr(ClO_4)_2$ and 0.01-0.2 mol L^{-1} H^+; $k_H/k_D = 4.8$; $\Delta H^{\ddagger} = 26.4$ kJ mol^{-1}; $\Delta S^{\ddagger} = -79.9$ J mol^{-1} K^{-1}; studied at 14.4-48.1 °C.	81A337
		1.8×10^4	0-2	var	22	p.r.	D.k. in Ar-satd. soln. contg. (1-20) × 10^{-4} mol L^{-1} Cr^{2+}; $k < 1$ s^{-1} for $CrH^{2+} + H_2O$.	741142
7.27a	**Hydroxymethylchromium(III) ion**							
7.27a.1	**Water**							
	$CrCH_2OH^{2+} + H_2O \rightarrow Cr^{3+} + MeOH + OH^-$	0.20 s^{-1}	5.65			p.r.	D.k. in N_2O-satd. soln. contg. 2 × 10^{-4} mol L^{-1} Cr^{2+}, 0.1 mol L^{-1} MeOH and 0.009 mol L^{-1} acetate buffer; k depends on pH and [acetate].	84A036
7.28	**Dihydroxymethylchromium(III) ion**							
7.28.1	**First-order reaction**							
	$CrCH(OH)_2^{2+} \rightarrow H_2O + CrCHO^{2+}$	1.0×10^2 s^{-1}	2.8-6			p.r.	D.k. and p.b.k. in N_2O-satd. soln. contg. Cr(II) and formaldehyde; product suggested to react with formaldehyde giving CO and MeOH, $k \sim 1$ L mol^{-1} s^{-1}.	85A084
7.28a	**1-Hydroxyethylchromium(III) ion**							
7.28a.1	**Water**							
	$CrCHOHCH_3^{2+} + H_2O \rightarrow Cr^{3+} + EtOH + OH^-$	0.72 s^{-1}	4.95			p.r.	D.k. in N_2O-satd. soln. contg. 5 × 10^{-4} mol L^{-1} Cr^{2+}, 0.1 mol L^{-1} EtOH and 0.009 mol L^{-1} acetate buffer; k depends on pH and [acetate].	84A036

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
7.29	**2-Hydroxyethylchromium(III) ion**							
7.29.1	**Hydrogen ion**							
	$CrCH_2CH_2OH^{2+} + H^+ \rightarrow Cr^{3+} + H_2O + H_2C{=}CH_2$	1.4×10^4				p.r.	D.k. at 300 nm in soln. contg. Cr^{2+} and satd. with ethylene/N_2O. For reaction with H_2O, $k = 2$ s^{-1}.	91A477
		1.4×10^4	2.5-4	0.05	24	f.p./pi	D.k. at 390 nm in soln. contg. 5.0×10^{-4} mol L^{-1} Cr^{2+}, 2.0×10^{-2} mol L^{-1} N_2O, 8.8×10^{-4} mol L^{-1} ethylene and $(1.0\text{-}30) \times 10^{-4}$ mol L^{-1} $HClO_4$; studied at 13.2-42.6 °C.; $\Delta H\ddagger = 66.1$ kJ mol^{-1}; $\Delta S\ddagger = 57.7$ J mol^{-1} K^{-1}	82A030
		1.5×10^4	2-3	0.01	25	f.p.	D.k. at 390 nm in soln. contg. $\sim 1 \times 10^{-3}$ mol L^{-1} Cr^{2+}, $\sim 2 \times 10^{-5}$ mol L^{-1} $HOCH_2CH_2Co(dmgBF_2)_2py$ and $(1.0\text{-}10) \times 10^{-3}$ mol L^{-1} $HClO_4$.	82A030
		3.6×10^4	1.4-2.6	0.5	25	f.p.	D.k. at 390 nm in soln. contg. Cr^{2+}, $(NH_3)_5CoO_2CCH_2CH_2OH^{2+}$ and $(2.5\text{-}40) \times 10^{-3}$ mol L^{-1} $HClO_4$.	82A030
7.29a	**1-Hydroxy-1-methylethylchromium(III) ion**							
7.29a.1	**Water**							
	$CrC(CH_3)_2OH^{2+} + H_2O \rightarrow Cr^{3+} + 2\text{-PrOH} + OH^-$	1.5 s^{-1}	5.05			p.r.	D.k. at 390 nm in N_2O-satd. soln. contg. 5×10^{-4} mol L^{-1} Cr^{2+}, 1 mol L^{-1} 2-PrOH and 0.01 mol L^{-1} acetate buffer; k depends on pH and [acetate].	84A036
7.30	**2-Hydroxy-1-methylethylchromium(III) ion**							
7.30.1	**Hydrogen ion**							
	$CrCH(CH_3)CH_2OH^{2+} + H^+ \rightarrow Cr^{3+} + H_2O + CH_3CH{=}CH_2$	1.1×10^5				p.r.	D.k. at 300 nm in soln. contg. Cr^{2+} and satd. with propylene/N_2O. For reaction with H_2O, $k = 21$ s^{-1}.	91A477
7.31	**2-Hydroxy-1,2-dimethylethylchromium(III) ion**							
7.31.1	**Hydrogen ion**							
	$CrCH(CH_3)CH(CH_3)OH^{2+} + H^+ \rightarrow Cr[CH(CH_3){=}CH(CH_3)]^{3+} + H_2O$	9.8×10^4	3-7			p.r.	D.k. at 300 nm in soln. contg. Cr^{2+} and satd. with 2-butene/N_2O. For reaction of $CrCH(CH_3)CH(CH_3)OH^{2+}$ with H_2O, $k = 230$ s^{-1}. For reaction of the product to give Cr^{3+} + 2-butene, $k = 0.8 + 6.7[H^+]$ s^{-1} at pH 1-5.	91A477
7.32	**2-Hydroxy-2,2-dimethylethylchromium(III) ion**							
7.32.1	**Hydrogen ion**							
	$CrCH_2C(CH_3)_2OH^{2+} + H^+ \rightarrow Cr^{3+} + H_2O + CH_2{=}C(CH_3)_2$	2.7×10^6	2-4			p.r.	D.k. in N_2O-satd. soln. contg. 0.18-0.48 mol L^{-1} *tert*-BuOH and $(5\text{-}10) \times 10^{-4}$ mol L^{-1} Cr^{2+}. For reaction with H_2O, $k = 160$ s^{-1}.	92A073
7.33	**2-Ethoxyethylchromium(III) ion**							
7.33.1	**Hydrogen ion**							
	$CrCH_2CH_2OC_2H_5^{2+} + H^+ \rightarrow Cr^{3+} + H_2C{=}CH_2 + EtOH$	4.6×10^3	1.8-3.5			p.r.	D.k. at 315 nm in N_2O-satd. soln. contg. $(1\text{-}10) \times 10^{-3}$ mol L^{-1} Cr(II) perchlorate and 0.5 mol L^{-1} Et_2O.	85A331

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
7.34	**1-Carboxy-1-hydroxyethylchromium(III) ion**							
7.34.1	**Hydrogen ion**							
	$CrCOH(CH_3)CO_2H^{2+} + H^+ \rightarrow Cr^{3+} + CH_3CH(OH)CO_2H$	2.8×10^2	0-1		22	p.r.	D.k. in Ar-satd. soln. contg. 0.15-1 mol L^{-1} lactic acid, (1-15) × 10^{-4} mol L^{-1} Cr^{2+} and 0.1-1 mol L^{-1} $HClO_4$. For reaction with H_2O, $k = 4.7 \times 10^2$ s^{-1}.	741146
7.35	**2-Carboxy-2,2-dimethylethylchromium(III) ion**							
7.35.1	**Hydrogen ion**							
	$CrCH_2C(CH_3)_2CO_2H^{2+} + H^+ \rightarrow Cr^{3+} + (CH_3)_3CCO_2H$	60	0-1		22	p.r.	D.k. in Ar-satd. soln. contg. 0.15-1 mol L^{-1} trimethylacetic acid, (1-15) × 10^{-4} mol L^{-1} Cr^{2+} and 0.1-1 mol L^{-1} $HClO_4$. For reaction with H_2O, $k = 1.8 \times 10^2$ s^{-1}.	741146
7.36	**2-Ammonio-2,2-dimethylethylchromium(III) ion**							
7.36.1	**First-order reaction**							
	$CrCH_2C(CH_3)_2NH_3^{3+} \rightarrow Cr^{3+} + NH_3 + CH_2{=}C(CH_3)_2$	0.015 s^{-1}	1-3			p.r.	D.k. in N_2O-satd. soln. contg. 0.08-0.09 mol L^{-1} 2-methyl-2-propanamine and (1-10) × 10^{-4} mol L^{-1} Cr^{2+}.	92A073
7.37	***cis*-Diammine(aqua)(1,4,8,11-tetraazacyclotetradecane)chromium(III) ion**							
7.37.1	**First-order reaction**							
	cis-$[Cr(cyclam)(H_2O)(NH_3)_2]^{3+} \rightarrow$ *cis*-$[Cr(cyclam)(H_2O)(NH_3)]^{3+} + NH_3$	~3 × 10^5 s^{-1}	2.7-5.4		22-27	f.p.	Condy. change (from $NH_3 + H^+ \rightarrow NH_4^+$) in soln. contg. (0.6-3.0) × 10^{-3} mol L^{-1} *cis*-$[Cr(cyclam)(NH_3)_2]^{3+}$; transient has p$K$ ~4.6.	88F171
7.38	***trans*-Dihydroxy-1,4,8,11-tetraazacyclotetradecanechromium(III), OH reaction product**							
7.38.1	**First-order reaction**							
	trans-$Cr(cyclam)(OH)_2^+$/OH →	2.9 × 10^3 s^{-1}	9.5-9.6		22	p.r.	D.k. at 320 nm in soln. contg. (1-5) × 10^{-3} mol L^{-1} *trans*-$Cr(cyclam)(OH)_2^+$; reaction is suggested to represent the conversion from Cr(III) to Cr(IV); k = 5.3 × 10^3, 1.1 × 10^4 and 1.1 × 10^4 s^{-1} at pH 3.1, 4.3, and 10.9, respectively.	87B063
7.39	**Chromate(V)**							
7.39.1	**Silver(II) ion**							
	$Cr(V) + Ag^{2+} \rightarrow Cr(VI) + Ag^+$	5.8 × 10^7	1		21	p.r.	D.k. at 270 nm in Ar-satd. soln. contg. 10^{-4} mol L^{-1} $Cr_2O_7^{2-}$ (mostly $HCrO_4^-$), 2 × 10^{-5} mol L^{-1} Ag^+ and 0.1 mol L^{-1} $HClO_4$.	89A422
7.40	**Chromate(V) ion**							
7.40.1	**Hydroxyl**							
	$CrO_4^{3-} + {}^{\bullet}OH \rightarrow CrO_4^{2-} + OH^-$	5 × 10^{10}				p.r.	P.b.k. at 365 nm in deaerated soln. contg. 1.6 × 10^{-5} mol L^{-1} CrO_4^{2-}.	650044

TABLE 8. Rate constants for copper transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.1	**Copper(0) chloride complex**							
8.1.1	**First-order reaction**							
	$CuCl_3^{3-} \rightarrow Cu^0 + 3\ Cl^-$	4.7×10^7 s^{-1}	5.8			p.r.	P.b.k. at 380 nm in soln. contg. (1-25) × 10^{-4} mol L^{-1} CuCl and 2 mol L^{-1} NaCl; 80% $CuCl_3^{2-}$, 20% $CuCl_2^-$; reaction includes $CuCl_2^{2-} \rightarrow Cu^0 + 2\ Cl^-$.	86G256
8.2	**Copper atom**							
8.2.1	**Copper(I) chloride complex**							
	$Cu^0 + Cu^I \rightarrow Cu^0\text{-}Cu^I$	2.1×10^9	5.8			p.r.	Computer anal. of changes in absorption in soln. contg. (1-25) × 10^{-4} mol L^{-1} CuCl, 2 mol L^{-1} NaCl and MeOH.	86G256
8.3	**Copper(I) chloride complex with copper(0)**							
8.3.1	**First-order reaction**							
	$Cu^0\text{-}Cu^I \rightarrow Cu_2^+$	4.9×10^7 s^{-1}	5.8			p.r.	Computer anal. of changes in absorption in soln. contg. (1-25) × 10^{-4} mol L^{-1} CuCl, 2 mol L^{-1} NaCl and MeOH.	86G256
8.4	**Copper(I) ion complex with copper(0)**							
8.4.1	**Copper(I) chloride complex**							
	$Cu_2^+ + Cu^I \rightarrow$	1.3×10^8	5.8			p.r.	Computer anal. of changes in absorption in soln. contg. (1-25) × 10^{-4} mol L^{-1} CuCl, 2 mol L^{-1} NaCl and MeOH. Product of this reaction decays with k = 4.8×10^5 s^{-1}.	86G256
8.5	**Copper(I) ion**							
8.5.1	**Cerium(IV) sulfate complex**							
	$Cu^+ + Ce(SO_4)_3^{2-} \rightarrow Cu^{2+} + Ce^{3+} + 3\ SO_4^{2-}$	7.0×10^8	0.8			p.r.	D.k. at 360 nm in soln. contg. 0.03 mol L^{-1} $Ce_2(SO_4)_3$, 0.1 mol L^{-1} $CuSO_4$ and 0.1 mol L^{-1} H_2SO_4. Value obtained by computer fit.	93A517
8.5.2	**Sulfate radical ion**							
	$Cu^+ + SO_4^{\bullet-} \rightarrow Cu^{2+} + SO_4^{2-}$	1.6×10^{10}	<0			p.r.	D.k. at 450 nm in soln. contg. 0.03 mol L^{-1} $Ce_2(SO_4)_3$, 0.1 mol L^{-1} $CuSO_4$ and 1.1 or 2.0 mol L^{-1} H_2SO_4. Value obtained by computer fit.	93A517
8.5.3	**Dihydroxycopper(III) ion**							
	$Cu^+ + Cu(OH)_2^+ \rightarrow 2\ Cu^{2+} + 2\ OH^-$	1.8×10^9 1.6×10^9	4.8 6	0.003	25	p.r.	Estimated from decay of Cu(III) in deaerated solutions. Degree of hydrolysis deduced from conductivity experiments [700512].	720844
		3.6×10^9				p.r.	D.k. at 300 nm in Ar-satd. soln. contg. 5 × 10^{-4} mol L^{-1} Cu^{2+}; [Cu^+] = 1.2[Cu(III)].	710174
8.5.4	**Iron(III) ion**							
	$Cu^+ + Fe^{3+} \rightarrow Cu^{2+} + Fe^{2+}$	1.3×10^7	2.1			p.r.	D.k. at 238 nm in soln. contg. 10^{-3} mol L^{-1} Fe^{2+}, 10^{-2} mol L^{-1} Cu^{2+}, (3-15) × 10^{-5} mol L^{-1} Fe^{3+} and $HClO_4$; also determined values in H_2SO_4 soln.	79G260 761074
8.5.5	**Permanganate ion**							
	$Cu^+ + MnO_4^- \rightarrow Cu^{2+} + MnO_4^{2-}$	6.4×10^9		0.004	25	p.r.	Measured by the rate of depletion of the MnO_4^- absorption.	720844

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.5	**Copper(I) ion** — Continued							
8.5.5	**Permanganate ion** — Continued							
		8×10^9	2		20	p.r.	D.k. in soln. contg. 10^{-5} mol L^{-1} MnO_4^-, 1×10^{-2} mol L^{-1} Cu^{2+} and 0.01 mol L^{-1} $HClO_4$. Dependence of k on [Cu^{2+}] detected.	650385
8.5.6	**Hydrogen atom**							
	$Cu^+ + H^\bullet \rightarrow CuH^+$	$\sim 10^{10}$	5.6			p.r.	P.b.k. at 340 nm in soln. contg. 10^{-3} mol L^{-1} $CuSO_4$ and 100 atm H_2; obtained by computer simulation of p.b.k. for initial [$H^\bullet$] = [Cu^+] in the range (5-40) $\times 10^{-6}$ mol L^{-1}.	82A104
8.5.7	**Hydrogen peroxide**							
	$Cu^+ + H_2O_2 \rightarrow Cu^+O_2H^- + H^+$	4.7×10^3	2.3			phot.	Sector method.	737514
8.5.8	**Perhydroxyl**							
	$Cu^+ + HO_2^- + H_2O \rightarrow H_2O_2 + Cu^{2+} + OH^-$	2.3×10^9	2.3			phot.	Sector method; assume $k(HO_2^- + Cu^{2+}) = 3.4 \times 10^7$ L mol^{-1} s^{-1} and $k(H_2O_2 + Cu^+) = 4.7 \times 10^3$ L mol^{-1} s^{-1}.	737514
8.5.9	**Superoxide radical anion**							
	$Cu^+ + O_2^{\bullet -} + 2\,H_2O \rightarrow Cu^{2+} + H_2O_2 + 2\,OH^-$	$\sim 10^{10}$	~3-6.5			p.r.	D.k. at 245 nm in O_2-satd. soln. contg. Cu^{2+} and formate. Estimated from dependence of the rate of decay of $HO_2^\bullet/O_2^{\bullet -}$ on pH, [Cu^{2+}] and dose per pulse.	730112
8.5.10	**Oxygen**							
	$Cu^+ + O_2 \rightarrow Cu^{2+} + O_2^{\bullet -}$	4.6×10^5	2.1			γ-r.	Estimated from calculations involving competing reactions and change in Fe^{3+} concn. in mixt. of O_2, Cu^{2+}, Fe^{3+}, 3×10^{-3} mol L^{-1} Fe^{2+} and H_2SO_4; $k = 1.0 \times 10^6$ L mol^{-1} s^{-1} in $HClO_4$.	79G260 761074
8.5.11	**Tris(2,2′-bipyridine)ruthenium(III) ion**							
	$Cu^+ + Ru(bpy)_3^{3+} \rightarrow Cu^{2+} + Ru(bpy)_3^{2+}$	9.7×10^8	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid; $k = 4.3 \times 10^8$ and 3×10^8 L mol^{-1} s^{-1} in 0.5 and 2.4 mol L^{-1} $HClO_4$, respectively.	78A090
		3.4×10^8		1.0	21	f.p./oq	P.b.k. in deoxygenated soln. contg. $Ru(bpy)_3^{2+}$ and Cu^{2+} (OQ).	78F683
		1×10^8	0	1.9	24	f.p./oq	D.k. at 480 nm in soln. contg. $Ru(bpy)_3^{2+}$, Cu^{2+} (OQ) and 1 mol L^{-1} $HClO_4$.	771093
8.5.12	**Tris(4,4′-dimethyl-2,2′-bipyridine)ruthenium(III) ion**							
	$Cu^+ + Ru(4,4'\text{-}Me_2bpy)_3^{3+} \rightarrow Cu^{2+} + Ru(4,4'\text{-}Me_2bpy)_3^{2+}$	8.7×10^7	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(4,4'\text{-}Me_2bpy)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
8.5.13	**Tris(1,10-phenanthroline)ruthenium(III) ion**							
	$Cu^+ + Ru(phen)_3^{3+} \rightarrow Cu^{2+} + Ru(phen)_3^{2+}$	1.2×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(phen)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
8.5.14	**Tris(5-bromo-1,10-phenanthroline)ruthenium(III) ion**							
	$Cu^+ + Ru(5\text{-}Brphen)_3^{3+} \rightarrow Cu^{2+} + Ru(5\text{-}Brphen)_3^{2+}$	2.3×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(5\text{-}Brphen)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.5	**Copper(I) ion** — Continued							
8.5.15	**Tris(5-chloro-1,10-phenanthroline)ruthenium(III) ion**							
	$Cu^+ + Ru(5\text{-}Clphen)_3^{3+} \rightarrow Cu^{2+} + Ru(5\text{-}Clphen)_3^{2+}$	2.7×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(5\text{-}Clphen)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
8.5.16	**Tris(5-methyl-1,10-phenanthroline)ruthenium(III) ion**							
	$Cu^+ + Ru(5\text{-}Mephen)_3^{3+} \rightarrow Cu^{2+} + Ru(5\text{-}Mephen)_3^{2+}$	1.0×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(5\text{-}Mephen)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
8.5.17	**Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion**							
	$Cu^+ + Ru(4,7\text{-}Me_2phen)_3^{3+} \rightarrow Cu^{2+} + Ru(4,7\text{-}Me_2phen)_3^{2+}$	1.4×10^8	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(4,7\text{-}Me_2phen)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
8.5.18	**Tris(5,6-dimethyl-1,10-phenanthroline)ruthenium(III) ion**							
	$Cu^+ + Ru(5,6\text{-}Me_2phen)_3^{3+} \rightarrow Cu^{2+} + Ru(5,6\text{-}Me_2phen)_3^{2+}$	5.4×10^8	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(5,6\text{-}Me_2phen)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
8.5.19	**Tris(3,4,7,8-tetramethyl-1,10-phenanthroline)ruthenium(III) ion**							
	$Cu^+ + Ru(3,4,7,8\text{-}Me_4phen)_3^{3+} \rightarrow Cu^{2+} + Ru(3,4,7,8\text{-}Me_4phen)_3^{2+}$	6.0×10^7	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(3,4,7,8\text{-}Me_4phen)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
8.5.20	**Tris(5-phenyl-1,10-phenanthroline)ruthenium(III) ion**							
	$Cu^+ + Ru(5\text{-}Phphen)_3^{3+} \rightarrow Cu^{2+} + Ru(5\text{-}Phphen)_3^{2+}$	1.1×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(5\text{-}Phphen)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
8.5.21	**Acrylamide**							
	$Cu^+ + H_2C{=}CHCONH_2 \rightarrow Cu(\text{acrylamide})^+$	2×10^9	2.5			p.r.	Measured from the effect of [acrylamide] on the yield and rate of formation of $Cu(\text{acrylamide})^+$; $k_r = 1.1 \times 10^5$ s^{-1}.	78A322
8.5.22	**Fumaric acid**							
	$Cu^+ + trans\text{-}HO_2CCH{=}CHCO_2H \rightarrow Cu(\text{fumaric acid})^+$	1.7×10^9	3.7		22	p.r.	P.b.k. in N_2O-satd. soln. contg. 0.01 mol L^{-1} $CuSO_4$, 1.0 mol L^{-1} MeOH and (1-100) $\times 10^{-5}$ mol L^{-1} fumaric acid; $k_r = 2.4 \times 10^5$ s^{-1}.	751092
8.5.23	**Hydroxymethyl**							
	$Cu^+ + {}^{\bullet}CH_2OH \rightarrow CuCH_2OH^+$	$\sim 6 \times 10^9$	3-5			p.r.	Estd. from dependence of yield of intermediate and its rate of decomposition on Cu^+ yield; He-satd. soln. contg. Cu^{2+} and MeOH; $K = \sim 5 \times 10^3$ L mol^{-1}.	80A278
		$\sim 10^{10}$	4.5			p.r.	Estimated from rate of growth and decay of $CuCH_2OH^+$; $k_r \sim 10^6$ s^{-1}.	78A322
8.5.24	**2-Hydroxyethyl**							
	$Cu^+ + {}^{\bullet}CH_2CH_2OH \rightarrow H_2C{=}CH_2 + OH^- + Cu^{2+}$	1.9×10^{10}	4.5			γ-r.	Estimated from yields of Cu(I) in γ-radiolysis of $Cu^{2+} + C_2H_4$ solutions.	78A322
8.5.25	**Maleic acid**							
	$Cu^+ + cis\text{-}HO_2CCH{=}CHCO_2H \rightarrow Cu(\text{maleic acid})^+$	2.0×10^9	3.7		22	p.r.	P.b.k. in N_2O-satd. soln. contg. 0.01 mol L^{-1} $CuSO_4$, 1.0 mol L^{-1} MeOH and (1-100) $\times 10^{-5}$ mol L^{-1} maleic acid; $k_r = 1.8 \times 10^5$ s^{-1}.	751092

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.5	**Copper(I) ion** — Continued							
8.5.26	**Tetranitromethane**							
	$Cu^+ + C(NO_2)_4 \rightarrow Cu^{2+} + {}^{\bullet}NO_2 + C(NO_2)_3^-$	4.7×10^8	4.9		25	p.r.	P.b.k. at 350 nm in soln. contg. 0.01 mol L^{-1} Cu^{2+} and (3-12) × 10^{-5} mol L^{-1} tetranitromethane.	761134
		4.2×10^8				p.r.	P.b.k. in O_2-free soln. contg. 5×10^{-3} mol L^{-1} Cu^{2+} and 6.0×10^{-5} mol L^{-1} tetranitromethane.	640133
8.6	**Copper(I) chloride**							
8.6.1	**Tris(2,2′-bipyridine)ruthenium(III) ion**							
	$CuCl + Ru(bpy)_3^{3+} \rightarrow CuCl^+ + Ru(bpy)_3^{2+}$	3.5×10^9	1	1.0	21	f.p./oq	P.b.k. in deoxygenated soln. contg. $Ru(bpy)_3^{2+}$, 0.1 mol L^{-1} $HClO_4$, 0.5 mol L^{-1} NaCl and Cu(II) (OQ); 75% $CuCl^+$.	78F683
8.7	**Tetraformatocuprate(I) ion**							
8.7.1	**Tris(2,2′-bipyridine)ruthenium(III) ion**							
	$Cu(HCO_2)_4^{3-} + Ru(bpy)_3^{3+} \rightarrow Cu(HCO_2)_4^{2-} + Ru(bpy)_3^{2+}$	2.1×10^9	1	1.0	21	f.p./oq	P.b.k. in deoxygenated soln. contg. $Ru(bpy)_3^{2+}$, 0.1 mol L^{-1} $HClO_4$, 0.5 mol L^{-1} formate and Cu(II) (OQ); 80% $Cu(HCO_2)_4^{2-}$.	78F683
8.8	**Tetraacetatocuprate(I) ion**							
8.8.1	**Tris(2,2′-bipyridine)ruthenium(III) ion**							
	$Cu(OAc)_4^{3-} + Ru(bpy)_3^{3+} \rightarrow Cu(OAc)_4^{2-} + Ru(bpy)_3^{2+}$	2.3×10^9	1	1.0	21	f.p./oq	P.b.k. in deoxygenated soln. contg. $Ru(bpy)_3^{2+}$, 0.1 mol L^{-1} $HClO_4$, 0.5 mol L^{-1} acetate ion and Cu(II) (OQ); 90% $Cu(OAc)_4^{2-}$.	78F683
8.9	**Ethylenediaminetetraacetatocuprate(I) ion**							
8.9.1	**1-Hydroxybutyl**							
	$CuEDTA^{3-} + CH_3(CH_2)_2\dot{C}HOH \rightarrow CH_3(CH_2)_2CHOHCuEDTA^{3-}$	5×10^9	7.5			p.r.	P.b.k. at 440 nm in soln. contg. $CuEDTA^{2-}$ and n-BuOH. Value obtained from computer fit.	80A153
8.10	**Bis(alaninato)cuprate(I)**							
8.10.1	**Bis(alaninato)hydroxycopper(II)**							
	$Cu(Ala)_2^- + HOCu(Ala)_2 \rightarrow 2\ Cu(Ala)_2 + OH^-$	1.2×10^9	7.5			p.r.	D.k. at 300 nm in N_2O-satd. soln. contg. 2 × 10^{-4} mol L^{-1} $Cu(Ala)_2$; $k = 9 \times 10^8$ L mol^{-1} s^{-1} in Ar-satd. soln.	89G017
8.11	**Bleomycin-copper(I) complex**							
8.11.1	**Hydrogen peroxide**							
	BLM-Cu(I) + H_2O_2 → BLM-Cu(III) + OH^-	3.2×10^3	7			p.r.	P.b.k. at 435 nm in N_2O-satd. soln. contg. 2×10^{-2} mol L^{-1} formate, 10^{-3} mol L^{-1} H_2O_2 and 5×10^{-5} mol L^{-1} BLM-Cu(II); $k_{obs} = 1.3 \times 10^3$ L mol^{-1} s^{-1}; chain reaction with chain length ~2.5.	87A184
8.12	**3,6,10,13,16,19-Hexaazabicyclo[6.6.6]eicosanecopper(I) ion**							
8.12.1	**Hydrogen ion**							
	$Cu(sar)^+ + H^+ \rightarrow Cu(sarH)^{2+}$	2×10^{10}	3-5		25	p.r.	Condy. change in He-satd. soln. contg. 0.01 mol L^{-1} EtOH, $HClO_4$ and $Cu(sar)^{2+}$; subsequent protonation was observed with $k = 2 \times 10^7$ L mol^{-1} s^{-1}.	91A387

TABLE 8. Rate constants for copper transients — Continued

Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.13 1,4,8,11-Tetraazacyclotetradecanecopper(I) ion							
8.13.1 Water							
$Cu(cyclam)^+ + H_2O \rightarrow Cu(cyclam)(H)^{2+} + OH^-$	5.4×10^4 s^{-1}	5.1			p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} formate and (2-30) × 10^{-5} mol L^{-1} $Cu(cyclam)^{2+}$.	82A320
8.14 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecopper(I) ion							
8.14.1 Water							
$Cu(aneN_4)^+ + H_2O \rightarrow Cu(aneN_4)(H)^{2+} + OH^-$	2.8×10^4 s^{-1}	6.0			p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} MeOH and (2-30) × 10^{-5} mol L^{-1} $Cu(aneN_4)^{2+}$.	82A320
8.14.2 2-Propanol							
$Cu(aneN_4)^+ + 2\text{-PrOH} \rightarrow$	5.0×10^5	acid			f.p./pi	D.k. in deaerated soln. contg. $Cu(aneN_4)^{2+}$ and 10^{-5}–10^{-2} mol L^{-1} 2-PrOH.	81A239
8.15 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(I) ion							
8.15.1 Water							
$Cu(4,11\text{-dieneN}_4)^+ + H_2O \rightarrow Cu(4,11\text{-dieneN}_4)(H)^{2+} + OH^-$	1.5×10^5 s^{-1}	6.0			p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} MeOH and (2-30) × 10^{-5} mol L^{-1} $Cu(4,11\text{-dieneN}_4)^{2+}$.	80A189
8.15.2 Tris(2,2′-bipyridine)cobalt(III) ion							
$Cu(4,11\text{-dieneN}_4)^+ + Co(bpy)_3^{3+} \rightarrow$	1.2×10^7	7.0	0.016-0.028		p.r.	D.k. in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} $Cu(4,11\text{-dieneN}_4)^{2+}$, (2.5-10) × 10^{-4} mol L^{-1} $Co(bpy)_3^{3+}$ and 1 mol L^{-1} *tert*-BuOH.	761039
8.15.3 Tris(2,2′-bipyridine)chromium(III) ion							
$Cu(4,11\text{-dieneN}_4)^+ + Cr(bpy)_3^{3+} \rightarrow Cu(4,11\text{-dieneN}_4)^{2+} + Cr(bpy)_3^{2+}$	3.7×10^6	4	0.01		p.r	D.k. and/or p.b.k. in N_2-satd. soln. contg. $Cu(4,11\text{-dieneN}_4)^{2+}$ and alcohol.	88A334
	3.7×10^6	7.0	0.016-0.028		p.r.	D.k. in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} $Cu(4,11\text{-dieneN}_4)^{2+}$, (2.5-10) × 10^{-4} mol L^{-1} $Cr(bpy)_3^{3+}$ and 1 mol L^{-1} *tert*-BuOH.	761039
8.15.4 Hydrogen ion							
$Cu(4,11\text{-dieneN}_4)^+ + H^+ \rightarrow$	5.0×10^6	<1.3	0.06-0.3		p.r.	D.k. in Ar-satd. soln. contg. 3 × 10^{-3} mol L^{-1} $Cu(4,11\text{-dieneN}_4)^{2+}$ and 1 mol L^{-1} *tert*-BuOH. Reaction suggested to involve proton transfer to the metal centre to give a hydrido complex.	761039
8.15.5 Nitrous oxide							
$Cu(4,11\text{-dieneN}_4)^+ + N_2O \rightarrow$	1.7×10^6	7.0			p.r.	D.k. in Ar-satd. soln. contg. 3 × 10^{-3} mol L^{-1} $Cu(4,11\text{-dieneN}_4)^{2+}$, (7.5-25) × 10^{-4} mol L^{-1} N_2O and 1 mol L^{-1} *tert*-BuOH.	761039
8.15.6 Oxygen							
$Cu(4,11\text{-dieneN}_4)^+ + O_2 \rightarrow Cu(4,11\text{-dieneN}_4)O_2^+$	2.6×10^7	7.0			p.r.	D.k. in Ar-satd. soln. contg. 3 × 10^{-3} mol L^{-1} $Cu(4,11\text{-dieneN}_4)^{2+}$, (7.5-25) × 10^{-4} mol L^{-1} O_2 and 1 mol L^{-1} *tert*-BuOH.	761039
8.15.7 Hexaammineruthenium(III) ion							
$Cu(4,11\text{-dieneN}_4)^+ + Ru(NH_3)_6^{3+} \rightarrow Cu(4,11\text{-dieneN}_4)^{2+} + Ru(NH_3)_6^{2+}$	7.1×10^4	4	0.01		p.r	D.k. and/or p.b.k. in N_2-satd. soln. contg. $Cu(4,11\text{-dieneN}_4)^{2+}$ and alcohol.	88A334
	7.2×10^4	7.0	0.016-0.028		p.r.	D.k. in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} $Cu(4,11\text{-dieneN}_4)^{2+}$, (2.5-10) × 10^{-4} mol L^{-1} $Ru(NH_3)_6^{3+}$ and 1 mol L^{-1} *tert*-BuOH.	761039

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.15	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(I) ion** — Continued							
8.15.8	**9,10-Anthraquinone-2,6-disulfonate ion**							
	Cu(4,11-dieneN$_4$)$^+$ + 2,6-diSO$_3$AQ^{2-} →	4.3×10^9	7.0	0.004		p.r.	D.k. in Ar-satd. soln. contg. 3×10^{-3} mol L^{-1} Cu(4,11-dieneN$_4$)$^{2+}$, (2.5-5) $\times 10^{-4}$ mol L^{-1} quinone and 1 mol L^{-1} *tert*-BuOH.	761039
8.15.9	**9,10-Anthraquinone-2-sulfonate ion**							
	Cu(4,11-dieneN$_4$)$^+$ + 2-SO$_3$AQ$^-$ →	1.1×10^9	7.0	0.004		p.r.	D.k. in Ar-satd. soln. contg. 3×10^{-3} mol L^{-1} Cu(4,11-dieneN$_4$)$^{2+}$, (2.5-5) $\times 10^{-4}$ mol L^{-1} quinone and 1 mol L^{-1} *tert*-BuOH.	761039
8.15.10	**1,4-Benzoquinone**							
	Cu(4,11-dieneN$_4$)$^+$ + Q →	2.6×10^9	7.0	0.004		p.r.	D.k. in Ar-satd. soln. contg. 3×10^{-3} mol L^{-1} Cu(4,11-dieneN$_4$)$^{2+}$, (2.5-5) $\times 10^{-4}$ mol L^{-1} benzoquinone and 1 mol L^{-1} *tert*-BuOH.	761039
8.15.11	**Iodomethane**							
	Cu(4,11-dieneN$_4$)$^+$ + CH$_3$I →	3.1×10^6	9.2	0.01		p.r.	D.k. in Ar-satd. soln. contg. 3×10^{-3} mol L^{-1} Cu(4,11-dieneN$_4$)$^{2+}$, (2.5-5) $\times 10^{-4}$ mol L^{-1} CH$_3$I and 1 mol L^{-1} *tert*-BuOH.	761039
8.16	**2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecopper(I) ion**							
8.16.1	**Tris(2,2′-bipyridine)cobalt(III) ion**							
	Cu(Me$_4$tetraeneN$_4$)$^+$ + Co(bpy)$_3^{3+}$ → Cu(Me$_4$tetraeneN$_4$)$^{2+}$ + Co(bpy)$_3^{2+}$	5.6×10^6	4	0.01		p.r	D.k. and/or p.b.k. in N$_2$-satd. soln. contg. Cu(Me$_4$tetraeneN$_4$)$^{2+}$ and alcohol.	88A334
8.16.2	**Tris(ethylenediamine)cobalt(III) ion**							
	Cu(Me$_4$tetraeneN$_4$)$^+$ + Co(en)$_3^{3+}$ → Cu(Me$_4$tetraeneN$_4$)$^{2+}$ + Co(en)$_3^{2+}$	3.3	6	0.01		p.r	D.k. and/or p.b.k. in N$_2$-satd. soln. contg. Cu(Me$_4$tetraeneN$_4$)$^{2+}$ and alcohol.	88A334
8.16.3	**Hexaammineruthenium(III) ion**							
	Cu(Me$_4$tetraeneN$_4$)$^+$ + Ru(NH$_3$)$_6^{3+}$ → Cu(Me$_4$tetraeneN$_4$)$^{2+}$ + Ru(NH$_3$)$_6^{2+}$	1.2×10^5	4	0.01		p.r	D.k. and/or p.b.k. in N$_2$-satd. soln. contg. Cu(Me$_4$tetraeneN$_4$)$^{2+}$ and alcohol.	88A334
8.17	**α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenecopper(I) ion**							
8.17.1	**Tris(2,2′-bipyridine)cobalt(III) ion**							
	Cu(Me$_2$pyo[14]trieneN$_4$)$^+$ + Co(bpy)$_3^{3+}$ → Cu(Me$_2$pyo[14]trieneN$_4$)$^{2+}$ + Co(bpy)$_3^{2+}$	2.5×10^7	4	0.01		p.r	D.k. and/or p.b.k. in N$_2$-satd. soln. contg. Cu(Me$_2$pyo[14]trieneN$_4$)$^{2+}$ and alcohol.	88A334
8.17.2	**Hexaammineruthenium(III) ion**							
	Cu(Me$_2$pyo[14]trieneN$_4$)$^+$ + Ru(NH$_3$)$_6^{3+}$ → Cu(Me$_2$pyo[14]trieneN$_4$)$^{2+}$ + Ru(NH$_3$)$_6^{2+}$	1.5×10^6	4	0.01		p.r	D.k. and/or p.b.k. in N$_2$-satd. soln. contg. Cu(Me$_2$pyo[14]trieneN$_4$)$^{2+}$ and alcohol.	88A334
8.17.3	**Tris(2,2′-bipyridine)rhodium(II) ion**							
	Cu(Me$_2$pyo[14]trieneN$_4$)$^+$ + Rh(bpy)$_3^{2+}$ → Cu(Me$_2$pyo[14]trieneN$_4$)$^{2+}$ + Rh(bpy)$_3^+$	1.3×10^7	4	0.7		p.r	D.k. and/or p.b.k. in N$_2$-satd. soln. contg. Cu(Me$_2$pyo[14]trieneN$_4$)$^{2+}$ and alcohol.	88A334
8.18	**Bis(2,2′-bipyridine)copper(I) ion**							
8.18.1	**Hydrogen peroxide**							
	Cu(bpy)$_2^+$ + H$_2$O$_2$ → Cu(bpy)$_2^{2+}$ + $^{\bullet}$OH + OH$^-$	1.5×10^3	7			p.r.	D.k. in soln. contg. 3×10^{-5} mol L^{-1} Cu(bpy)$_2^{2+}$, 0.05 mol L^{-1} formate and (1-4) $\times 10^{-4}$ mol L^{-1} H$_2$O$_2$.	85A059

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.18	**Bis(2,2′-bipyridine)copper(I) ion** — Continued							
8.18.2	**Oxygen**							
	$Cu(bpy)_2^+ + O_2 \rightarrow Cu(bpy)_2^{2+} + O_2^{\cdot -}$	5.8×10^4	7			p.r.	D.k. in O_2-satd. soln. contg. 0.02 mol L^{-1} formate, 1.96×10^{-6} mol L^{-1} SOD and $(1\text{-}4) \times 10^{-5}$ mol L^{-1} $Cu(bpy)_2^{2+}$.	85A059
8.18.3	**Superoxide radical anion**							
	$Cu(bpy)_2^+ + O_2^{\cdot -} + 2\,H^+ \rightarrow H_2O_2 + Cu(bpy)_2^{2+}$	1.8×10^8	7			p.r.	D.k. in air-satd. soln. contg. 0.02 mol L^{-1} formate and $(1\text{-}7) \times 10^{-7}$ mol L^{-1} $Cu(bpy)_2^{2+}$.	85A059
8.19	**Bis(1,10-phenanthroline)copper(I) ion**							
8.19.1	**Hydrogen peroxide**							
	$Cu(phen)_2^+ + H_2O_2 \rightarrow Cu(phen)_2^{2+} + {}^{\cdot}OH + OH^-$	9.4×10^2	7			p.r.	D.k. in soln. contg. 3×10^{-5} mol L^{-1} $Cu(phen)_2^{2+}$, 0.05 mol L^{-1} formate and $(5\text{-}45) \times 10^{-4}$ mol L^{-1} H_2O_2; [85G297] shows ${}^{\cdot}OH$ is not formed directly but through decomposition of a metal-peroxo complex, and k is about 1100 L mol^{-1} s^{-1}.	83A299
8.19.2	**Oxygen**							
	$Cu(phen)_2^+ + O_2 \rightarrow Cu(phen)_2^{2+} + O_2^{\cdot -}$	5.0×10^4	7			p.r.	D.k. in O_2-satd. soln. contg. 0.02 mol L^{-1} formate, and 1.2×10^{-6} mol L^{-1} SOD and ~$(1\text{-}8) \times 10^{-5}$ mol L^{-1} $Cu(phen)_2^{2+}$.	83A299
8.19.3	**Superoxide radical anion**							
	$Cu(phen)_2^+ + O_2^{\cdot -} + 2\,H^+ \rightarrow H_2O_2 + Cu(phen)_2^{2+}$	3.0×10^8	7			p.r.	D.k. at 435 nm in soln. contg. 0.05 mol L^{-1} formate and 10^{-3} mol L^{-1} phosphate; 1,10-phenanthroline/Cu^{2+} concn. = 2.0-2.5.	83A299
8.20	**Bis(5-chloro-1,10-phenanthroline)copper(I) ion**							
8.20.1	**Oxygen**							
	$Cu(5\text{-}Clphen)_2^+ + O_2 \rightarrow Cu(5\text{-}Clphen)_2^{2+} + O_2^{\cdot -}$	5.0×10^3	7			p.r.	D.k. in O_2-satd. soln. contg. 0.02 mol L^{-1} formate, 1.96×10^{-6} mol L^{-1} SOD and $(0.1\text{-}1) \times 10^{-4}$ mol L^{-1} $Cu(5\text{-}Clphen)_2^{2+}$.	85A059
8.20.2	**Superoxide radical anion**							
	$Cu(5\text{-}Clphen)_2^+ + O_2^{\cdot -} + 2\,H^+ \rightarrow H_2O_2 + Cu(5\text{-}Clphen)_2^{2+}$	2.1×10^8	7			p.r.	D.k. in air-satd. soln. contg. 0.02 mol L^{-1} formate and $(1\text{-}7) \times 10^{-7}$ mol L^{-1} $Cu(5\text{-}Clphen)_2^{2+}$.	85A059
8.21	**Bis(5-nitro-1,10-phenanthroline)copper(I) ion**							
8.21.1	**Hydrogen peroxide**							
	$Cu(5\text{-}NO_2phen)_2^+ + H_2O_2 \rightarrow Cu(5\text{-}NO_2phen)_2^{2+} + {}^{\cdot}OH + OH^-$	4.4×10^2	7			p.r.	D.k. in soln. contg. 3×10^{-5} mol L^{-1} $Cu(5\text{-}NO_2phen)_2^{2+}$, 0.05 mol L^{-1} formate and $(1\text{-}5) \times 10^{-4}$ mol L^{-1} H_2O_2.	85A059
8.21.2	**Oxygen**							
	$Cu(5\text{-}NO_2phen)_2^+ + O_2 \rightarrow Cu(5\text{-}NO_2phen)_2^{2+} + O_2^{\cdot -}$	5.8×10^2	7			p.r.	D.k. in O_2-satd. soln. contg. 0.02 mol L^{-1} formate and 1.96×10^{-6} mol L^{-1} SOD and $(1\text{-}4) \times 10^{-5}$ mol L^{-1} $Cu(5\text{-}NO_2phen)_2^{2+}$.	85A059
8.21.3	**Superoxide radical anion**							
	$Cu(5\text{-}NO_2phen)_2^+ + O_2^{\cdot -} + 2\,H^+ \rightarrow H_2O_2 + Cu(5\text{-}NO_2phen)_2^{2+}$	8.3×10^8	7			p.r.	D.k. in air-satd. soln. contg. 0.02 mol L^{-1} formate and $(1\text{-}6) \times 10^{-7}$ mol L^{-1} $Cu(5\text{-}NO_2phen)_2^{2+}$.	85A059

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.22	**Bis(5-methyl-1,10-phenanthroline)copper(I) ion**							
8.22.1	**Hydrogen peroxide**							
	$Cu(5\text{-Mephen})_2^+ + H_2O_2 \rightarrow Cu(5\text{-Mephen})_2^{2+} + {}^{\bullet}OH + OH^-$	1.6×10^3	7			p.r.	D.k. in soln. contg. 3×10^{-5} mol L^{-1} $Cu(5\text{-Mephen})_2^{2+}$, 0.05 mol L^{-1} formate and $(1\text{-}4) \times 10^{-3}$ mol L^{-1} H_2O_2.	85A059
8.22.2	**Oxygen**							
	$Cu(5\text{-Mephen})_2^+ + O_2 \rightarrow Cu(5\text{-Mephen})_2^{2+} + O_2^{\bullet-}$	6.6×10^4	7			p.r.	D.k. in O_2-satd. soln. contg. 0.02 mol L^{-1} formate, 1.96×10^{-6} mol L^{-1} SOD and $(1\text{-}4) \times 10^{-5}$ mol L^{-1} $Cu(5\text{-Mephen})_2^{2+}$.	85A059
8.22.3	**Superoxide radical anion**							
	$Cu(5\text{-Mephen})_2^+ + O_2^{\bullet-} + 2\,H^+ \rightarrow H_2O_2 + Cu(5\text{-Mephen})_2^{2+}$	2.3×10^8	7			p.r.	D.k. in air-satd. soln. contg. 0.02 mol L^{-1} formate and $(1\text{-}4) \times 10^{-7}$ mol L^{-1} $Cu(5\text{-Mephen})_2^{2+}$.	85A059
8.23	**Bis(2,9-dimethyl-1,10-phenanthroline)copper(I) ion**							
8.23.1	**Superoxide radical anion**							
	$Cu(2,9\text{-}Me_2phen)_2^+ + O_2^{\bullet-} + 2\,H^+ \rightarrow H_2O_2 + Cu(2,9\text{-}Me_2phen)_2^{2+}$	2.4×10^8	7			p.r.	D.k. in air-satd. soln. contg. 0.02 mol L^{-1} formate and $(1\text{-}6) \times 10^{-7}$ mol L^{-1} $Cu(2,9\text{-}Me_2phen)_2^{2+}$.	85A059
8.24	**5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatocopper(II), radical anion**							
8.24.1	**5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatocopper(II), radical anion**							
	$[CuTMpyP]^{\bullet 3+} + [CuTMpyP]^{\bullet 3+} \rightarrow$	9.1×10^8	6.8			p.r.	D.k. in N_2O-satd. soln. contg. $CuTMpyP^{4+}$ and 2-PrOH; disproportionation reaction; $\Delta G = 27$ kJ mol^{-1}.	83C026
8.24.2	**Hydrogen ion**							
	$[CuTMpyP]^{\bullet 3+} + H^+ \rightarrow [CuTMpyPH]^{\bullet 4+}$	$\geq 2 \times 10^7$	0.9-1.5	21		p.r.	P.b.k. at 640 nm in deoxygenated soln. contg. 2-PrOH, 0.001 mol L^{-1} $CuTMpyP^{4+}$ and varied $[H^+]$.	92A390
8.25	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocuprate(II), radical anion**							
8.25.1	**Hydrogen ion**							
	$[CuTPPS]^{\bullet 5-} + H^+ \rightarrow [CuTPPSH]^{\bullet 4-}$	5×10^7	3.5-4.1	21		p.r.	P.b.k. at 650 nm in deoxygenated soln. contg. 2-PrOH, 4.5×10^{-5} mol L^{-1} $CuTPPS^{4-}$ and $(0.8\text{-}3.4) \times 10^{-4}$ mol L^{-1} H^+.	92A390
8.26	**Tetrakis-4-(*N,N,N*-trimethylammonio)phenylporphinecopper(II), radical anion**							
8.26.1	**Hydrogen ion**							
	$[CuTAPP]^{\bullet 3+} + H^+ \rightarrow [CuTAPPH]^{\bullet 4+}$	8×10^6	2.4-3.0	21		p.r.	P.b.k. at 640 nm in deoxygenated soln. contg. 2-PrOH, $CuTAPP^{4+}$ and varied $[H^+]$.	92A390
8.27	**Hydridocopper(II) ion**							
8.27.1	**Water**							
	$CuH^+ + H_2O \rightarrow Cu^{2+} + H_2 + OH^-$	4×10^3 s^{-1}	3-6			p.r.	D.k. at 340 nm in soln. contg. $(2\text{-}10) \times 10^{-4}$ mol L^{-1} $CuSO_4$ satd. with 100 atm H_2.	82A104

TABLE 8. Rate constants for copper transients — Continued

No. Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.28 Methylcopper(II) ion							
8.28.1 Hydrogen ion							
$CuCH_3^+ + H^+ \rightarrow Cu^{2+} + CH_4$	2×10^3	1			p.r.	D.k. in N_2O-satd. soln. contg. 9×10^{-4} mol L^{-1} $CuSO_4$, 0.09 mol L^{-1} DMSO and 2×10^{-4} mol L^{-1} Cr^{2+}. Authors reported $k = 200$ s^{-1} at pH 1.	86A115
8.28.2 Methylcopper(II) ion							
$CuCH_3^+ + CuCH_3^+ \rightarrow 2\ Cu^+ + C_2H_6$	9×10^6	≥2.5			p.r.	D.k. in N_2O-satd. soln. contg. 9×10^{-4} mol L^{-1} $CuSO_4$, 0.09 mol L^{-1} DMSO and 2×10^{-4} mol L^{-1} Cr^{2+}.	86A115
8.29 Carboxylatocopper(II)							
8.29.1 Copper(I) ion							
$CuCO_2 + Cu^+ \rightarrow Cu_2^+ + CO_2$	~10^8	7.3			p.r.	D.k. at 480 nm in Ar-satd. soln. contg. 1×10^{-4} mol L^{-1} $Cu(ClO_4)_2$ and 0.01 mol L^{-1} formate.	91A367
8.29.2 Copper(II) ion							
$CuCO_2 + Cu^{2+} \rightarrow 2\ Cu^+ + CO_2$	5×10^8	7.3			p.r.	D.k. at 480 nm in N_2O-satd. soln. contg. $(1\text{-}3) \times 10^{-4}$ mol L^{-1} $Cu(ClO_4)_2$ and 5×10^{-3} mol L^{-1} formate.	91A367
8.29.3 Oxalatocuprate(II) ions							
$CuCO_2 + Cu(C_2O_4)_n^{(2-n)+} \rightarrow$	2×10^9		0.1		f.p.	D.k. in soln. contg. 2×10^{-4} mol L^{-1} Cu(II), 10^{-2} mol L^{-1} oxalate, varied [O_2] and pH; value refers to basic form of $CuCO_2$. For an acidic form of $CoCO_2$, $k = 1 \times 10^7$ L mol^{-1} s^{-1}.	80A239
8.29.4 Oxygen							
$CuCO_2 + O_2 \rightarrow$	3×10^7		0.1		f.p.	D.k. in soln. contg. 2×10^{-4} mol L^{-1} Cu(II), 10^{-2} mol L^{-1} oxalate, varied [O_2] and pH; value refers to basic form of $CuCO_2$. For an acidic form of $CoCO_2$, $k = 4 \times 10^5$ L mol^{-1} s^{-1}.	80A239
8.30 2-Ammonio-1-carboxyethylcopper(II) ion							
8.30.1 First-order reaction							
$CuCH(CH_2NH_3)CO_2^+ \rightarrow Cu^{2+} + NH_3 + CH_2{=}CHCO_2^-$	2.7×10^4 s^{-1} 1.1×10^4 s^{-1}	≤3 >3.5			p.r.	D.k. at 380 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} β-alanine, $(3.5\text{-}11) \times 10^{-5}$ mol L^{-1} Cu^+ and $(0\text{-}1) \times 10^{-3}$ mol L^{-1} Cu^{2+}.	92A134
8.31 2-Ammonioethylcopper(II) ion							
8.31.1 First-order reaction							
$CuCH_2CH_2NH_3^{2+} \rightarrow CuCH{=}CH_2^{2+} + NH_3$	2.4 s^{-1}	2.3-3.5			p.r.	D.k. at 370 nm in N_2O-satd. soln. contg. 0.05-0.1 mol L^{-1} ethylamine, $(2.5\text{-}8.0) \times 10^{-4}$ mol L^{-1} $CuSO_4$ and $(0.5\text{-}1.0) \times 10^{-4}$ mol L^{-1} Cu^+. Complex formed by reaction of Cu^+ with $^{\bullet}CH_2CH_2NH_3^+$, $k = 1.1 \times 10^9$ L mol^{-1} s^{-1}.	93A473
8.32 2-Hydroxy-2,2-dimethylethylcopper(II) ion							
8.32.1 First-order reaction							
$CuCH_2C(CH_3)_2OH^+ \rightarrow CH_2{=}C(CH_3)_2 + Cu^{2+} + OH^-$	2.2×10^5 s^{-1}	2.7			p.r.	D.k. in N_2O-satd. soln. contg. $(5\text{-}20) \times 10^{-4}$ mol L^{-1} $CuSO_4$, $(5\text{-}30) \times 10^{-5}$ mol L^{-1} Cu^+, $(5\text{-}30) \times 10^{-5}$ mol L^{-1} Cr(III), and 0.1-1 mol L^{-1} *tert*-BuOH. $k = 5.0 \times 10^4 + 8.6 \times 10^7[H_3O^+]$ s^{-1}.	88A410

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.33	**2-Ammonio-2,2-dimethylethylcopper(II) ion**							
8.33.1	**First-order reaction**							
	$CuCH_2C(CH_3)_2NH_3^{2+} \rightarrow Cu^{2+} + CH_2{=}C(CH_3)_2 + NH_3$	7.0 s^{-1}	1.5-3			p.r.	D.k. at 375 nm in N_2O-satd. soln. contg. (0.39-1.1) × 10^{-4} mol L^{-1} Cu^+, (0-5) × 10^{-4} mol L^{-1} $CuSO_4$ and 0.02-0.2 mol L^{-1} 2-methyl-2-propanamine.	92A073
8.34	**1,3-Diammonio-2-propylcopper(II) ion**							
8.34.1	**First-order reaction**							
	$CuCH(CH_2NH_3^+)_2^+ \rightarrow$	2.0 s^{-1}	3.0-3.8			p.r.	D.k. in N_2O-satd. soln. contg. 0.05-0.1 mol L^{-1} 1,3-propanediamine, (0-2.5) × 10^{-4} mol L^{-1} $CuSO_4$ and (0.62-1.2) × 10^{-4} mol L^{-1} Cu^+. Complex formed by reaction of Cu^+ with $^{\bullet}CH(CH_2NH_3^+)_2$, k = 4.2 × 10^8 L mol^{-1} s^{-1}.	93A473
8.35	**2-(Dimethylammonio)-1-(dimethylammoniomethyl)ethylcopper(II) ion**							
8.35.1	**First-order reaction**							
	$CuCH(CH_2NMe_2H^+)_2^+ \rightarrow$	150 s^{-1}	2.2-3.8			p.r.	D.k. in N_2O-satd. soln. contg. 0.05-0.1 mol L^{-1} *N,N,N′,N′*-tetramethyl-1,3-propanediamine, 0-0.001 mol L^{-1} $CuSO_4$ and (0.05-0.13) × 10^{-3} mol L^{-1} Cu^+. Complex formed by reaction of Cu^+ with $^{\bullet}CH(CH_2NMe_2H^+)_2$, k = 4.2 × 10^8 L mol^{-1} s^{-1}.	93A473
8.36	**2-(Dimethylammonio)ethylcopper(II) ion**							
8.36.1	**First-order reaction**							
	$CuCH_2CH_2NEt_2H^{2+} \rightarrow CuCH{=}CH_2^{2+} + (C_2H_5)_2NH$	190 s^{-1}	2.2-3.8			p.r.	D.k. at 370 nm in N_2O-satd. soln. contg. 0.05-0.1 mol L^{-1} triethylamine, (0-8) × 10^{-4} mol L^{-1} $CuSO_4$ and (0.59-1.10) × 10^{-4} mol L^{-1} Cu^+. Complex formed by reaction of Cu^+ with $^{\bullet}CH_2CH_2NEt_2H^+$, k = 7.5 × 10^8 L mol^{-1} s^{-1}.	93A473
8.37	**2-Carboxy-2,2-dimethylethylcopper(II) ion**							
8.37.1	**First-order reaction**							
	$CuCH_2C(CH_3)_2CO_2H^+ \rightarrow Cu^+ + {}^{\bullet}CH_2C(CH_3)_2CO_2H$	1.6 × 10^5 s^{-1}	3.0			p.r.	Calculated from the intercept of plot of rate of formation of complex on [Cu^+] in N_2O-satd. soln. contg. 0.001 mol L^{-1} Cu^{2+}, 0.05 mol L^{-1} $(CH_3)_3CCO_2H$ and (5-30) × 10^{-5} mol L^{-1} Cu^+; k_r = 2.4 × 10^9 L mol^{-1} s^{-1}.	90A474
8.37.2	**Copper(II) ion**							
	$CuCH_2C(CH_3)_2CO_2H^+ + Cu^{2+} + H^+ \rightarrow 2\ Cu^{2+} + (CH_3)_3CCO_2H$	1 × 10^7	3.0			p.r.	D.k. in N_2O-satd. soln. contg. varied [Cu^{2+}], 0.05 mol L^{-1} $(CH_3)_3CCO_2H$ and 1 × 10^{-4} mol L^{-1} Cu^+.	90A474
8.38	**2-Ammonio-2-carboxypropylcopper(II) ion**							
8.38.1	**First-order reaction**							
	$CuCH_2C(CH_3)(NH_3)CO_2^+ \rightarrow Cu^{2+} + NH_3 + CH_2{=}C(CH_3)CO_2^-$	2.7 s^{-1}	3			p.r.	D.k. at 300 and 350 nm in N_2O-satd. soln. contg. 0.05 mol L^{-1} 2-methylalanine, (5-15) × 10^{-5} mol L^{-1} Cu^+ and (3-100) × 10^{-3} mol L^{-1} Cu^{2+}.	92A215

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.39	**Copper(II) ion, complex with cyclohexene**							
8.39.1	**2-Hydroxycyclohexyl**							
	$Cu(cyclohexene)^+ + \dot{C}HCHOH(CH_2)_4^- \rightarrow c\text{-}C_6H_{10} + CuCHCH(OH)(CH_2)_4^{-+}$	2.6×10^9	1-5.5			p.r.	P.b.k. in N_2O-satd. soln. contg. (5-20) × 10^{-4} mol L^{-1} $CuSO_4$, (5-40) × 10^{-5} mol L^{-1} Cu^+, (5-40) × 10^{-5} mol L^{-1} Cr(III), 0.02-0.15 mol L^{-1} cyclohexene and 0.15-0.65 mol L^{-1} acetonitrile.	91A152
8.40	**4-Hydroxyphenoxycopper(II) ion, conjugate base**							
8.40.1	**4-Hydroxyphenoxycopper(II) ion, conjugate base**							
	$CuOC_6H_4\text{-}4\text{-}O + CuOC_6H_4\text{-}4\text{-}O \rightarrow$	3.8×10^7	7.0			f.p.	D.k. at 425 nm in soln. contg. Cu^+ and 1 × 10^{-4} mol L^{-1} hydroquinone.	78A449
8.41	**(1-Hydroxybutyl)ethylenediaminetetraacetatocuprate(II) ion**							
8.41.1	**Nitrite ion**							
	$CH_3(CH_2)_2CHOHCuEDTA^{3-} + NO_2^- \rightarrow$	4×10^5	7.5			p.r.	D.k. at 440 nm in soln. contg. $CuEDTA^{2-}$ and 1-butanol.	80A153
8.42	**Bis(1,10-phenanthroline)(2-hydroxyethyl)copper(II) ion**							
8.42.1	**First-order reaction**							
	$HOCH_2CH_2Cu(phen)_2^+ \rightarrow Cu(phen)_2^{2+} + H_2C{=}CH_2 + OH^-$	1.1×10^4 s^{-1}	4-10			p.r.	D.k. at 430 nm in ethylene-satd. soln. contg. $Cu(phen)_2^{2+}$.	88A392
8.43	**Bis(1,10-phenanthroline)(2-hydroxy-2,2-dimethylethyl)copper(II) ion**							
8.43.1	**First-order reaction**							
	$HOC(CH_3)_2CH_2Cu(phen)_2^+ \rightarrow Cu(phen)_2^{2+} + CH_2{=}C(CH_3)_2 + OH^-$	1.7×10^3 s^{-1}	4-10			p.r.	D.k. in He-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH and $Cu(phen)_2^{2+}$.	88A392
8.43a	**Aminomethyl(glycinato)copper(II)**							
8.43a.1	**Oxygen**							
	$(Gly)CuCH_2NH_2 + O_2 \rightarrow$	2×10^5 6×10^5	6.3 7.7			f.p.	Estd. from dependence of d.k. in soln. contg. 2×10^{-4} mol L^{-1} Cu(II) and 10^{-3} mol L^{-1} glycine on $[O_2]$.	84A293
8.44	**α-2,12-Dimethyl-3,7,11,17,tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenecopper(II) ion OH-adduct**							
8.44.1	**First-order reaction**							
	$Cu(Me_2pyo[14]trieneN_4)(OH)^{2+} \rightarrow$	6.3×10^5 s^{-1}	3,5, 4.5	0.1		p.r.	D.k. in N_2O-satd. soln. contg. $Cu(Me_2\text{-}3,4,5\text{-}pyo[14]trieneN_4)^{2+}$ and $NaClO_4$; the product is a Cu(I) species formed by intramolecular reduction which decays with $k = 1.6 \times 10^3$ s^{-1}.	86A210
8.45	**Copper(III)**							
8.45.1	**Iron(II) ion**							
	$Cu(III) + Fe^{2+} \rightarrow Cu^{2+} + Fe^{3+}$	3.3×10^8	2.1			p.r.	P.b.k. at 238 nm in soln. contg. (5-30) × 10^{-4} mol L^{-1} Fe^{2+}, 10^{-2} mol L^{-1} Cu^{2+}, 5 × 10^{-5} mol L^{-1} Fe^{3+} and H_2SO_4; $k = 1.3 \times 10^8$ L mol^{-1} s^{-1} in $HClO_4$.	79G260 761074
8.45.2	**Hydrogen peroxide**							
	$Cu(III) + H_2O_2 \rightarrow$	2×10^6				γ-r.	Estimated from computer simulation based on G for HCHO and Cu^+ in N_2O-satd. soln. contg. Cu^{2+}, CH_3OH and H_2O_2.	88G016

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.45	**Copper(III)** — Continued							
8.45.3	**Methanol**							
	Cu(III) + MeOH → $^{\bullet}CH_2OH + Cu^{2+} + H^+$	$\leq 4 \times 10^5$				γ-r.	Estimated from computer simulation based on G for HCHO and Cu^+ in N_2O-satd. soln. contg. Cu^{2+}, CH_3OH and H_2O_2.	88G016
8.46	**Dihydroxycopper(III) ion**							
8.46.1	**First-order reaction**							
	$Cu(OH)_2^+ \rightarrow CuOH^+ + {}^{\bullet}OH$	4.2×10^4 s^{-1} 2.8×10^4 s^{-1}	3.5 3.65			p.r.	Estimated from decay of Cu(III) in the presence of Br^-, CH_3OH, H_2O_2 etc. Values of k_r taken to be same as $k(Cu^{2+} + {}^{\bullet}OH)$; $K = 1.3 \times 10^{-4}$ and 9.0×10^{-5} L mol^{-1} at pH 3.5 and 3.65, respectively.	710174
8.46.2	**Nitrilotriacetatocuprate(II) ion**							
	$Cu(OH)_2^+ + CuNTA^- \rightarrow Cu^{2+} + CuNTA$	1.2×10^8	3.9			p.r.	N_2O-satd. soln. contg. 0.001 mol L^{-1} $CuSO_4$ and (2-8) × 10^{-5} mol L^{-1} NTA.	78A436
8.47	**Trihydroxycopper(III)**							
8.47.1	**Trihydroxycopper(III)**							
	$Cu(OH)_3 + Cu(OH)_3 \rightarrow$	$<2.5 \times 10^7$	6	0.004	25	p.r.		720844
		2.3×10^7	6			p.r.	D.k. at 300 nm in N_2O-satd. soln. contg. 5 × 10^{-4} mol L^{-1} Cu^{2+}.	710174
8.47.2	**Nitritocopper(II) ion**							
	$Cu(OH)_3 + CuNO_2^+ \rightarrow$	$\sim 3 \times 10^9$	5.2			p.r.	D.k. at 300 nm in N_2O-satd. soln. contg. NO_2^-.	710174
8.47.3	**Glycinatocopper(II) ion**							
	$Cu(OH)_3 + Cu(Gly)^+ \rightarrow$	8.1×10^7	5.5			p.r.	D.k. in N_2O-satd. soln. contg. 0.001 mol L^{-1} $CuSO_4$ and (1-100) × 10^{-6} mol L^{-1} glycine.	710775
8.47.4	**2-Methyl-1,4-naphthoquinone**							
	$Cu(OH)_3 + 2\text{-}CH_3NQ \rightarrow$	2.0×10^9	9.0,10.6			p.r.	40% of Cu(III) claimed to react by electron transfer. Cu(III) formed by $^{\bullet}OH + Cu(ClO_4)_2$; 20.3% and 39% electron transfer at pH 8.0 and 10.6, respectively, in $CuSO_4$ soln.	731047
8.48	**Amminecopper(III) complex**							
8.48.1	**Amminecopper(III) complex**							
	$Cu^{III}(NH_3)_n + Cu^{III}(NH_3)_n \rightarrow$	1.5×10^7	11.1			p.r.	D.k. in N_2O-satd. soln. contg. (5-50) × 10^{-5} mol L^{-1} $CuSO_4$ and $[NH_3] = 1.9[CuSO_4]$.	710775
8.49	**Ethylenediaminecopper(III) complex**							
8.49.1	**First-order reaction**							
	$Cu^{III}(en)_n \rightarrow$	<3 s^{-1} 120 s^{-1}	5.8 11.6			p.r.	D.k. in N_2O-satd. soln. contg. (5-50) × 10^{-5} mol L^{-1} $CuSO_4$ and $[en] = 1.9[CuSO_4]$.	710775
8.49.2	**Ethylenediaminecopper(III) complex**							
	$Cu^{III}(en)_n + Cu^{III}(en)_n \rightarrow$	2.8×10^5 2.0×10^7	5.8 11.6			p.r.	D.k. in N_2O-satd. soln. contg. (5-50) × 10^{-5} mol L^{-1} $CuSO_4$ and $[en] = 1.9[CuSO_4]$.	710775

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.50	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecopper(III) ion**							
8.50.1	**First-order reaction**							
	$Cu(aneN_4)^{3+} \rightarrow$	6.1 s^{-1}	1	1.0	25	f.p.	D.k. at 360 nm in soln. contg. 0.01-1 mol L^{-1} Cl^- and (1-2) × 10^{-5} mol L^{-1} $Cu(aneN_4)^{2+}$.	83A271
8.51	**Chloro-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(III) ion**							
8.51.1	**Chloride ion**							
	$Cu(4,11\text{-dieneN}_4)Cl^{2+} + Cl^- \rightarrow Cu(4,11\text{-dieneN}_4)^{2+} + Cl_2^{\bullet-}$	1.5 × 10^3	1		22	f.p.	D.k. in N_2O-satd. soln. contg. (1-5) × 10^{-4} mol L^{-1} $Cu(4,11\text{-dieneN}_4)^{2+}$, 0.1 mol L^{-1} Cl^-, 0.001-0.01 mol L^{-1} H_2O_2 and 0.1 mol L^{-1} H^+; k_r = 1.5 × 10^8 L mol^{-1} s^{-1}.	79A080
8.52	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(III) ion**							
8.52.1	**First-order reaction**							
	$Cu(4,11\text{-dieneN}_4)^{3+} \rightarrow$	0.36 s^{-1}	1	1.0	25	f.p.	D.k. at 340 or 400 nm in soln. contg. 0.01-1 mol L^{-1} Cl^- and (0.4-1.0) × 10^{-4} mol L^{-1} $Cu(4,11\text{-dieneN}_4)^{2+}$.	83A271
8.52.2	**Chloride ion**							
	$Cu(4,11\text{-dieneN}_4)^{3+} + Cl^- \rightarrow$	0.63	1	1.0	25	f.p.	D.k. at 340 or 400 nm in soln. contg. 0.01-1 mol L^{-1} Cl^- and (0.4-1.0) × 10^{-4} mol L^{-1} $Cu(4,11\text{-dieneN}_4)^{2+}$.	83A271
8.52.3	**Hydrogen peroxide**							
	$Cu(4,11\text{-dieneN}_4)^{3+} + H_2O_2 \rightarrow Cu(4,11\text{-dieneN}_4)^{2+} + H^+ + HO_2^{\bullet}$	7.0 × 10^2	1		22	f.p.	D.k. in soln. contg. $Cu(4,11\text{-dieneN}_4)^{2+}$ and (1-10) × 10^{-3} mol L^{-1} H_2O_2.	79A080
8.52.4	**Azide ion**							
	$Cu(4,11\text{-dieneN}_4)^{3+} + N_3^- \rightarrow Cu(4,11\text{-dieneN}_4)^{2+} + {}^{\bullet}N_3$	2.5 × 10^4	1		22	f.p.	D.k. in soln. contg. $Cu(4,11\text{-dieneN}_4)^{2+}$, (8-40) × 10^{-4} mol L^{-1} azide ion, 0.1 mol L^{-1} Cl^-, 0.1 mol L^{-1} H^+ and $Co(NH_3)_5Cl^{2+}$.	79A080
8.53	**1,4,8,11-Tetraazacyclotetradecane(hydrido)copper(III) ion**							
8.53.1	**Hydrogen ion**							
	$Cu(cyclam)(H)^{2+} + H^+ \rightarrow Cu^+ + cyclamH_2^{2+}$	~2 × 10^8	6.0			p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} MeOH and (2-30) × 10^{-5} mol L^{-1} $Cu(cyclam)^{2+}$.	82A320
8.54	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydrido)copper(III) ion**							
8.54.1	**Hydrogen ion**							
	$Cu(aneN_4)(H)^{2+} + H^+ \rightarrow Cu^+ + aneN_4H_2^{2+}$	1.6 × 10^6	<5.5			p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} formate and (2-30) × 10^{-5} mol L^{-1} $Cu(aneN_4)^{2+}$.	82A320
8.55	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene(hydrido)copper(III) ion**							
8.55.1	**Hydrogen ion**							
	$Cu(4,11\text{-dieneN}_4)(H)^{2+} + H^+ \rightarrow Cu^+ + 4,11\text{-dieneN}_4H_2^{2+}$	6 × 10^6	4.0-5.5			p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} MeOH and (2-30) × 10^{-5} mol L^{-1} $Cu(4,11\text{-dieneN}_4)^{2+}$.	80A189

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.56	**2,2,4,11,11,13-Hexamethyl-1,5,10,14-tetraazacyclooctadeca-4,13-diene(hydrido)copper(III) ion**							
8.56.1	**Hydrogen ion**							
	$Cu(4,13\text{-dieneN}_4)(H)^{2+} + H^+ \rightarrow Cu^+ + 4,13\text{-dieneN}_4H_2^{2+}$	$\sim 6 \times 10^8$	6.1			p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} formate and (2-30) × 10^{-5} mol L^{-1} $Cu(4,13\text{-dieneN}_4)^{2+}$; k was estimated from rate constants measured at pH 6.1 and 7.0.	82A320
8.57	**Bis(glycine)copper(III) complex**							
8.57.1	**First-order reaction**							
	$Cu^{III}(Gly)_2 \rightarrow$	6.0×10^3 s^{-1} 2.2×10^4 s^{-1}	6.1 7.5			p.r.	D.k. in N_2O-satd. soln. contg. (5-50) × 10^{-5} mol L^{-1} $CuSO_4$ and [glycine] = 1.9[$CuSO_4$].	710775
8.58	**Bis(alanine)copper(III) complex**							
8.58.1	**First-order reaction**							
	$Cu^{III}(Ala)_2 \rightarrow$	8.0×10^3 s^{-1}	6.3			p.r.	D.k. in N_2O-satd. soln. contg. (5-50) × 10^{-5} mol L^{-1} $CuSO_4$ and [alanine] = 1.9[$CuSO_4$].	710775
8.59	**Bis(β-alanine)copper(III) complex**							
8.59.1	**First-order reaction**							
	$Cu^{III}(\beta\text{-Ala})_2 \rightarrow$	7.0×10^3 s^{-1}	5.8			p.r.	D.k. in N_2O-satd. soln. contg. (5-50) × 10^{-5} mol L^{-1} $CuSO_4$ and [β-alanine] = 1.9[$CuSO_4$].	710775
8.60	**Bis(α-aminobutyric acid)copper(III) complex**							
8.60.1	**First-order reaction**							
	$Cu^{III}(\alpha\text{-aminobutyric acid})_2 \rightarrow$	5.0×10^3 s^{-1}	6.1			p.r.	D.k. in N_2O-satd. soln. contg. (5-50) × 10^{-5} mol L^{-1} $CuSO_4$ and [α-aminobutyric acid] = 1.9[$CuSO_4$].	710775
8.61	**Bis(β-aminobutyric acid)copper(III) complex**							
8.61.1	**First-order reaction**							
	$Cu^{III}(\beta\text{-aminobutyric acid})_2 \rightarrow$	4.5×10^3 s^{-1}	6.0			p.r.	D.k. in N_2O-satd. soln. contg. (5-50) × 10^{-5} mol L^{-1} $CuSO_4$ and [β-aminobutyric acid] = 1.9[$CuSO_4$].	710775
8.62	**Bis(γ-aminobutyric acid)copper(III) complex**							
8.62.1	**First-order reaction**							
	$Cu^{III}(\gamma\text{-aminobutyric acid})_2 \rightarrow$	1.2×10^3 s^{-1}	4.8			p.r.	D.k. in N_2O-satd. soln. contg. (5-50) × 10^{-5} mol L^{-1} $CuSO_4$ and [γ-aminobutyric acid] = 1.9[$CuSO_4$].	710775
8.63	**Bis(α-aminoisobutyric acid)copper(III) complex**							
8.63.1	**First-order reaction**							
	$Cu^{III}(\alpha\text{-aminoisobutyric acid})_2 \rightarrow$	1.5×10^3 s^{-1} 2.5×10^3 s^{-1}	6.2 7.3			p.r.	D.k. in N_2O-satd. soln. contg. (5-50) × 10^{-5} mol L^{-1} $CuSO_4$ and [α-aminoisobutyric acid] = 1.9[$CuSO_4$].	710775
8.64	**Hydroperoxocopper(III) ion**							
8.64.1	**First-order reaction**							
	$CuO_2H^{2+} \rightarrow Cu(I) + O_2 + H^+$	2.2×10^3 s^{-1}				p.r.	D.k. in O_2-satd. soln. contg. 1 × 10^{-4} mol L^{-1} Cu^{2+}, 0.05 mol L^{-1} formate and 0.01 mol L^{-1} arginine. Reactant includes $[Cu(HCO_2^-)(HO_2)]^+$.	87A160

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.65	**Methylcopper(III) ion**							
8.65.1	**First-order reaction**							
	$CuCH_3^{2+} \rightarrow$	7×10^2 s^{-1}	6			p.r.	D.k. in N_2O-satd. soln. contg. $CuSO_4$ and DMSO.	78F301
8.66	**Trichloromethylcopper(III) ion**							
8.66.1	**Water**							
	$CuCCl_3^{2+} + H_2O \rightarrow Cu^+ + HOCCl_3 + H^+$	0.9 s^{-1}	6			p.r.	D.k. in Ar-satd. soln. contg. (2-10) $\times 10^{-5}$ mol L^{-1} $CuSO_4$ and (1-10) $\times 10^{-2}$ mol L^{-1} $CHCl_3$; $CuCHCl_2^+$ also present. Authors did not distinguish between the two species.	80A277
8.67	**2-Hydroxyethylcopper(III) ion**							
8.67.1	**First-order reaction**							
	$CuCH_2CH_2OH^{2+} + \rightarrow Cu^+ + H^+ + -OCH_2CH_2-$	3.3×10^2 s^{-1}	6			p.r.	D.k. in N_2O-ethylene (1:1) satd. soln. contg. (1-5) $\times 10^{-4}$ mol L^{-1} $CuSO_4$.	80A277
8.68	**Carboxymethylcopper(III) ion**							
8.68.1	**Water**							
	$CuCH_2CO_2^+ + H_2O \rightarrow Cu^+ + H^+ + HOCH_2CO_2^-$	2.8 s^{-1}	6			p.r.	D.k. in N_2O-satd. soln. contg. $CuSO_4$ and acetate; an initial process with $k = 1 \times 10^2$ s^{-1} was also reported.	80A277
8.69	**1-Carboxyethylcopper(III) ion**							
8.69.1	**Water**							
	$CuCH(CH_3)CO_2^+ + H_2O \rightarrow Cu^+ + H^+ + CH_3CHOHCO_2^-$	0.2 s^{-1}	6			p.r.	D.k. in N_2O-satd. soln. contg. (5-10) $\times 10^{-5}$ mol L^{-1} $CuSO_4$ and 0.01 mol L^{-1} propionate; an initial process with $k = 8.6 \times 10^3$ s^{-1} was also reported.	80A277
8.70	**2-Hydroxy-2,2-dimethylethylcopper(III) ion**							
8.70.1	**Water**							
	$CuCH_2C(CH_3)_2OH^{2+} + H_2O \rightarrow Cu^+ + H^+ + HOCH_2C(CH_3)_2OH$	4.5×10^2 s^{-1}	6			p.r.	D.k. in N_2O-satd. soln. contg. (1-5) $\times 10^{-5}$ mol L^{-1} $CuSO_4$ and 0.1 mol L^{-1} *tert*-BuOH.	80A277
8.71	**1,2-Dicarboxy-2-hydroxyethylcopper(III) ion**							
8.71.1	**First-order reaction**							
	$CuCH(CO_2)C(OH)CO_2 \rightarrow$	1 s^{-1}	6			p.r.	D.k. in N_2O-satd. soln. contg. (5-10) $\times 10^{-5}$ mol L^{-1} $CuSO_4$ and (2.5-10) $\times 10^{-4}$ mol L^{-1} fumarate; an initial process with $k = 2 \times 10^2$ s^{-1} was also reported.	80A277
8.72	**2-Carboxy-2,2-dimethylethylcopper(III) ion**							
8.72.1	**First-order reaction**							
	$CuCH_2C(CH_3)_2CO_2H^{2+} \rightarrow Cu^+ + CO_2 + CH_2{=}C(CH_3)_2 + H^+$	0.03 s^{-1}	3.0-4.0			p.r.	D.k. at 400 nm in N_2O-satd. soln. contg. 0.05 mol L^{-1} trimethylacetic acid, (5-30) $\times 10^{-4}$ mol L^{-1} Cu^{2+} and ((5-30) $\times 10^{-5}$ mol L^{-1} Cu^+.	90A474
8.73	**2-Ammonio-2-carboxypropylcopper(III) ion**							
8.73.1	**First-order reaction**							
	$CuCH_2C(CH_3)(NH_3)CO_2^{2+} \rightarrow Cu^+ + CO_2 + CH_2{=}C(CH_3)NH_3^+$	0.15 s^{-1}	3			p.r.	D.k. in N_2O-satd. soln. contg. 0.05 mol L^{-1} 2-methylalanine and (0.5-2.0) $\times 10^{-3}$ mol L^{-1} Cu^{2+}.	92A215

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.74	**Benzylcopper(III) ion**							
8.74.1	**First-order reaction**							
	$CuCH_2C_6H_5^{2+} \rightarrow Cu^{2+} + C_6H_5\dot{C}H_2$	1.2×10^6 s^{-1}				f.p.	D.k. in deaerated soln. contg. (0.4-1.2) × 10^{-3} mol L^{-1} $Co(NH_3)_5(C_6H_5CH_2CO_2)^{2+}$ and $Cu(ClO_4)_2$; $k_r = 2.8 \times 10^6$ L mol^{-1} s^{-1}. In soln. contg. 10% acetonitrile and dibenzyl ketone, $k = 1.3 \times 10^6$ s^{-1} and $k_r = 2.5 \times 10^7$ L mol^{-1} s^{-1} at 20 °C; $E_a = 7.0$ kJ mol^{-1}, log $A = 7.58$, studied at 1-60 °C [92A148].	93A346
		1.1×10^6 s^{-1}	2.8		27	f.p.	D.k. at 375 nm in soln. contg. ~0.002 mol L^{-1} $Co(NH_3)(C_6H_5CH_2CO_2)^{2+}$ and 0.001-0.004 mol L^{-1} $CuSO_4$: $k_r = 2.1 \times 10^7$ L mol^{-1} s^{-1}.	84A367
8.74.2	**Water**							
	$CuCH_2C_6H_5^{2+} + H_2O \rightarrow Cu^+ + C_6H_5CH_2OH + H^+$	4.3×10^4 s^{-1}				f.p.	D.k. in soln. contg. $Co(NH_3)_5(C_6H_5CH_2CO_2)^{2+}$ and $Cu(ClO_4)_2$; in soln. contg. dibenzyl ketone, $Cu(ClO_4)_2$ and 10% acetonitrile $k = 3.5 \times 10^5$ s^{-1} at 20 °C; $E_a = 6.9$ kJ mol^{-1}, log $A = 6.61$, studied at 1-60 °C [92A148].	93A346
		~1.2×10^4 s^{-1}	2.8		27	f.p.	D.k. in soln. contg. ~0.002 mol L^{-1} $[Co(NH_3)_5OCOCH_2C_6H_5]^{2+}$ and 0.001-0.004 mol L^{-1} $CuSO_4$.	84A367
8.75	**(4-Chlorophenyl)methylcopper(III) ion**							
8.75.1	**First-order reaction**							
	$CuCH_2C_6H_4\text{-}4\text{-}Cl^{2+} \rightarrow Cu^{2+} + 4\text{-}ClC_6H_4\dot{C}H_2$	1.5×10^6 s^{-1}				f.p.	D.k. in soln. contg. $Co(NH_3)_5(4\text{-}ClC_6H_4CH_2CO_2)^{2+}$ and $Cu(ClO_4)_2$; $k_r = 1.6 \times 10^6$ L mol^{-1} s^{-1}.	93A346
8.75.2	**Water**							
	$CuCH_2C_6H_4\text{-}4\text{-}Cl^{2+} + H_2O \rightarrow Cu^+ + 4\text{-}ClC_6H_4CH_2OH + H^+$	3.3×10^4 s^{-1}				f.p.	D.k. in soln. contg. $Co(NH_3)_5(4\text{-}ClC_6H_4CH_2CO_2)^{2+}$ and $Cu(ClO_4)_2$.	93A346
8.76	**2-Hydroxyphenoxycopper(III) ion**							
8.76.1	**2-Hydroxyphenoxycopper(III) ion**							
	$CuOC_6H_4\text{-}2\text{-}OH^{2+} + CuOC_6H_4\text{-}2\text{-}OH^{2+} \rightarrow$	1.6×10^6	2.0	→0		f.p.	D.k. at 380 nm in soln. contg. (1.5-20) × 10^{-2} mol L^{-1} Cu^{2+} and 1×10^{-4} mol L^{-1} catechol.	78A449 757592
8.77	**3-Hydroxyphenoxycopper(III) ion**							
8.77.1	**First-order reaction**							
	$CuOC_6H_4\text{-}3\text{-}OH^{2+} \rightarrow$	3.0×10^3 s^{-1}	2-6			f.p.	D.k. at 420 nm in soln. contg. (2-300) × 10^{-4} mol L^{-1} Cu^{2+} and 2×10^{-3} mol L^{-1} resorcinol.	79A272
8.77.2	**3-Hydroxyphenoxycopper(III) ion**							
	$CuOC_6H_4\text{-}3\text{-}OH^{2+} + CuOC_6H_4\text{-}3\text{-}OH^{2+} \rightarrow$	5.0×10^9	2-6	0.04		f.p.	D.k. at 420 nm in soln. contg. > 10^{-2} mol L^{-1} Cu^{2+} and 2×10^{-3} mol L^{-1} resorcinol.	79A272
8.78	**4-Hydroxyphenoxycopper(III) ion, conjugate base**							
8.78.1	**4-Hydroxyphenoxycopper(III) ion, conjugate base**							
	$CuOC_6H_4\text{-}4\text{-}O^+ + CuOC_6H_4\text{-}4\text{-}O^+ \rightarrow$	1.6×10^6	7.0	→0		f.p.	D.k. at 425 nm in soln. contg. Cu^{2+} and 1×10^{-4} mol L^{-1} hydroquinone.	78A449

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.79	**3-Hydroxy-5-methylphenoxycopper(III) ion**							
8.79.1	**First-order reaction**							
	$CuOC_6H_3$-5-CH_3-3-OH^{2+} →	3.0×10^3 s^{-1}	2-6			f.p.	D.k. at 420 nm in soln. contg. (2-300) × 10^{-4} mol L^{-1} Cu^{2+} and 2×10^{-3} mol L^{-1} 5-methylresorcinol.	79A272
8.79.2	**3-Hydroxy-5-methylphenoxycopper(III) ion**							
	$CuOC_6H_3$-5-CH_3-3-OH^{2+} + $CuOC_6H_3$-5-CH_3-3-OH^{2+} →	5.0×10^9	2-6	0.04		f.p.	D.k. at 420 nm in soln. contg. > 10^{-2} mol L^{-1} Cu^{2+} and 2×10^{-3} mol L^{-1} 5-methylresorcinol.	79A272
8.80	**(4-Methoxyphenyl)methylcopper(III) ion**							
8.80.1	**First-order reaction**							
	$CuCH_2C_6H_4$-4-OCH_3^{2+} → Cu^{2+} + 4-$CH_3OC_6H_4\dot{C}H_2$	6.2×10^5 s^{-1}				f.p.	D.k. in soln. contg. $Co(NH_3)_5$(4-$CH_3OC_6H_4CH_2CO_2)^{2-}$ and $Cu(ClO_4)_2$; k_r = 8.0×10^6 L mol^{-1} s^{-1}.	93A346
8.80.2	**Water**							
	$CuCH_2C_6H_4$-4-OCH_3^{2+} + H_2O → Cu^+ + 4-$CH_3OC_6H_4CH_2OH$ + H^+	1.5×10^4 s^{-1}				f.p.	D.k. in soln. contg. $Co(NH_3)_5$(4-$CH_3OC_6H_4CH_2CO_2)^{2-}$ and $Cu(ClO_4)_2$.	93A346
8.81	**(4-Methylphenyl)methylcopper(III) ion**							
8.81.1	**First-order reaction**							
	$CuCH_2C_6H_4$-4-CH_3^{2+} → Cu^{2+} + 4-$CH_3C_6H_4\dot{C}H_2$	7.9×10^5 s^{-1}				f.p.	D.k. in soln. contg. $Co(NH_3)_5$(4-$CH_3C_6H_4CH_2CO_2)^{2-}$ and $Cu(ClO_4)_2$; k_r = 5.7×10^6 L mol^{-1} s^{-1}.	93A346
8.81.2	**Water**							
	$CuCH_2C_6H_4$-4-CH_3^{2+} + H_2O → Cu^+ + 4-$CH_3C_6H_4CH_2OH$ + H^+	3.4×10^4 s^{-1}				f.p.	D.k. in soln. contg. $Co(NH_3)_5$(4-$CH_3C_6H_4CH_2CO_2)^{2-}$ and $Cu(ClO_4)_2$.	93A346
8.82	**Bis(glycinato)methylcopper(III) ion**							
8.82.1	**Methyl**							
	$(Gly)_2CuCH_3$ + $^{\bullet}CH_3$ → $Cu(Gly)_2$ + C_2H_6	$>5 \times 10^9$				γ-r.	Estd. from yield of ethane in low-dose experiments.	90A421
8.83	**β-Alaninato(2-aminoethyl)copper(III)**							
8.83.1	**Water**							
	(β-Ala)$CuCH_2CH_2NH_2$ + H_2O → Cu(β-Ala) + $H_2NCH_2CH_2OH$ + H^+	1.2×10^1 s^{-1}				f.p.	D.k. in soln. contg. Cu(β-Ala)$_2$; the transient is from reaction of the Cu(II) complex with aminoalkyl radical.	81F406
8.83.2	**Hydroxide ion**							
	(β-Ala)$CuCH_2CH_2NH_2$ + OH^- → Cu(β-Ala) + $H_2NCH_2CH_2OH$	4.0×10^8				f.p.	D.k. in soln. contg. Cu(β-Ala)$_2$.	81F406
8.84	***cis*-Aqua(hydroxymethyl)(nitrilotriacetato)cuprate(III) ion**							
8.84.1	**Hexaamminecobalt(III) ion**							
	cis-$[HOCH_2Cu(NTA)(H_2O)]^-$ + $Co(NH_3)_6^{3+}$ →	3.8×10^5	5-8			p.r.	D.k. in N_2O-satd. soln. contg. $CuSO_4$, nitrilotriacetate ion and MeOH; $^{\bullet}CH_2OH$ in the complex may be ionized to $^{\bullet}CH_2O^-$ in this pH region.	86B151
8.84.2	**Hexaammineruthenium(III) ion**							
	cis-$[HOCH_2Cu(NTA)(H_2O)]^-$ + $Ru(NH_3)_6^{3+}$ →	1.8×10^8	5-8			p.r.	D.k. in N_2O-satd. soln. contg. $CuSO_4$, nitrilotriacetate ion and MeOH; $^{\bullet}CH_2OH$ in the complex may be ionized to $^{\bullet}CH_2O^-$ in this pH region.	86B151

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
8.84	***cis*-Aqua(hydroxymethyl)(nitrilotriacetato)cuprate(III) ion** — Continued							
8.84.3	**Ferricyanide ion**							
	cis-$[HOCH_2Cu(NTA)(H_2O)]^-$ + $Fe(CN)_6^{3-}$ →	1.9×10^7	5-8			p.r.	D.k. in N_2O-satd. soln. contg. $CuSO_4$, nitrilotriacetate ion and MeOH; $^{\bullet}CH_2OH$ in the complex may be ionized to $^{\bullet}CH_2O^-$ in this pH region.	86B151
8.84.4	***cis*-Diaqua(nitrilotriacetato)copper(II) ion**							
	cis-$[HOCH_2Cu(NTA)(H_2O)]^-$ + *cis*-$[Cu(NTA)(H_2O)_2]^-$ + H_2O → *cis*-$[Cu(NTA)(H_2O)_2]^-$ + *cis*-$[Cu(NTA)(H_2O)_2]^{2-}$ + HCHO + H^+	4.0×10^5	5-8			p.r.	D.k. at 425 nm in N_2O-satd. soln. contg. $(1\text{-}100) \times 10^{-5}$ mol L^{-1} $CuSO_4$, 0.001 mol L^{-1} nitrilotriacetate ion and 0.1 mol L^{-1} MeOH; $^{\bullet}CH_2OH$ in the complex may be ionized to $^{\bullet}CH_2O^-$ in this pH region.	86B151
8.85	***cis*-Aqua(1-hydroxyethyl)(nitrilotriacetato)cuprate(III) ion**							
8.85.1	***cis*-Diaqua(nitrilotriacetato)copper(II) ion**							
	cis-$[HOCH(CH_3)Cu(NTA)(H_2O)]^-$ + *cis*-$[Cu(NTA)(H_2O)_2]^-$ + H_2O → *cis*-$[Cu(NTA)(H_2O)_2]^-$ + *cis*-$[Cu(NTA)(H_2O)_2]^{2-}$ + CH_3CHO + H^+	1.3×10^6	5-8			p.r.	D.k. in N_2O-satd. soln. contg. $CuSO_4$, nitrilotriacetate ion and EtOH.	86B151
8.86	***cis*-Aqua(1-hydroxy-1-methylethyl)(nitrilotriacetato)cuprate(III) ion**							
8.86.1	***cis*-Diaqua(nitrilotriacetato)copper(II) ion**							
	cis-$[HOC(CH_3)_2Cu(NTA)(H_2O)]^-$ + *cis*-$[Cu(NTA)(H_2O)_2]^-$ + H_2O → *cis*-$[Cu(NTA)(H_2O)_2]^-$ + *cis*-$[Cu(NTA)(H_2O)_2]^{2-}$ + CH_3COCH_3 + H^+	1.5×10^6	5-8			p.r.	D.k. in N_2O-satd. soln. contg. $CuSO_4$, nitrilotriacetate ion and 2-PrOH.	86B151

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
9.12	**Iron(II) deuteroporphyrin (2-propanol)$_2$**							
9.12.1	**Trichloromethyl**							
	$FeDP(2\text{-}PrOH)_2 + {}^{\bullet}CCl_3 \rightarrow CCl_3FeDP(2\text{-}PrOH)_2$	$\sim 2 \times 10^9$	7.2			p.r.	D.k. at 412 nm in soln. contg. 10^{-4} mol L^{-1} Fe(III) deuteroporphyrin, 6.5 mol L^{-1} 2-PrOH, 0.034 mol L^{-1} acetone, (0.25-1.0) × 10^{-4} mol L^{-1} CCl_4 and 6.2×10^{-3} mol L^{-1} phosphate. Reaction is followed by first-order process, $k = 70$ s^{-1}; suggested to represent structural rearrangement.	80A011
9.13	**Tris(2,2′-bipyridine)iron(II) ion, OH-adduct**							
9.13.1	**First-order reaction**							
	$Fe(bpy)_2(bpyOH)^{2+} \rightarrow$	1.4×10^3 s^{-1}				p.r.	D.k. at 400 nm in N_2O-satd. soln. contg. (0.32-1.0) × 10^{-4} mol L^{-1} $Fe(bpy)_3{}^{2+}$. At 520 nm decay is mixed order; $k = 1 \times 10^3$ s^{-1} from condy. change at pH 4 and 9.	90A105
		1.3×10^3 s^{-1}	7		20	p.r.	D.k. at 400 nm in N_2O-satd. soln. contg. $Fe(bpy)_3{}^{2+}$. At 520 nm decay is mixed order suggesting existence of at least two isomers.	82A343
9.13.2	**Ferricyanide ion**							
	$Fe(bpy)_2(bpyOH)^{2+} + Fe(CN)_6{}^{3-} \rightarrow$	† 2.1×10^5	~6			p.r.	D.k. at 375 and 620 nm in N_2O-satd. soln. contg. 8.0×10^{-4} mol L^{-1} $Fe(CN)_6{}^{3-}$.	90A015
		† 8×10^5	~6			p.r.	D.k. at 825 nm in N_2O-satd. soln. contg. (0.8-2.0) × 10^{-3} mol L^{-1} $Fe(CN)_6{}^{3-}$. † Wavelength dependence of k attributed to the presence of more than one form of the reactant.	90A015
9.13.3	**Oxygen**							
	$Fe(bpy)_2(bpyOH)^{2+} + O_2 \rightarrow$	† 4×10^6	~6			p.r.	D.k. at 400 nm in N_2O-satd. soln. contg. 6.0 × 10^{-4} mol L^{-1} O_2.	90A015
		† 7.6×10^6	~6			p.r.	D.k. at 525 nm in N_2O-satd. soln. contg. 6.0 × 10^{-4} mol L^{-1} O_2. † Wavelength dependence of k attributed to the presence of more than one form of the reactant.	90A015
9.14	**Bis(2,2′-bipyridine)dicyanoferrate(II), OH reaction product**							
9.14.1	**First-order reaction**							
	$Fe(bpy)_2(CN)_2/OH \rightarrow$	$\sim 3 \times 10^3$ s^{-1}	4, nat			p.r.	D.k. at 310, 330, 515-530 nm in N_2O-satd. soln. contg. (3.1-5.6) × 10^{-5} mol L^{-1} $Fe(bpy)_2(CN)_2$. From condy. measurements $k = 4 \times 10^3$ s^{-1}. At pH 9.0, 9.5 d.k. is complex. Reactant suggested to be a mixture of $[Fe(bpy)_2(CN)_2]^+$ and various ${}^{\bullet}OH$ adducts.	90A015
9.15	**Hydroperoxide-iron(III) iron(II) complex**							
9.15.1	**First-order reaction**							
	$FeHO_2Fe^{4+} \rightarrow Fe^{3+} + FeHO_2{}^+$	1.8×10^4 s^{-1} 2.5×10^4 s^{-1}	0.1- 0.3	1.0	20 25	p.r.	D.k. at 450 nm in O_2-satd. soln. contg. $Fe(ClO_4)_2$ and $HClO_4$; $E_a = 48$ kJ mol^{-1}; studied at 20-40°C. For the equilibrium $Fe^{3+}HO_2{}^- + Fe^{2+} \rightleftarrows FeHO_2Fe^{4+}$ $K = 22, 27, 33, 37.5$ L mol^{-1} at 20, 25, 30 and 40°C, respectively.	730038

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
9.16	**Hydridoiron(III) ion**							
9.16.1	**Hydrogen ion**							
	$FeH^{2+} + H^+ \rightarrow Fe^{3+} + H_2$	1.1×10^4	0.1-1.0	0.1-1.0	19-24	p.r.	D.k. at 320-370 nm in deaerated soln. contg. $Fe(ClO_4)_2$ and $HClO_4$.	690434
9.17	**Hydroperoxide-iron(III) complex**							
9.17.1	**First-order reaction**							
	$FeHO_2^{2+} \rightarrow Fe^{3+} + HO_2^-$	1.8×10^3 s^{-1}	0.1-0.3	1.0	20,25	p.r.	Calcd. from d.k. at 450 nm in O_2-satd. soln. contg. $Fe(ClO_4)_2$ and $HClO_4$; $E_a = 8.8$ kJ mol^{-1}; studied at 20-40°C.	730038
9.18	**Hydroperoxide-sulfatoiron(III) complex**							
9.18.1	**First-order reaction**							
	$FeHO_2SO_4 \rightarrow FeSO_4^+ + HO_2^-$	~10^4 s^{-1}	0.1-0.3		22	p.r.	Estd. from d.k. at 450 nm in O_2-satd. soln. contg. $(1.5\text{-}2.3) \times 10^{-2}$ mol L^{-1} Fe^{2+} and 0-0.13 mol L^{-1} sulfate. For the equilibrium $Fe^{3+}HO_2^- + SO_4^{2-} \rightleftarrows FeHO_2SO_4$, $K = 90$ L mol^{-1}.	731022
9.19	**Hydroperoxide-sulfatoiron(III) iron(II) complex**							
9.19.1	**First-order reaction**							
	$FeHO_2FeSO_4^{2+} \rightarrow FeSO_4Fe^{3+} + HO_2^-$	~10^4 s^{-1}	0.1-0.3		22	p.r.	Estd. from d.k. at 450 nm in O_2-satd. soln. contg. $(1.5\text{-}2.3) \times 10^{-2}$ mol L^{-1} Fe^{2+} and 0-0.13 mol L^{-1} sulfate. For the equilibrium $FeHO_2Fe^{4+} + SO_4^{2-} \rightleftarrows FeHO_2FeSO_4^{2+}$, $K = 100$ L mol^{-1}.	731022
9.20	**Hydridoiron(III) protoporphyrin**							
9.20.1	**Water**							
	$Fe(III)PP(H) + H_2O \rightarrow Fe(III)PP + H_2 + OH^-$	2.5×10^3 s^{-1}	10			p.r.	D.k. in Ar-satd. soln. contg. 2×10^{-5} mol L^{-1} Fe(II) protoporphyrin and 0.1 mol L^{-1} *tert*-BuOH. In N_2O-satd. soln. contg. (2-10) $\times 10^{-5}$ mol L^{-1} Fe(II)PP and 0.1 mol L^{-1} formate, $k = 2.0 \times 10^3$ s^{-1}.	85A006
9.21	**Hydroxymethyliron(III) protoporphyrin**							
9.21.1	**Water**							
	$HOCH_2Fe(III)PP + H_2O \rightarrow Fe(III)PP + MeOH + OH^-$	2.5×10^2 s^{-1}	10			p.r.	D.k. in N_2O-satd. soln. contg. 2×10^{-5} mol L^{-1} Fe(II) protoporphyrin and 0.1 mol L^{-1} MeOH.	85A006
9.22	**1-Hydroxyethyliron(III) protoporphyrin**							
9.22.1	**Water**							
	$CH_3CHOHFe(III)PP + H_2O \rightarrow Fe(III)PP + EtOH + OH^-$	2.5×10^2 s^{-1}	10			p.r.	D.k. in N_2O-satd. soln. contg. 2×10^{-5} mol L^{-1} Fe(II) protoporphyrin and 0.1 mol L^{-1} EtOH.	85A006
9.23	**1-Hydroxy-1-methylethyliron(III) protoporphyrin**							
9.23.1	**Water**							
	$(CH_3)_2C(OH)Fe(III)PP + H_2O \rightarrow Fe(III)PP + 2\text{-}PrOH + OH^-$	3.0×10^2 s^{-1}	10			p.r.	D.k. in N_2O-satd. soln. contg. 2×10^{-5} mol L^{-1} Fe(II) protoporphyrin and 0.1 mol L^{-1} 2-PrOH.	85A006

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
9.24	**2-Hydroxyethyliron(III) protoporphyrin**							
9.24.1	**First-order reaction**							
	$HOCH_2CH_2Fe(III)PP \rightarrow Fe(III)PP + H_2C{=}CH_2 + OH^-$	80 s^{-1}	10-13			p.r.	D.k. in ethylene-N_2O (9:1) satd. soln. contg. (1-3) × 10^{-5} mol L^{-1} Fe(II) protoporphyrin.	86A511
9.25	**2-Hydroxy-1-methylethyliron(III) protoporphyrin**							
9.25.1	**First-order reaction**							
	$HOCH_2CH(CH_3)Fe(III)PP \rightarrow Fe(III)PP + CH_3CH{=}CH_2 + OH^-$	40 s^{-1}	10-13			p.r.	D.k. in propylene-N_2O (9:1) satd. soln. contg. (1-3) × 10^{-5} mol L^{-1} Fe(II) protoporphyrin.	86A511
9.26	**Trifluoromethyliron(III) deuteroporphyrin (2-propoxy)(2-propanol)**							
9.26.1	**Iron(II) deuteroporphyrin (2-propoxy)(2-propanol)**							
	$CF_3Fe(III)DP(2\text{-}PrO^-)(2\text{-}PrOH) + Fe(II)DP(2\text{-}PrO^-)(2\text{-}PrOH) \rightarrow CF_2FeDP(2\text{-}PrO^-)(2\text{-}PrOH) + Fe(III)DP(2\text{-}PrO^-)(2\text{-}PrOH) + F^-$	5.1 × 10^6	12.7			p.r.	P.b.k. at 460 nm in CF_3Br-satd. soln. contg. 6.5 mol L^{-1} 2-PrOH, (0.6-2) × 10^{-4} mol L^{-1} Fe(II) deuteroporphyrin and 0.05 mol L^{-1} NaOH; CF_2FeDP is suggested to hydrolyze slowly to give FeDP(CO).	87A232
9.27	**Tris(1,10-phenanthroline)iron(III) ion**							
9.27.1	**Iron(II) ion**							
	$Fe(phen)_3^{3+} + Fe^{2+} \rightarrow Fe(phen)_3^{2+} + Fe^{3+}$	5.4 × 10^4 6.4 × 10^4	0 1.1	1.0 0.10	25	f.p./oq	Absorbance changes at 450 nm in soln. contg. 3.0 × 10^{-6} mol L^{-1} $Ru(bpy)_3^{2+}$, 2.5 × 10^{-6} mol L^{-1} $Fe(phen)_3^{2+}$, 4.0 × 10^{-3} mol L^{-1} Fe^{3+} (OQ), 3.0 × 10^{-5} mol L^{-1} Fe^{2+} and 1.0 or 0.076 mol L^{-1} H^+, respectively.	777164
9.28	**Aqua(methyl)nitrilotriacetatoferrate(III) ion**							
9.28.1	**First-order reaction**							
	$CH_3FeNTA(H_2O)^- \rightarrow FeNTA(H_2O)^- + {}^{\bullet}CH_3$	9 × 10^3 s^{-1} 1.1 × 10^3 s^{-1}	4-8 10.5			p.r.	D.k. in N_2O-satd. soln. contg. 0.002-0.006 mol L^{-1} NTA, (0.5-5.0) × 10^{-3} mol L^{-1} $FeSO_4$ and 0.1-0.5 mol L^{-1} DMSO; k_r = 2.1 × 10^7 and 5.3 × 10^6 L mol^{-1} s^{-1} at pH 4-8 and 10.5, respectively.	88A426
9.28.2	**Methyl**							
	$CH_3FeNTA(H_2O)^- + {}^{\bullet}CH_3 \rightarrow FeNTA(H_2O)^- + C_2H_6$	5.5 × 10^8	4-8			p.r.	Calcd. from concn. dependence of d.k. in N_2O-satd. soln. contg. 0.002-0.006 mol L^{-1} NTA, (0.5-5.0) × 10^{-3} mol L^{-1} $FeSO_4$ and 0.1-0.5 mol L^{-1} DMSO; at pH 10.5, $k \sim 2 \times 10^7$ L mol^{-1} s^{-1}.	88A426
9.29	**Carboxylato(nitrilotriacetato)ferrate(III) ion**							
9.29.1	**First-order reaction**							
	$[CO_2FeNTA]^{2-} \rightarrow FeNTA^- + CO_2^{\bullet-}$	140 s^{-1}	7			p.r.	Calcd. from concn. dependence of d.k. in N_2O-satd. soln. contg. $FeSO_4$, formate, NTA, with and without $Co(NH_3)_6^{3+}$ or Fe(III); k_r = 1.5 × 10^7 L mol^{-1} s^{-1}.	88A184
9.29.2	**Carbon dioxide radical anion**							
	$[CO_2FeNTA]^{2-} + CO_2^{\bullet-} + H_2O \rightarrow FeNTA^- + CO_2 + CO + 2\,OH^-$	1.9 × 10^7	7			p.r.	Calcd. from concn. dependence of d.k. in N_2O-satd. soln. contg. formate and $FeSO_4$ with and without $Co(NH_3)_6^{3+}$, NTA or Fe(III).	88A184

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
9.30	**Carboxylato(2-hydroxyethylethylenediaminetriacetato)ferrate(III) ion**							
9.30.1	**First-order reaction**							
	$CO_2FeHEDTA^{2-} \rightarrow FeHEDTA^- + CO_2^{\bullet -}$	25	7			p.r.	Calcd. from concn. dependence of d.k. in N_2O-satd. soln. contg. ferrous ammonium sulfate, formate, HEDTA, with and without $Co(NH_3)_6^{3+}$ or Fe(III); $k_r = 6.2 \times 10^6$ L mol^{-1} s^{-1}.	88A184
9.30.2	**Carbon dioxide radical anion**							
	$CO_2FeHEDTA^{2-} + CO_2^{\bullet -} + H_2O \rightarrow FeHEDTA^- + CO_2 + CO + 2\ OH^-$	4.5×10^6	7			p.r.	Calcd. from concn. dependence of d.k. in N_2O-satd. soln. contg. formate, ferrous ammonium sulfate and HEDTA with and without $Co(NH_3)_6^{3+}$ or Fe(III).	88A184
9.31	**Diethylenetriaminepentaacetatoferrate(III), DTPA radical adduct**							
9.31.1	**First-order reaction**							
	$DTPAFe^{III}DTPA^{\bullet} \rightarrow DTPAFe^{III}DTPA_f^{\bullet}$	2.1×10^4 s^{-1}	8-11	0.1		p.r.	Calcd. from d.k. in N_2O-satd. soln. contg. 0.1 mol L^{-1} $NaClO_4$, 0.001 mol L^{-1} DTPA, and (4.5-143) $\times 10^{-6}$ mol L^{-1} $FeDTPA^{2-}$. Reaction suggested to represent rearrangement of the ligand radical. Product reacts with parent complex, $k = 2.5 \times 10^7$ L mol^{-1} s^{-1} at pH 8-10.	89A135
9.32	**Tetracyano(2,2′-bipyridine)ferrate(III) ion**							
9.32.1	**1,1′-Dimethyl-4,4′-bipyridinium radical cation**							
	$Fe(bpy)(CN)_4^- + MV^{\bullet +} \rightarrow Fe(bpy)(CN)_4^{2-} + MV^{2+}$	1.8×10^{10}				f.p./pi	D.k. in soln. contg. $Fe(bpy)(CN)_4^{2-}$ and MV^{2+}. Value obtained from computer fit.	91A067
9.33	**Sulfatoiron(III) ion**							
9.33.1	**First-order reaction**							
	$FeSO_4^+ \rightarrow SO_4^{2-} + Fe^{3+}$	6.5×10^3 s^{-1}	2.1		20	f.p.	D.k. at 450 nm in Ar-satd. soln. contg. 0.001 mol L^{-1} $K_2S_2O_8$ and 7.5×10^{-5} mol L^{-1} Fe^{2+}; value obtained from computer fit.	90A261
	$FeSO_4^+ \rightarrow SO_4^{\bullet -} + Fe^{2+}$	~5×10^4 s^{-1}	2.1		20	f.p.	D.k. at 450 nm in Ar-satd. soln. contg. 0.001 mol L^{-1} $K_2S_2O_8$ and 7.5×10^{-5} mol L^{-1} Fe^{2+}; value obtained from computer fit; $k_r = 3 \times 10^8$ L mol^{-1} s^{-1}.	90A261
9.34	**Ferricyanide ion**							
9.34.1	**3,4-Dimethoxyphenoxide ion**							
	$Fe(CN)_6^{3-} + 3,4\text{-}(CH_3O)_2C_6H_3O^- \rightarrow Fe(CN)_6^{4-} + 3,4\text{-}(CH_3O)_2C_6H_3O^{\bullet}$	2.7×10^4	13.5		20	p.r.	P.b.k. in N_2O-satd. soln. contg. (1-10) $\times 10^{-3}$ mol L^{-1} $K_4Fe(CN)_6$, ~0.04 mol L^{-1} 3,4-dimethoxyphenoxide ion and Br^-; $k_r = 6.5 \times 10^5$ L mol^{-1} s^{-1}.	91A455
9.34.2	**5-Hydroxyindole, conjugate base**							
	$Fe(CN)_6^{3-} + 5\text{-InH-O}^- \rightarrow Fe(CN)_6^{4-} + 5\text{-InH-O}^{\bullet}$	4.0×10^6	13.5		20	f.p./pi	P.b.k. at 500 nm in Ar-satd. soln. contg. (2-4) $\times 10^{-3}$ mol L^{-1} $K_4Fe(CN)_6$ and 0.1 mol L^{-1} 2-chloroethanol.	90C007
9.34.3	**5-Hydroxyindole-3-acetate ion, conjugate base**							
	$Fe(CN)_6^{3-} + R\text{-InH-O}^- \rightarrow Fe(CN)_6^{4-} + R\text{-InH-O}^{\bullet}$	2.7×10^6	13.5		20	f.p./pi	P.b.k. at 500 nm in Ar-satd. soln. contg. (2-4) $\times 10^{-3}$ mol L^{-1} $K_4Fe(CN)_6$ and 0.1 mol L^{-1} 2-chloroethanol.	90C007

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
9.34	**Ferricyanide ion** — Continued							
9.34.4	**5-Hydroxytryptophan, conjugate base**							
	$Fe(CN)_6^{3-}$ + 5-(O$^-$)TrpH → $Fe(CN)_6^{4-}$ + 5-(O$^\bullet$)TrpH	2.1×10^6	13.5		20	f.p./pi	P.b.k. at 500 nm in Ar-satd. soln. contg. (2-4) × 10^{-3} mol L^{-1} $K_4Fe(CN)_6$ and 0.1 mol L^{-1} 2-chloroethanol; $k_r = 2.8 \times 10^4$ L mol^{-1} s^{-1}.	90C007
		1.6×10^6	13.5		20	p.r.	P.b.k. at 500 nm in N_2O-satd. soln. contg. 1 × 10^{-4} mol L^{-1} $K_4Fe(CN)_6$ and 0.1 mol L^{-1} azide ion; $k_r = 2.7 \times 10^4$ L mol^{-1} s^{-1}.	90C007
9.34.5	**Sesamol, conjugate base**							
	$Fe(CN)_6^{3-}$ + 3,4-$(CH_2O_2)C_6H_3O^-$ → $Fe(CN)_6^{4-}$ + 3,4-$(CH_2O_2)C_6H_3O^\bullet$	2.4×10^5	13.5		20	p.r.	P.b.k. in N_2O-satd. soln. contg. (1-10) × 10^{-3} mol L^{-1} $K_4Fe(CN)_6$, ~0.04 mol L^{-1} sesamol and Br^-; $k_r = 8.2 \times 10^5$ L mol^{-1} s^{-1}.	91A455
9.34.6	**Serotonin, conjugate base**							
	$Fe(CN)_6^{3-}$ + R-InH-O$^-$ → $Fe(CN)_6^{4-}$ + R-InH-O$^\bullet$	5.9×10^6	13.7		20	f.p./pi	P.b.k. at 500 nm in Ar-satd. soln. contg. (2-4) × 10^{-3} mol L^{-1} $K_4Fe(CN)_6$ and 0.1 mol L^{-1} 2-chloroethanol; $k_r = 1 \times 10^5$ L mol^{-1} s^{-1}.	90C007
9.34.7	***N,N,N′,N′*-Tetramethyl-*p*-phenylenediamine**							
	$Fe(CN)_6^{3-}$ + TMPD → $Fe(CN)_6^{4-}$ + $[TMPD]^{\bullet+}$	5.4×10^6	9.1		20	f.p./pi	P.b.k. in Ar-satd. soln. contg. (2-4) × 10^{-3} mol L^{-1} $K_4Fe(CN)_6$ and 0.1 mol L^{-1} 2-chloroethanol; $k_r = 1.4 \times 10^5$ L mol^{-1} s^{-1}.	90C007
		9.8×10^6	13.5		20	p.r.	P.b.k. at 500 nm in N_2O-satd. soln. contg. 0.01 mol L^{-1} $K_4Fe(CN)_6$ and 0.1 mol L^{-1} azide ion.	90C007
9.35	**Carboxyferricenium**							
9.35.1	***N,N,N′,N′*-Tetramethyl-*p*-phenylenediamine**							
	$Fc^+CO_2^-$ + TMPD → $FcCO_2^-$ + $[TMPD]^{\bullet+}$	7.2×10^8	8		20	p.r.	P.b.k. at 565 nm in N_2O-satd. soln. contg. (1-5) × 10^{-3} mol L^{-1} $FcCO_2^-$, (0.05-0.2) mol L^{-1} SCN^- and (1-5) × 10^{-5} mol L^{-1} TMPD.	92A363
9.36	**1,1′-Dicarboxyferricenium**							
9.36.1	**3,5-Dimethoxyphenoxide ion**							
	$Fc^+(CO_2^-)_2$ + 3,5-$(CH_3O)_2C_6H_3O^-$ → $Fc(CO_2^-)_2$ + 3,5-$(CH_3O)_2C_6H_3O^\bullet$	6×10^5 2×10^6	7.0 8.0		20	p.r.	P.b.k. in N_2O-satd. soln. contg. Br^-; $k_r = 1.1 \times 10^9$ and 7.0×10^8 L mol^{-1} s^{-1} at pH 7.0 and 8.0, respectively.	91A455
9.36.2	**2,6-Dimethoxyphenoxide ion**							
	$Fc^+(CO_2^-)_2$ + 2,6-$(CH_3O)_2C_6H_5O^-$ → $Fc(CO_2^-)_2$ + 2,6-$(CH_3O)_2C_6H_3O^\bullet$	6.5×10^6	7.0		20	p.r.	P.b.k. in N_2O-satd. soln. contg. Br^-.	91A455
9.36.3	***N,N,N′,N′*-Tetramethyl-*p*-phenylenediamine**							
	$Fc^+(CO_2^-)_2$ + TMPD → $Fc(CO_2^-)_2$ + $[TMPD]^{\bullet+}$	9.3×10^8	8		20	p.r.	P.b.k. at 565 nm in N_2O-satd. soln. contg. (1-5) × 10^{-3} mol L^{-1} $Fc(CO_2^-)_2$, (0.05-0.2) mol L^{-1} SCN^- and (1-5) × 10^{-5} mol L^{-1} TMPD.	92A363
9.37	**Hydroxymethylferricenium**							
9.37.1	***N,N,N′,N′*-Tetramethyl-*p*-phenylenediamine**							
	Fc^+CH_2OH + TMPD → $FcCH_2OH$ + $[TMPD]^{\bullet+}$	1.7×10^8	8		20	p.r.	P.b.k. at 565 nm in N_2O-satd. soln. contg. (1-5) × 10^{-3} mol L^{-1} $FcCH_2OH$, (0.05-0.2) mol L^{-1} SCN^- and (1-5) × 10^{-5} mol L^{-1} TMPD.	92A363

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
9.38	**(Dimethylaminomethyl)ferricenium**							
9.38.1	***N,N,N′,N′*-Tetramethyl-*p*-phenylenediamine**							
	$Fc^+CH_2N(CH_3)_2$ + TMPD → $FcCH_2N(CH_3)_2$ + $[TMPD]^{\cdot+}$	2.2×10^8	8		20	p.r.	P.b.k. at 565 nm in N_2O-satd. soln. contg. (1-5) × 10^{-3} mol L^{-1} $FcCH_2N(CH_3)_2$, (0.05-0.2) mol L^{-1} SCN^- and (1-5) × 10^{-5} mol L^{-1} TMPD.	92A363
9.38.2	**3,4-Dimethoxyphenol**							
	$Fc^+CH_2N(CH_3)_2$ + 3,4-$(CH_3O)_2C_6H_3OH$ → $FcCH_2N(CH_3)_2$ + 3,4-$(CH_3O)_2C_6H_3O^\cdot$ + H^+	8.7×10^5	7.0		20	p.r.	P.b.k. in N_2O-satd. soln. contg. Br^-; $k_r = 2.9 \times 10^7$ L mol^{-1} s^{-1}.	91A455
9.39	**Tris(2,2′-bipyridine)iron(III) ion, OH-adduct**							
9.39.1	**First-order reaction**							
	$Fe(bpy)_2(bpyOH)^{3+}$ →	8.6×10^2 s^{-1}	3		20	p.r.	D.k. at 400 nm in N_2O-satd. soln. contg. 1 × 10^{-4} mol L^{-1} $Fe(bpy)_3^{3+}$.	82A343
9.40	**Tris(2,2′-bipyridine)iron(III) ion, H-adduct**							
9.40.1	**First-order reaction**							
	$Fe(bpy)_2(bpyH)^{3+}$ →	6×10^4 s^{-1}	3		20	p.r.	D.k. at 400 nm in Ar-satd. soln. contg. 1 × 10^{-4} mol L^{-1} $Fe(bpy)_3^{3+}$ and 0.5 mol L^{-1} *tert*-BuOH.	82A343
9.41	**5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphineiron(III)-superoxide complex**							
9.41.1	**Superoxide radical anion**							
	$[FeTMpyP\text{-}O_2]^{4+}$ + $O_2^{\cdot-}$ + 2 H^+ → $FeTMpyP^{5+}$ + H_2O_2 + O_2	2.3×10^9	8.1			p.r.	Calcd. from equil. concn. formed in O_2-satd. soln. of Fe(III) complex ; in presence of formate $k = 7.6 \times 10^8$ L mol^{-1} s^{-1}, difference attributed to change in ionic strength.	82A119
9.42	**Methyliron(IV) deuteroporphyrin (2-propanol)$_2$**							
9.42.1	**Iron(II) deuteroporphyrin (2-propanol)$_2$**							
	$CH_3Fe(IV)DP(2\text{-}PrOH)_2$ + $Fe(II)DP(2\text{-}PrOH)_2$ → $CH_3Fe(III)DP(2\text{-}PrOH)_2$ + $Fe(III)DP(2\text{-}PrOH)_2$	4×10^8	7			p.r.	D.k. at 470 nm in soln. contg. 6.5 mol L^{-1} 2-PrOH, 10^{-4} mol L^{-1} Fe(III) deuteroporphyrin and CH_3Cl.	81A123
9.43	**Iron(III) deuteroporphyrin (2-propanol)$_2$, $^\cdot CHCl_2$ radical adduct**							
9.43.1	**First-order reaction**							
	$FeDP(2\text{-}PrOH)_2/^\cdot CHCl_2$ →	~10^3 s^{-1}	7.2			p.r.	D.k. in soln. contg. 10^{-4} mol L^{-1} Fe(III) deuteroporphyrin, 6.5 mol L^{-1} 2-PrOH and chloroform.	80A011
9.44	**Iron(III) deuteroporphyrin (2-propoxy)(2-propanol), $^\cdot CF_3$ reaction product**							
9.44.1	**First-order reaction**							
	$FeDP(2\text{-}PrO^-)(2\text{-}PrOH)/^\cdot CF_3$ →	2.8×10^3 s^{-1}	12.7			p.r.	D.k. at 520 nm in CF_3Br-satd. soln. contg. 6.5 mol L^{-1} 2-PrOH, varied concn. of Fe(III) deuteroporphyrin and 0.05 mol L^{-1} NaOH. Species suggested to be Fe(IV)-CF_3 adduct or $Fe(III)DP^+$ (oxidized porphyrin).	87A232

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
9.45	**Iron(III) deuteroporphyrin dimethyl ester (2-propanol)$_2$, 1-hydroxy-1-methylethylperoxyl adduct**							
9.45.1	**First-order reaction**							
	$(CH_3)_2C(OH)OOFeDPDME(2\text{-}PrOH)_2 \rightarrow [Fe(III)DPDME(2\text{-}PrOH)_2]^{\cdot+} + (CH_3)_2C(OH)OO^-$	~4×10^7 s^{-1}	0-2			p.r.	Calcd. from d.k. at 660 nm in air-satd. soln. contg. 6.5 mol L^{-1} 2-PrOH, 1×10^{-4} mol L^{-1} Fe(III) deuteroporphyrin dimethyl ester and 0.01-1 mol L^{-1} H$^+$.	85A311
	$(CH_3)_2C(OH)OOFeDPDME(2\text{-}PrOH)_2 \rightarrow Fe(III)DPDME(2\text{-}PrOH)_2 + (CH_3)_2C(OH)OO^{\cdot}$	~2×10^8 s^{-1}	0-2			p.r.	Calcd. from d.k. at 660 nm in air-satd. soln. contg. 6.5 mol L^{-1} 2-PrOH, 1×10^{-4} mol L^{-1} Fe(III) deuteroporphyrin dimethyl ester and 0.01-1 mol L^{-1} H$^+$; k_r = ~6×10^7 L mol^{-1} s^{-1}.	85A311
9.46	**Ferrate(IV) ion**							
9.46.1	**First-order reaction**							
	$FeO(OH)_n^{2-n} \rightarrow$	~2 s^{-1}	14		25	p.r.	D.k. in N_2O-satd. soln. contg. (1-3.5) $\times 10^{-5}$ mol L^{-1} $Fe(OH)_4^-$ and 1 mol L^{-1} NaOH.	86A018
9.47	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoferrate(III) radical cation**							
9.47.1	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoferrate(III) radical cation**							
	$[FeTPPS]^{\cdot 2-} + [FeTPPS]^{\cdot 2-} \rightarrow$	1.3×10^9	7			p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. 0.01 mol L^{-1} KBr.	86S115
9.48	**Carbonatoiron(IV)**							
9.48.1	**Carbonatoiron(IV)**							
	$Fe^{IV}(CO_3)_m + Fe^{IV}(CO_3)_m \rightarrow$	1.3×10^5	13			p.r.	D.k. at 420 nm in N_2O-satd. soln. contg. Fe(III) and carbonate; unclear whether k or $2k$.	90A278
9.49	**Iron(IV) pyrophosphate**							
9.49.1	**Iron(IV) pyrophosphate**							
	$FeO(P_2O_7)_2^{6-} + FeO(P_2O_7)_2^{6-} \rightarrow (P_2O_7)_2FeOOFe(P_2O_7)_2^{12-}$	1.0×10^6	10		25	p.r.	D.k. at 420 nm in N_2O-satd. soln. contg. (4-10) $\times 10^{-4}$ mol L^{-1} Fe(III) and 0.1 mol L^{-1} Na pyrophosphate. Computer simulation suggested that k could be 10-20% lower; unclear whether k or $2k$.	90A373
9.49.2	**Hydrogen peroxide**							
	$FeO(P_2O_7)_2^{6-} + H_2O_2 \rightarrow FeOH(P_2O_7)_2^{6-} + O_2^{\cdot-} + H^+$	3.9×10^5	10		25	p.r.	D.k. at 420 nm in N_2O-satd. soln. contg. (1-10) $\times 10^{-4}$ mol L^{-1} Fe(III) and 0.1 mol L^{-1} Na pyrophosphate. Average of values obtained with and without added H_2O_2.	90A373
9.49.3	**Manganese(II) pyrophosphate**							
	$FeO(P_2O_7)_2^{6-} + Mn(P_2O_7)_n^{(4n-2)-} \rightarrow$	1.2×10^6	10		25	p.r.	D.k. in N_2O-satd. soln. contg. 0.1 mol L^{-1} pyrophosphate and (1-13) $\times 10^{-5}$ mol L^{-1} Mn(II) pyrophosphate.	90A373
9.49.4	**Iron(II) pyrophosphate**							
	$FeO(P_2O_7)_2^{6-} + Fe(P_2O_7)_n^{(4n-2)-} \rightarrow$	1.6×10^6	10		25	p.r.	D.k. in N_2O-satd. soln. contg. 0.1 mol L^{-1} pyrophosphate and Fe(II) pyrophosphate.	90A373
9.49.5	**Cobalt(II) pyrophosphate**							
	$FeO(P_2O_7)_2^{6-} + Co(P_2O_7)_n^{(4n-2)-} \rightarrow$	5.5×10^5	10		25	p.r.	D.k. in N_2O-satd. soln. contg. 0.1 mol L^{-1} pyrophosphate and Co(II) pyrophosphate.	90A373
9.49.6	**Nickel(II) pyrophosphate**							
	$FeO(P_2O_7)_2^{6-} + Ni(P_2O_7)_n^{(4n-2)-} \rightarrow$	$<4.0 \times 10^2$	10		25	p.r.	No effect on d.k. of Fe(IV) in N_2O-satd. soln. contg. 0.1 mol L^{-1} pyrophosphate and Ni(II) pyrophosphate.	90A373

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
9.49	**Iron(IV) pyrophosphate** — Continued							
9.49.7	**Copper(II) pyrophosphate**							
	$FeO(P_2O_7)_2^{6-} + Cu(P_2O_7)_n^{(4n-2)-} \rightarrow$	$<4.0 \times 10^2$	10		25	p.r.	No effect on d.k. of Fe(IV) in N_2O-satd. soln. contg. 0.1 mol L^{-1} pyrophosphate and Cu(II) pyrophosphate.	90A373
9.49.8	**Ferrocyanide ion**							
	$FeO(P_2O_7)_2^{6-} + Fe(CN)_6^{4-} \rightarrow$	$<1 \times 10^2$	10		25	p.r.	No effect on d.k. of Fe(IV) in N_2O-satd. soln. contg. 0.1 mol L^{-1} pyrophosphate with added 0.1 mol L^{-1} ferrocyanide.	90A373
9.50	**Iron(IV) (hydroxo)undecatungstosilicate ion**							
9.50.1	**Iron(IV) (hydroxo)undecatungstosilicate ion**							
	$HOFeSiW_{11}O_{39}^{5-} +$ $HOFeSiW_{11}O_{39}^{5-} \rightarrow$	3.2×10^9 2.5×10^9	4 7		20-23	p.r.	D.k. at 355 nm in N_2O-satd. soln. contg. $(0.13\text{-}2) \times 10^{-3}$ mol L^{-1} Fe(III) complex and 0.1 mol L^{-1} $NaClO_4$.	90A253
9.51	**Dihydrogenferrate(V) ion**							
9.51.1	**Dihydrogenferrate(V) ion**							
	$H_2FeO_4^- + H_2FeO_4^- \rightarrow$	$\sim 9 \times 10^7$			25	p.r.	Calcd. from d.k. as a function of pH (6.3-13) in N_2O-satd. soln. contg. Fe(VI), 2-PrOH or EtOH and 0.001 mol L^{-1} phosphate/borate buffer.	89A354
9.51.2	**Hydrogenferrate(V) ion**							
	$H_2FeO_4^- + HFeO_4^{2-} \rightarrow$	$\sim 3 \times 10^7$			25	p.r.	Calcd. from d.k. as a function of pH (6.3-13) in N_2O-satd. soln. contg. Fe(VI), 2-PrOH or EtOH and 0.001 mol L^{-1} phosphate/borate buffer; pK_a of $H_2FeO_4^-$ = 7.5.	89A354
9.52	**Hydrogenferrate(V) ion**							
9.52.1	**Hydrogenferrate(V) ion**							
	$HFeO_4^{2-} + HFeO_4^{2-} \rightarrow$	$\sim 1.5 \times 10^7$			25	p.r.	Calcd. from d.k. as a function of pH (6.3-13) in N_2O-satd. soln. contg. Fe(VI), 2-PrOH or EtOH and 0.001 mol L^{-1} phosphate/borate buffer.	89A354
9.52.2	**Ferrate(V) ion**							
	$HFeO_4^{2-} + FeO_4^{3-} \rightarrow$	1.0×10^7			25	p.r.	Calcd. from d.k. as a function of pH (6.3-13) in N_2O-satd. soln. contg. Fe(VI), 2-PrOH or EtOH and 0.001 mol L^{-1} phosphate/borate buffer; pK_a of $HFeO_4^{2-}$ = 10.1.	89A354
9.53	**Ferrate(V) ion**							
9.53.1	**First-order reaction**							
	$FeO_4^{3-} \rightarrow$	8 s^{-1}	10.4-13		25	p.r.	D.k. in N_2O-satd. soln. contg. K_2FeO_4; the major products are Fe(III) and H_2O_2. At 15°C, k = 4 s^{-1} [86A018].	89A354

TABLE 10. Rate constants for mercury transients

No. Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
10.1 Mercury atom							
10.1.1 Mercury(II) ion							
$Hg^0 + Hg^{2+} \rightarrow Hg_2^{2+}$	5.9×10^8	3-4			p.r.	Calcd. from pH dependence of p.b.k. at 236 nm in soln. contg. $(1.5\text{-}5.9) \times 10^{-5}$ mol L^{-1} HgO.	731080
10.1.2 Hydroxymercury(II) ion							
$Hg^0 + HgOH^+ \rightarrow Hg_2^{2+} + OH^-$	5.0×10^8	3-4			p.r.	Calcd. from pH dependence of p.b.k. at 236 nm in soln. contg. $(1.5\text{-}5.9) \times 10^{-5}$ mol L^{-1} HgO.	731080
10.1.3 Mercury(II) dihydroxide							
$Hg^0 + Hg(OH)_2 \rightarrow Hg_2^{2+} + 2\ OH^-$	$\leq 5 \times 10^7$	3-4			p.r.	Calcd. from pH dependence of p.b.k. at 236 nm in soln. contg. $(1.5\text{-}5.9) \times 10^{-5}$ mol L^{-1} HgO.	731080
10.2 Mercury(I) ion, complex with mercury(0)							
10.2.1 Mercury(I) ion, complex with mercury(0)							
$Hg_2^+ + Hg_2^+ \rightarrow$	* 7.5×10^9	2.3			p.r.	D.k. at 285 nm in Ar-satd. soln. contg. Hg_2^{2+} and $HClO_4$,	92A466
	* 1.6×10^9	1.0-3.5	≤0.2		p.r.	D.k. at 300 nm in Ar-satd. soln. contg. $HgSO_4$ and $HClO_4$; average of 8 values; $k = 2.5 \times 10^9$ L mol^{-1} s^{-1} in presence of 1 mol L^{-1} $HClO_4$. In strong acid observed initial slow component attributed to presence of Hg_2H^{2+}.	79A063
	* 7×10^9	1.9	≤0.017		p.r.	D.k. at 285 nm in Ar-satd. soln. contg. 0.01 mol L^{-1} *tert*-BuOH and $Hg_2(ClO_4)_2$.	720290
						* Unexplained discrepancy in these data.	
10.2.2 Mercury(I) dimer ion							
$Hg_2^+ + Hg_2^{2+} \rightarrow Hg_4^{3+}$	4.2×10^7	1			p.r.	P.b.k. at 390 nm in Ar-satd. soln. contg. 0.2 mol L^{-1} Hg_2^{2+} and $HClO_4$; $k_r = 7 \times 10^6$ s^{-1}.	92A466
10.2.3 Oxygen							
$Hg_2^+ + O_2 \rightarrow$	1.1×10^9	3, 3.5			p.r.	D.k. at 300 nm in O_2-satd. soln. contg. $HgSO_4$ and $HClO_4$; $k = \sim 7 \times 10^8$ L mol^{-1} s^{-1} at pH 0 and 1.	79A063
10.3 Mercury(I) ion							
0.3.1 Mercury(I) ion							
$Hg^+ + Hg^+ \rightarrow Hg^0 + Hg^{2+}$	2.5×10^9 2.6×10^9	1.2 3.15			p.r.	D.k. at 360 nm in deaerated soln. contg. 0.05×10^{-3} mol L^{-1} *tert*-BuOH and 8×10^{-4} mol L^{-1} $Hg(ClO_4)_2$.	751218
	2.5×10^9 2.6×10^9	2.0 4.3	→0 →0		p.r.	D.k. at 255 nm in soln. contg. 2×10^{-3} mol L^{-1} *tert*-BuOH and 1×10^{-3} or 5×10^{-5} mol L^{-1} HgO at pH 2.0 and 4.3, respectively.	731080
10.3.2 Tris(2,2′-bipyridine)ruthenium(III) ion							
$Hg^+ + Ru(bpy)_3^{3+} \rightarrow Hg^{2+} + Ru(bpy)_3^{2+}$	2.9×10^9	~1	0.23	21	f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. 3.6×10^{-6} mol L^{-1} $Ru(bpy)_3^{2+}$, 1×10^{-2} mol L^{-1} $Hg(NO_3)_2$ (OQ), 0.11 mol L^{-1} HNO_3 and 0.09 mol L^{-1} $NaNO_3$; assumed $k(Hg^+ + Hg^+) = 8 \times 10^9$ L mol^{-1} s^{-1}.	84A148
10.3.3 Tris(1,10-phenanthroline)ruthenium(III) ion							
$Hg^+ + Ru(phen)_3^{3+} \rightarrow Hg^{2+} + Ru(phen)_3^{2+}$	2.5×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $Ru(phen)_3^{2+}$, excess $Hg(NO_3)_2$ (OQ), HNO_3 and $NaNO_3$; assumed $k(Hg^+ + Hg^+) = 8 \times 10^9$ L mol^{-1} s^{-1}.	84A148

TABLE 10. Rate constants for mercury transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
10.3	**Mercury(I) ion** — Continued							
10.3.4	**Tris(5-chloro-1,10-phenanthroline)ruthenium(III) ion**							
	$Hg^+ + Ru(5\text{-Clphen})_3^{3+} \rightarrow Hg^{2+} + Ru(5\text{-Clphen})_3^{2+}$	3.9×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $Ru(5\text{-Clphen})_3^{2+}$, excess $Hg(NO_3)_2$ (OQ), HNO_3 and $NaNO_3$; assumed $k(Hg^+ + Hg^+) = 8 \times 10^9$ L mol^{-1} s^{-1}.	84A148
10.3.5	**Tris(5,6-dimethyl-1,10-phenanthroline)ruthenium(III) ion**							
	$Hg^+ + Ru(5,6\text{-Me}_2\text{phen})_3^{3+} \rightarrow Hg^{2+} + Ru(5,6\text{-Me}_2\text{phen})_3^{2+}$	3.2×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $Ru(5,6\text{-Me}_2\text{phen})_3^{2+}$, excess $Hg(NO_3)_2$ (OQ), HNO_3 and $NaNO_3$; assumed $k(Hg^+ + Hg^+) = 8 \times 10^9$ L mol^{-1} s^{-1}.	84A148
10.3.6	**Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion**							
	$Hg^+ + Ru(4,7\text{-Me}_2\text{phen})_3^{3+} \rightarrow Hg^{2+} + Ru(4,7\text{-Me}_2\text{phen})_3^{2+}$	3.0×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $Ru(4,7\text{-Me}_2\text{phen})_3^{2+}$, excess $Hg(NO_3)_2$ (OQ), HNO_3 and $NaNO_3$; assumed $k(Hg^+ + Hg^+) = 8 \times 10^9$ L mol^{-1} s^{-1}.	84A148
10.3.7	**Tris(5-methyl-1,10-phenanthroline)ruthenium(III) ion**							
	$Hg^+ + Ru(5\text{-Mephen})_3^{3+} \rightarrow Hg^{2+} + Ru(5\text{-Mephen})_3^{2+}$	3.1×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $Ru(5\text{-Mephen})_3^{2+}$, excess $Hg(NO_3)_2$ (OQ), HNO_3 and $NaNO_3$; assumed $k(Hg^+ + Hg^+) = 8 \times 10^9$ L mol^{-1} s^{-1}.	84A148
10.4	**Mercury(I) hydroxide**							
10.4.1	**Mercury(I) hydroxide**							
	$HgOH + HgOH \rightarrow$	2.2×10^9	7			p.r.	D.k. in Ar-satd. soln. contg. 0.05 mol L^{-1} *tert*-BuOH and HgO. In 1 mol L^{-1} KOH, $k = 3.5 \times 10^9$ L mol^{-1} s^{-1} [751218]. pK of the equilibrium $Hg^+ + H_2O \rightleftarrows HgOH + H^+$ is reported to be 5.1 [751044].	83A178
		2.2×10^9		≤0.1		p.r.	D.k. at 260 nm in soln. contg. 0.01 mol L^{-1} *tert*-BuOH and 2.0×10^{-4} mol L^{-1} HgO. Products suggested to be Hg_2O or $Hg_2(OH)_2$.	751044
10.5	**Mercury(I)**							
10.5.1	**Oxygen**							
	$Hg(I) + O_2 \rightarrow$	1.2×10^9 1.6×10^9	11.2 14			p.r.	D.k.; at pH 2.7, $k = 4.2 \times 10^8$ L mol^{-1} s^{-1}.	751218
10.6	**Mercury(I) bromide**							
10.6.1	**Mercury(I) bromide**							
	$HgBr + HgBr \rightarrow Hg_2Br_2$	4×10^9				p.r.	P.b.k. in soln. contg. $HgBr_2$.	761042
		5×10^9				p.r.	D.k. at 350 nm in soln. contg. 5×10^{-4} mol L^{-1} $HgBr_2$ and 0.01 mol L^{-1} MeOH, EtOH, 2-PrOH or formate.	761087
10.6.2	**Oxygen**							
	$HgBr + O_2 \rightarrow HgBrO_2$	$\geq 10^9$				p.r.	D.k. in air-satd. soln. contg. $HgBr_2$.	761042
10.6.3	**1,4-Benzoquinone**							
	$HgBr + Q \rightarrow HgBr^+ + Q^{\cdot -}$	$>10^9$	5-5.5			p.r.	P.b.k. in soln. contg. $HgBr_2$.	761042
10.6.4	**Tetranitromethane**							
	$HgBr + C(NO_2)_4 \rightarrow HgBr^+ + C(NO_2)_3^- + {}^{\cdot}NO_2$	2.2×10^9				p.r.	P.b.k. in soln. contg. $HgBr_2$.	761042

TABLE 10. Rate constants for mercury transients — Continued

No. Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
10.7 Bromomercury(I)peroxyl							
10.7.1 1,4-Benzoquinone							
$HgBrO_2 + Q \rightarrow HgBr^+ + O_2 + Q^{\cdot-}$	7×10^8				p.r.	P.b.k. in air-satd. soln. contg. $HgBr_2$.	761042
10.8 Mercury(I) chloride							
10.8.1 Mercury(I) chloride							
$HgCl + HgCl \rightarrow Hg_2Cl_2$	3.9×10^9	7			p.r.	D.k. in Ar-satd. soln. contg. 0.05 mol L^{-1} *tert*-BuOH and $HgCl_2$.	83A178
	4.0×10^9				p.r.	P.b.k. at 235 nm and d.k. at 330 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and 2 $\times 10^{-4}$ mol L^{-1} $HgCl_2$.	730043
10.8.2 Oxygen							
$HgCl + O_2 \rightarrow HgClO_2$	$\sim 10^9$				p.r.	D.k. in air-satd. soln. contg. 5×10^{-3} mol L^{-1} $HgCl_2$.	730043
10.8.3 Hydroxyl							
$HgCl + {}^{\cdot}OH \rightarrow HgCl^+ + OH^-$	$\sim 10^{10}$	5.0			p.r.	Estd. from the yield of Hg_2Cl_2 in Ar-satd. soln. contg. 2×10^{-4} mol L^{-1} $HgCl_2$.	730043
10.8.4 1,4-Benzoquinone							
$HgCl + Q \rightarrow HgCl^+ + Q^{\cdot-}$	3.0×10^9				p.r.	P.b.k. in soln. contg. $HgCl_2$.	761042
	3.9×10^9	5.1		25	p.r.	P.b.k. at 430 nm in deaerataed soln. contg. 1 mol L^{-1} *tert*-BuOH and 6×10^{-3} mol L^{-1} $HgCl_2$.	761134
10.8.5 Tetranitromethane							
$HgCl + C(NO_2)_4 \rightarrow HgCl^+ + C(NO_2)_3^- + {}^{\cdot}NO_2$	4.5×10^9				p.r.	D.k. at 270 nm and p.b.k. at 370 nm in Ar-satd. soln. contg. 0.2 mol L^{-1} 2-PrOH and 10^{-3} mol L^{-1} $HgCl_2$.	730043
10.9 Chloromercury(I)peroxyl							
10.9.1 1,4-Benzoquinone							
$HgClO_2 + Q \rightarrow HgCl^+ + O_2 + Q^{\cdot-}$	6×10^8				p.r.	P.b.k. in air-satd. soln. contg. $HgCl_2$.	761042
	1.1×10^9	5.1		25	p.r.	P.b.k. in O_2-satd. soln. contg. $HgCl_2$, 1,4-benzoquinone and 1 mol L^{-1} *tert*-BuOH.	761134
10.10 Mercury(I) cyanide							
10.10.1 Mercury(I) cyanide							
$HgCN + HgCN \rightarrow Hg_2(CN)_2$	* 6.0×10^9				p.r.	P.b.k. in soln. contg. $Hg(CN)_2$.	761042
	* 1.7×10^9		≤0.2		p.r.	D.k. at 285 nm in deaerated soln. contg. 0.005 mol L^{-1} formate and 2×10^{-4} mol L^{-1} $Hg(CN)_2$.	751203
						* Unexplained discrepancy in these data.	
10.10.2 Oxygen							
$HgCN + O_2 \rightarrow HgCN^+ + O_2^{\cdot-}$	4×10^9				p.r.	P.b.k. in air-satd. soln. contg. $Hg(CN)_2$.	761042
10.10.3 Hydroxyl							
$HgCN + {}^{\cdot}OH \rightarrow$	3.1×10^9				p.r.	Estimated from initial decay of HgCN in the absence of OH scavengers.	751203
10.10.4 Hydroxymethyl							
$HgCN + {}^{\cdot}CH_2OH \rightarrow$	4.0×10^9				p.r.	Estimated from initial decay of HgCN in the presence of methanol.	751203
10.10.5 1-Hydroxyethyl							
$HgCN + CH_3\dot{C}HOH \rightarrow$	3.9×10^9				p.r.	Estimated from initial decay of HgCN in the presence of ethanol.	751203

TABLE 10. Rate constants for mercury transients — Continued

No.	Reaction	k (L·mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
10.10	**Mercury(I) cyanide** — Continued							
10.10.6	**1-Hydroxy-1-methylethyl**							
	$HgCN + (CH_3)_2\dot{C}OH \rightarrow$	2.4×10^9				p.r.	Estimated from initial decay of HgCN in the presence of 2-propanol.	751203
10.10.7	**2-Hydroxy-2,2-dimethylethyl**							
	$HgCN + {}^{\bullet}CH_2C(CH_3)_2OH \rightarrow$	1.6×10^9				p.r.	Estimated from initial decay of HgCN in the presence of *tert*-BuOH.	751203
10.10.8	**1,4-Benzoquinone**							
	$HgCN + Q \rightarrow HgCN^+ + Q^{\bullet-}$	3.5×10^9				p.r.	P.b.k. in soln. contg. $Hg(CN)_2$.	761042
10.10.9	**Tetranitromethane**							
	$HgCN + C(NO_2)_4 \rightarrow HgCN^+ + C(NO_2)_3^- + {}^{\bullet}NO_2$	3.1×10^9				p.r.	P.b.k. in soln. contg. $Hg(CN)_2$.	761042
10.11	**Mercury(I) iodide**							
10.11.1	**Mercury(I) iodide**							
	$HgI + HgI \rightarrow Hg_2I_2$	2.5×10^9				p.r.	P.b.k. in soln. contg. HgI_2.	761042
10.11.2	**Oxygen**							
	$HgI + O_2 \rightarrow HgIO_2$	$\geq 10^9$				p.r.	P.b.k. in air-satd. soln. contg. HgI_2.	761042
10.11.3	**1,4-Benzoquinone**							
	$HgI + Q \rightarrow HgI^+ + Q^{\bullet-}$	$>10^9$				p.r.	P.b.k. in soln. contg. HgI_2.	761042
10.11.4	**Tetranitromethane**							
	$HgI + C(NO_2)_4 \rightarrow HgI^+ + C(NO_2)_3^- + {}^{\bullet}NO_2$	1.4×10^9				p.r.	P.b.k. in soln. contg. HgI_2.	761042
10.12	**Mercury(I) thiocyanate**							
10.12.1	**Mercury(I) thiocyanate**							
	$HgSCN + HgSCN \rightarrow Hg_2(SCN)_2$	3.0×10^9				p.r.	P.b.k. in soln. contg. $Hg(SCN)_2$.	761042
10.12.2	**Oxygen**							
	$HgSCN + O_2 \rightarrow HgSCNO_2$	$\geq 10^9$				p.r.	P.b.k. in air-satd. soln. contg. $Hg(SCN)_2$.	761042
10.12.3	**1,4-Benzoquinone**							
	$HgSCN + Q \rightarrow HgSCN^+ + Q^{\bullet-}$	$>10^9$				p.r.	P.b.k. in soln. contg. $Hg(SCN)_2$.	761042
10.12.4	**Tetranitromethane**							
	$HgSCN + C(NO_2)_4 \rightarrow HgSCN^+ + C(NO_2)_3^- + {}^{\bullet}NO_2$	2.8×10^9				p.r.	P.b.k. in soln. contg. $Hg(SCN)_2$.	761042
10.13	**Thiocyanatomercury(I)peroxyl**							
10.13.1	**1,4-Benzoquinone**							
	$HgSCNO_2 + Q \rightarrow HgSCN^+ + O_2 + Q^{\bullet-}$	1.0×10^9				p.r.	P.b.k. in air-satd. soln. contg. $Hg(SCN)_2$.	761042

TABLE 11. Rate constants for indium transients

No. Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
11.1 Indium atoms							
11.1.1 Indium(I) ion							
$In^0 + In^+ \rightarrow In_2^+$	1.5×10^9	6.8			p.r.	P.b.k. at 310 nm in Ar-satd. soln. contg. 0.005 mol L^{-1} InBr; $k_r \sim 3 \times 10^6$ s^{-1}. Product reported to disappear in second-order reaction, $k = 5 \times 10^9$ L mol^{-1} s^{-1}, suggested to represent mainly formation of In_4^{2+}.	89A492
11.2 Indium(II) ion							
11.2.1 Indium(II) ion							
$In^{2+} + In^{2+} \rightarrow In^{3+} + In^+$	1.3×10^9	2.7-4.3	0.09	22	p.r.	D.k. in He-satd. soln. contg. 0.05 mol L^{-1} 2-PrOH. Value obtained by computer fit.	84A008
11.2.2 Hydroxyl							
$In^{2+} + {}^{\bullet}OH \rightarrow In^{3+} + OH^-$	3.2×10^{10}	1.5-3.5			p.r.	D.k. in Ar-satd. soln. contg. (3-700) × 10^{-5} mol L^{-1} In^{3+}.	83A206
11.2.3 Hydrogen peroxide							
$In^{2+} + H_2O_2 \rightarrow In^{3+} + {}^{\bullet}OH + OH^-$	6.0×10^8	2.7-3.3	0.09	22	p.r.	D.k. in He-satd. soln. contg. 0.05 mol L^{-1} 2-PrOH and added H_2O_2. At pH 4.3, $k = 3 \times 10^8$ L mol^{-1} s^{-1}. Value obtained by computer fit.	84A008
11.2.4 Hydroxymethyl							
$In^{2+} + {}^{\bullet}CH_2OH \rightarrow$	1.9×10^9	1.5-2.2			p.r.	D.k. in Ar-satd. soln. contg. (0.2-2) × 10^{-3} mol L^{-1} In^{3+} and 0.1 mol L^{-1} MeOH.	83A206
11.2.5 1-Hydroxy-1-methylethyl							
$In^{2+} + (CH_3)_2\dot{C}OH \rightarrow CH_3COCH_3 + H^+ + In^+$	9×10^8	2.7-4.3	0.09	22	p.r.	D.k. in He-satd. soln. contg. 0.05 mol L^{-1} 2-PrOH. Value obtained by computer fit.	84A008
11.3 Tetrakis(4-*N*-methylpyridyl)porphineindium(III) radical anion							
11.3.1 Sulfur dioxide							
$[InTMpyP]^{\bullet 4+} + SO_2 \rightarrow InTMpyP^{5+} + SO_2^{\bullet -}$	2×10^8	1			p.r.	D.k. at 700 nm in N_2-satd. soln. contg. $NaHSO_3$, $InTMpyP^{5+}$ and 0.1 mol L^{-1} HCl or $HClO_4$.	87A083
11.4 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoindate(III) radical cation							
11.4.1 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoindate(III) radical cation							
$[InTPPS]^{\bullet 2-} + [InTPPS]^{\bullet 2-} \rightarrow$	1.3×10^9	7			p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. 0.01 mol L^{-1} KBr.	86S115

TABLE 12. Rate constants for iridium transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
12.1	**Hexachloroiridate(III) ion, electron adduct**							
12.1.1	**Hexachloroiridate(III) ion, electron adduct**							
	Ir(II) + Ir(II) → Ir(I) + Ir(III)	1.7×10^9				p.r.	D.k. at 280 nm in N_2-satd. soln. contg. 3×10^{-4} mol L^{-1} $IrCl_6^{3-}$ and 0.1 mol L^{-1} 2-PrOH.	731066
12.2	**Bis(2,2′-bipyridine)([2,2′-bipyridin]-3-yl-*C,N′*)iridium(III) ion, conjugate acid, electron adduct**							
12.2.1	**Hydrogen ion**							
	$Ir(bpy)_2(C^3,N'\text{-Hbpy})^{2+} + H^+ \rightarrow IrH(bpy)_2(C^3,N'\text{-Hbpy})^{3+}$	2.3	0-1.7			p.r.	D.k. in soln. contg. 0.02-1 mol L^{-1} $HClO_4$, 1 mol L^{-1} 2-PrOH and (6-30) × 10^{-5} mol L^{-1} Ir(III) complex (pK_a = 3.0).	87A165
12.2.2	**Dibromine radical ion**							
	$Ir(bpy)_2(C^3,N'\text{-Hbpy})^{2+} + Br_2^{\bullet-} \rightarrow Ir(bpy)_2(C^3,N'\text{-Hbpy})^{3+} + 2\ Br^-$	2.5×10^{10}	1.0			p.r.	D.k. at 380 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} NaBr, 0.9 mol L^{-1} 2-PrOH and 2×10^{-4} mol L^{-1} Ir(III) complex; pK_a of reduced complex = 0.9.	85A160
12.3	**Bis(2,2′-bipyridine)([2,2′-bipyridin]-3-yl-*C,N′*)iridium(III) ion, electron adduct**							
12.3.1	**Dibromine radical ion**							
	$Ir(bpy)_2(C^3,N'\text{-bpy})^{+} + Br_2^{\bullet-} \rightarrow Ir(bpy)_2(C^3,N'\text{-bpy})^{2+} + 2\ Br^-$	~10^9			20	f.p./rq	Estd. from d.k. in soln. contg. Ir(III) complex, Br^- and 1,4-dimethoxybenzene (RQ); reaction in competition with disproportionation of $Br_2^{\bullet-}$.	89A025
12.3.2	**Oxygen**							
	$Ir(bpy)_2(C^3,N'\text{-bpy})^{+} + O_2 \rightarrow Ir(bpy)_2(C^3,N'\text{-bpy})^{2+} + HO_2/O_2^-$	9.0×10^8	1-6			p.r.	Reaction includes protonated form $Ir(bpy)_2(C^3,N'\text{-Hbpy})^{2+}$.	85A160
12.3.3	**1,4-Dimethoxybenzene radical cation**							
	$Ir(bpy)_2(C^3,N'\text{-bpy})^{+} + [1,4\text{-}C_6H_4(OCH_3)_2]^{\bullet+} \rightarrow Ir(bpy)_2(C^3,N'\text{-bpy})^{2+} + 1,4\text{-}C_6H_4(OCH_3)_2$	2.3×10^9	1.5-6.3	→0	20	f.p./rq	D.k. at 400, 420 and 460 nm in soln. contg. (3-5) × 10^{-5} mol L^{-1} Ir(III) complex and (1-6.4) × 10^{-3} mol L^{-1} 1,4-dimethoxybenzene (RQ).	89A025
12.4	**Bis(2,2′-bipyridine)([2,2′-bipyridin]-3-yl-*C,N′*)iridium(IV) ion, conjugate monoacid ‡**							
12.4.1	**1,1′-Dimethyl-4,4′-bipyridinium radical cation**							
	$Ir(bpy)_2(C^3,N'\text{-Hbpy})^{4+} + MV^{\bullet+} \rightarrow Ir(bpy)_2(C^3,N'\text{-Hbpy})^{3+} + MV^{2+}$	3.1×10^9	1.4		20	f.p./oq	D.k. at various wavelengths in soln. contg. 5×10^{-5} mol L^{-1} $[Ir(Hbpy\text{-}C^3,N')(bpy)_2]^{3+}$ and 0.07 mol L^{-1} MV^{2+} (OQ). ‡It is not known whether $[Ir(Hbpy\text{-}C^3,N')(bpy)_2]^{4+}$ has been oxidized at the metal or ligand.	86A057
12.4.2	**Chloride ion**							
	$Ir(bpy)_2(C^3,N'\text{-Hbpy})^{4+} + Cl^- \rightarrow Ir(bpy)_2(C^3,N'\text{-Hbpy})^{3+} + Cl^{\bullet}$	~8×10^8	1.4	0.2	20	f.p./oq	P.b.k. at 350 nm ($Cl^{\bullet} + Cl^- \rightarrow Cl_2^{\bullet-}$) in soln. contg. 5×10^{-5} mol L^{-1} $[Ir(Hbpy\text{-}C^3,N')(bpy)_2]^{3+}$, 0.04 mol L^{-1} $S_2O_8^{2-}$ (OQ) and 6.6 × 10^{-4} mol L^{-1} chloride ion.	86A057
12.5	**Hexachloroiridate(IV) ion**							
12.5.1	**5-Hydroxyindole**							
	$IrCl_6^{2-}$ + 5-HOInH → $IrCl_6^{3-}$ + H^+ + 5-$^{\bullet}$OInH	3.8×10^6	3			f.p./pi	P.b.k. in Ar-satd. soln. contg. (2-3) × 10^{-3} mol L^{-1} $IrCl_6^{3-}$, 0.1 mol L^{-1} 2-chloroethanol and (1-10) × 10^{-4} mol L^{-1} 5-hydroxyindole; also used 5-HO-tryptamine, 5-HO-tryptophan or 5-HO-indole-3-acetic acid.	*90C007*

TABLE 13. Rate constants for manganese transients

No	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
13.1	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatomanganate(II) radical anion**							
13.1.1	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatomanganate(II) radical anion**							
	$[MnTPPS]^{\cdot 5-} + [MnTPPS]^{\cdot 5-} \rightarrow$	3.9×10^7	6.8			p.r.	D.k. at 770 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and $MnTPPS^{4-}$.	84A120
13.2	**5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatomanganese(II) radical anion**							
13.2.1	**5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatomanganese(II) radical anion**							
	$[MnTMpyP]^{\cdot 3+} + [MnTMpyP]^{\cdot 3+} \rightarrow$	3.7×10^7	6.8			p.r.	D.k. at 770 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and $MnTMpyP^{4+}$.	84A120
13.3	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatomanganate(II) ion**							
13.3.1	**Hydrogen ion**							
	$MnTPPS^{4-} + H^+ \rightarrow MnTPPSH^{3-}$	1.0×10^6	1.2-1.7	0.1		p.r.	D.k. and p.b.k. in N_2O-satd. soln. contg. $MnTPPS^{3-}$, 0.1 mol L^{-1} 2-PrOH and 0.02-0.06 mol L^{-1} H^+; at $[H^+] \leq 0.01$ mol L^{-1}, $k \sim 3.3 \times 10^7$ L^2 mol^{-2} s^{-1}.	84A190
13.3.2	**Oxygen**							
	$MnTPPS^{4-} + O_2 \rightarrow [MnTPPS\text{-}O_2]^{4-}$	1.5×10^5	8.5	0.05	18	s.f.	Soln. contg. ~10^{-6}-10^{-5} mol L^{-1} $MnTPPS^{4-}$ and (5-200) $\times 10^{-5}$ mol L^{-1} O_2.	80R105
13.4	**5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatomanganese(II) ion**							
13.4.1	**Hydrogen ion**							
	$MnTMpyP^{4+} + 2\,H^+ \rightarrow Mn^{2+} + H_2TMpyP^{4+}$	4.7×10^4 L^2 mol^{-2} s^{-1}	0-1	1.0		p.r.	D.k. and p.b.k. in N_2O-satd. soln. contg. $MnTMpyP^{5+}$, 0.1 mol L^{-1} 2-PrOH and 0.1-1.0 mol L^{-1} $HClO_4$.	84A190
13.4.2	**Oxygen**							
	$MnTMpyP^{4+} + O_2 \rightarrow [MnTMpyP\text{-}O_2]^{4+}$	1.6×10^5				p.r.		86A313
		1.2×10^5	8.5	0.05	18	s.f.	Soln. contg. ~10^{-6}-10^{-5} mol L^{-1} $MnTMpyP^{4+}$ and (5-200) $\times 10^{-5}$ mol L^{-1} O_2.	80R105
13.5	**5,10,15,20-Tetrakis(4-pyridyl)porphinatomanganese(II)**							
13.5.1	**Hydrogen ion**							
	$MnTpyP + 2\,H^+ \rightarrow Mn^{2+} + H_2TpyP$	5×10^4 L^2 mol^{-2} s^{-1}	0-1	1.0		p.r.	D.k. and p.b.k. in N_2O-satd. soln. contg. $MnTpyP^+$, 0.1 mol L^{-1} 2-PrOH and 0.1-1.0 mol L^{-1} $HClO_4$.	84A190
13.5.2	**Oxygen**							
	$MnTpyP + O_2 \rightarrow [MnTpyP\text{-}O_2]$	5×10^2	8.5	0.05	18	s.f.	Soln. contg. varied $[O_2]$.	80R105
13.6	**5,10,15,20-Tetrakis[4-(*N,N,N*-trimethylammonio)phenyl]porphinatomanganese(II) ion**							
13.6.1	**Oxygen**							
	$MnTAPP^{4+} + O_2 \rightarrow [MnTAPP\text{-}O_2]^{4+}$	1.6×10^5				p.r.		86A313
13.7	**α,α,α,β-Tetrakis[2-(*N*-methylisonicotinamido)phenyl]porphinatomanganese(II) ion**							
13.7.1	**Oxygen**							
	$MnPFP^{4+} + O_2 \rightarrow [MnPFP\text{-}O_2]^{4+}$	1.6×10^5				p.r.		86A313
13.8	**5,10,15,20-Tetrakis(4-carboxyphenyl)porphinatomanganate(II) ion**							
13.8.1	**Oxygen**							
	$MnTCPP^{4-} + O_2 \rightarrow [MnTCPP\text{-}O_2]^{4-}$	2.2×10^5	8.5	0.05	18	s.f.	Soln. contg. varied $[O_2]$.	80R105

TABLE 13. Rate constants for manganese transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
13.9	**Nitrilotriacetatomanganate(II) ion, H-abstraction product**							
13.9.1	**First-order reaction**							
	$Mn[NTA\text{-}H]^- \rightarrow$	3.0×10^3 s^{-1}	4-9			p.r.	D.k. in N_2O-satd. soln. contg. $MnNTA^-$; followed by second-order reaction, $k = 2.9 \times 10^7$ L mol^{-1} s^{-1} at pH 4.5-5.5.	78A436
13.10	**Ethylenediaminetetraacetatomanganate(II) ion, H-abstraction product**							
13.10.1	**First-order reaction**							
	$Mn[EDTA\text{-}H]^{2-} \rightarrow$	2.5×10^3 s^{-1}	4-9			p.r.	D.k. in N_2O-satd. soln. contg. $MnEDTA^{2-}$; followed by pH-dependent (pH 3-10) second-order reaction.	78A436
13.11	**Manganese(III) ion**							
13.11.1	**Thionine semiquinone, conjugate monoacid**							
	$Mn^{3+} + [ThH]^{\cdot+} \rightarrow Mn^{2+} + Th^+ + H^+$	3.5×10^9	2.5	0.2		f.p./oq	D.k. of semithionine in soln. contg. Mn^{2+} and thionine (OQ).	777315
13.12	**Hydroxymanganese(III) ion**							
13.12.1	**Zinc(I) ion**							
	$MnOH^{2+} + Zn^+ \rightarrow Mn^{2+} + Zn^{2+} + OH^-$	2.4×10^9	~6		23	p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $MnSO_4$ and 0.03 mol L^{-1} $ZnSO_4$. Value obtained from computer fit.	78A041
13.13	**Peroxidomanganese(III) ion**							
13.13.1	**First-order reaction**							
	$MnO_2^+ \rightarrow Mn^{2+} + O_2^{\cdot-}$	2.7×10^3 s^{-1} 6.1×10^3 s^{-1}	6.7 6.7	0.01 0.5	24 24	p.r.	Calcd. from equilibration obs. at 254 and 275 nm in O_2-satd. soln. contg. 4.0×10^{-5} mol L^{-1} Mn^{2+} and 0.01 mol L^{-1} formate; $k_r = 1.1 \times 10^8$ L mol L^{-1} s^{-1}. In the presence of 0.5 mol L^{-1} formate, $k = 2.2 \times 10^3$ s^{-1}; species present as MnO_2^+-formate. Measurements reported in [84A384] indicate that MnO_2^+-formate disappeared by a first-order process with $k = 5$ s^{-1}.	761109
13.14	**Peroxidomanganese(III) formate**							
13.14.1	**Ascorbate ion**							
	MnO_2^+-formate + $AH^- \rightarrow$ MnO_2-formate + $^{\cdot}A^-$ + H^+	3.5×10^5	7.4		23.5	s.f.	P.b.k. in N_2O-satd. soln. contg. ascorbate, formate, O_2 and Mn^{2+}.	85Z381
13.15	**Hydroperoxidomanganese(III) formate complex**							
13.15.1	**First-order reaction**							
	MnO_2H^{2+}-formate $\rightarrow$ Mn(III)-formate + HO_2^-	79 s^{-1}			25	p.r.	P.b.k. in O_2-satd. soln. contg. 0.5 mol L^{-1} formate and varied [Mn^{2+}].	84A189
13.15.2	***tert*-Butylhydroquinone**							
	MnO_2H^{2+}-formate + $(CH_3)_3CC_6H_3$-1,4-$(OH)_2 \rightarrow$	2.2×10^4	0.9		23	phot., s.f.	D.k. in soln. contg. 0.1-0.2 mol L^{-1} $Mn(ClO_4)_2$, 0.25 mol L^{-1} formate, $HClO_4$ and (1.4-5.8) $\times 10^{-4}$ mol L^{-1} *tert*-butylhydroquinone.	83A382
13.15.3	**1,2-Benzenediol**							
	MnO_2H^{2+}-formate + 1,2-$C_6H_4(OH)_2 \rightarrow$	2.6×10^4	0.9		23	phot., s.f.	D.k. in soln. contg. 0.1-0.2 mol L^{-1} $Mn(ClO_4)_2$, 0.25 mol L^{-1} formate, $HClO_4$ and (1-4) $\times 10^{-4}$ mol L^{-1} 1,2-benzenediol (most likely complexed with Mn^{2+}).	83A382

TABLE 13. Rate constants for manganese transients — Continued

No. Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
13.15 Hydroperoxidomanganese(III) formate complex — Continued							
13.15.4 1,3-Benzenediol							
MnO_2H^{2+}-formate + 1,3-$C_6H_4(OH)_2$ →	5.2×10^4	0.9		23	phot., s.f.	D.k. in soln. contg. 0.1-0.2 mol L^{-1} $Mn(ClO_4)_2$, 0.25 mol L^{-1} formate, $HClO_4$ and (0.5-2.0) × 10^{-3} mol L^{-1} 1,3-benzenediol.	83A382
13.16 Peroxidomanganese(III)-manganese(II) formate complex							
13.16.1 First-order reaction							
($MnOOHMn^{4+}$)-formate →	2.8×10^3 s^{-1}	1-1.3		25	p.r.	P.b.k. in O_2-satd. soln. contg. 0.5 mol L^{-1} formate and varied [Mn^{2+}].	84A189
13.17 Manganese(III) phosphate complex							
13.17.1 Ascorbate ion							
Mn(III)-phosphate + AH^- → Mn(II)-phosphate + $^{\bullet}A^-$ + H^+	1.4×10^6	4.7		23.5	p.r.	N_2O-satd. soln. Reactant includes ~20% ascorbic acid (pK_a = 4.1).	85Z381
13.17.2 6-Hydroxy-2,5,7,8-tetramethylchroman-2-carboxylate ion							
Mn(III)-phosphate + $TxOH^-$ → Mn(II)-phosphate + $HTxO^{\bullet}$	8.2×10^4	4.6			p.r.	D.k. and p.b.k. in N_2O-satd. soln. contg. 0.2 mol L^{-1} phosphate, 0.1 mol L^{-1} $MnSO_4$ and (0.35-1.75) × 10^{-4} mol L^{-1} $TxOH^-$.	86A492
13.18 Peroxidomanganese(III) phosphate complex							
13.18.1 First-order reaction							
MnO_2^+-phosphate →	2×10^3 s^{-1}	3.5-5.3			p.r.	P.b.k. in O_2-satd. soln. contg. 0.5 mol L^{-1} phosphate, 0.005 mol L^{-1} formate and 0.005 mol L^{-1} $MnSO_4$. Reaction suggested to generate Mn(III)-phosphate and H_2O_2; k invariant in the pH range 3.5-5.3.	84A384
13.18.2 *tert*-Butylhydroquinone							
MnO_2^+-phosphate + $(CH_3)_3CC_6H_3$-1,4-$(OH)_2$ →	8.7×10^3	5-7		23	phot., s.f.	D.k. in soln. contg. 5 × 10^{-4} mol L^{-1} $MnSO_4$ and 0.5 mol L^{-1} phosphate.	83A382
13.18.3 1,2-Benzenediol							
MnO_2^+-phosphate + 1,2-$C_6H_4(OH)_2$ →	6.7×10^5	5-7		23	phot., s.f.	D.k. in soln. contg. 5 × 10^{-4} mol L^{-1} $MnSO_4$ and 0.5 mol L^{-1} phosphate.	83A382
13.18.4 6-Hydroxy-2,5,7,8-tetramethylchroman-2-carboxylate ion							
MnO_2^+-phosphate + $TxOH^-$ → MnO_2-phosphate + $HTxO^{\bullet}$	1.1×10^5	5.0-5.6			p.r.	D.k. and p.b.k. in O_2-satd. soln. contg. 0.2 mol L^{-1} phosphate, 0.05 mol L^{-1} formate, 5 × 10^{-6} mol L^{-1} $MnSO_4$ and (0.68-2.65) × 10^{-4} mol L^{-1} $TxOH^-$.	86A492
13.18.5 Nicotinamide adenine dinucleotide, reduced							
MnO_2^+-phosphate + NADH →	~1 × 10^2	5-7		23	phot., s.f.	D.k. in soln. contg. 5 × 10^{-4} mol L^{-1} $MnSO_4$ and 0.5 mol L^{-1} phosphate.	83A382
13.18.6 Nicotinamide-adenine dinucleotide phosphate, reduced							
MnO_2^+-phosphate + NADPH →	~1 × 10^2	5-7		23	phot., s.f.	D.k. in soln. contg. 5 × 10^{-4} mol L^{-1} $MnSO_4$ and 0.5 mol L^{-1} phosphate.	83A382
13.18.7 1,3-Benzenediol							
MnO_2^+-phosphate + 1,3-$C_6H_4(OH)_2$ →	67	5-7		23	phot., s.f.	D.k. in soln. contg. 5 × 10^{-4} mol L^{-1} $MnSO_4$ and 0.5 mol L^{-1} phosphate.	83A382
13.19 Manganese(III) pyrophosphate complex							
13.19.1 Ascorbate ion							
Mn(III)-pyrophosphate + AH^- → Mn(II)-pyrophosphate + $^{\bullet}A^-$ + H^+	1.4×10^4	7.0		23.5	p.r.	N_2O-satd. soln.	85Z381

TABLE 13. Rate constants for manganese transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
13.20	**Manganese(III) sulfate complex**							
13.20.1	**Ascorbate ion**							
	Mn(III)-sulfate + AH^- → Mn(II)-sulfate + $^{\bullet}A^-$ + H^+	1.8×10^6	5.6		23.5	p.r.	N_2O-satd. soln.	85Z381
13.20.2	**Nicotinamide-adenine dinucleotide phosphate, reduced**							
	Mn(III)-sulfate + NADPH → Mn(II)-sulfate + NADP + H^+	3.1×10^6	5.4		23.5	p.r.	N_2O-satd. soln.	85Z381
13.21	**Peroxidomanganese(III) sulfate complex**							
13.21.1	**Superoxide radical anion**							
	MnO_2^+-sulfate + $O_2^{\bullet-}$ + 2 H^+ → Mn(II)-sulfate + O_2 + H_2O_2	3.3×10^7	6			p.r.	Calcd. from d.k. in O_2-satd. soln. contg. (0.1-2) × 10^{-3} mol L^{-1} Mn^{2+}, 0.5 mol L^{-1} Na_2SO_4 and 0.005 mol L^{-1} formate.	84A384
13.22	**Hydroperoxidomanganese(III) sulfate complex**							
13.22.1	**First-order reaction**							
	MnO_2H^{2+}-sulfate → Mn(III)-sulfate + HO_2^-	13 s^{-1}			25	p.r.	P.b.k. in O_2-satd. soln. contg. 0.5 mol L^{-1} sulfate, and varied [formate] and [Mn^{2+}].	84A189
13.23	**Peroxidomanganese(III)-manganese(II) sulfate complex**							
13.23.1	**First-order reaction**							
	($MnOOHMn^{4+}$)-sulfate →	3.1×10^3 s^{-1}	1-1.3		25	p.r.	P.b.k. in O_2-satd. soln. contg. 0.5 mol L^{-1} sulfate, and varied [formate] and [Mn^{2+}].	84A189
13.24	**Dibromomanganese(III) ion**							
13.24.1	**First-order reaction**							
	$MnBr_2^+$ → Mn^{3+} + 2 Br^-	2.3×10^5 s^{-1}	1	0.25	25	f.p.	D.k. of $Br_2^{\bullet-}$ in soln. contg. 0.1 mol L^{-1} Br^- and (1-20) × 10^{-3} mol L^{-1} Mn^{2+}; value of k obtained from the intercept of plot of $(k_{obs})^{-1}$ vs $[Mn^{2+}]^{-1}$.	737317
13.25	**Chloromanganese(III) ion**							
13.25.1	**2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion**							
	$MnCl^{2+}$ + $Co(Me_4tetraeneN_4)^{2+}$ → Mn^{2+} + $Co(Me_4tetraeneN_4)Cl^{2+}$	2.4×10^7	0		25	f.p.	D.k. at 540 nm in soln. contg. ~10^{-2} mol L^{-1} Mn^{2+} and 1 mol L^{-1} HCl.	79A016
13.25.2	***N-rac*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(II) ion**							
	$MnCl^{2+}$ + *N-rac*-$Co(4,11\text{-dieneN}_4)^{2+}$ → Mn^{2+} + $Co(4,11\text{-dieneN}_4)Cl^{2+}$	5.3×10^6	0		25	f.p.	D.k. at 340 nm in soln. contg. ~10^{-2} mol L^{-1} Mn^{2+} and 1 mol L^{-1} HCl.	79A016
13.26	**Dichloromanganese(III) ion**							
13.26.1	**First-order reaction**							
	$MnCl_2^+$ → Mn^{3+} + 2 Cl^-	2.1×10^5 s^{-1}	1	0.2	25	f.p.	D.k. of $Cl_2^{\bullet-}$ in soln. contg. 0.1 mol L^{-1} Cl^- and (1-20) × 10^{-3} mol L^{-1} Mn^{2+}; value of k obtained from the intercept of plot of $(k_{obs})^{-1}$ vs [Mn^{2+}].	737317
13.27	**Peroxido(ethylenediaminediacetato)manganate(III) ion**							
13.27.1	**Water**							
	$MnEDDA(O_2)^-$ + 2 H_2O → $MnEDDA(OH)_2^-$ + H_2O_2	220 s^{-1} *50* s^{-1}	6.3 7.1	0.1		p.r.	D.k. in O_2-satd. soln. contg. MnEDDA and *0.01 mol L^{-1} formate; product reacts with* $O_2^{\bullet-}$ to give $MnEDDA(OH)_2(O_2)^-$ which decays by first-order reaction, k = 55 s^{-1}.	90A116

TABLE 13. Rate constants for manganese transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
13.28	**Aqua(methyl)nitrilotriacetatomanganate(III) ion**							
13.28.1	**First-order reaction**							
	$CH_3MnNTA(H_2O)^- \rightarrow MnNTA(H_2O)^- + {}^{\bullet}CH_3$	$1.2 \times 10^5 s^{-1}$	6			p.r.	D.k. in N_2O-satd. soln. contg. 0.002-0.006 mol L^{-1} NTA, (0.5-5.0) × 10^{-3} mol L^{-1} $MnSO_4$ and 0.1-0.5 mol L^{-1} DMSO; k_r = 1.5×10^8 L mol^{-1} s^{-1}.	88A426
13.28.2	**Methyl**							
	$CH_3MnNTA(H_2O)^- + {}^{\bullet}CH_3 \rightarrow MnNTA(H_2O)^- + C_2H_6$	1.6×10^9	6			p.r.	Calcd. from concn. dependence of d.k. in N_2O-satd. soln. contg. 0.002-0.006 mol L^{-1} NTA, (0.5-5.0) × 10^{-3} mol L^{-1} $MnSO_4$ and 0.1-0.5 mol L^{-1} DMSO.	88A426
13.29	**Bromo[5,10,15,20-tetrakis(4-sulfonatophenyl)porphinatomanganate(III) ion**							
13.29.1	**Water**							
	$[BrMnTPPS]^{4-} + H_2O \rightarrow (H_2O)MnTPPS^{3-} + Br^-$	$4 \times 10^3 s^{-1}$ $9 \times 10^3 s^{-1}$	6.8 12.9			p.r.	D.k. in N_2O-satd. soln. contg. 0.1 mol L^{-1} KBr and $MnTPPS^{4-}$.	84A120
13.30	**2-Hydroxy-2,2-dimethylethyltetrakis(4-sulfonatophenyl)porphinatomanganate(III) ion**							
13.30.1	**Water**							
	$HOC(CH_3)_2CH_2MnTPPS^{4-} + H_2O \rightarrow MnTPPS^{3-}$ + *tert*-BuOH + OH^-	~$4 \times 10^2 s^{-1}$	6.8			p.r.	D.k. in N_2O-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH and $MnTPPS^{4-}$.	84A120
13.31	**Bromo[5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(III) ion**							
13.31.1	**Water**							
	$[BrMnTMpyP]^{4+} + H_2O \rightarrow (H_2O)MnTMpyP^{5+} + Br^-$	$6 \times 10^4 s^{-1}$ $1.5 \times 10^5 s^{-1}$	6.8 12.9			p.r.	D.k. in N_2O-satd. soln. contg. 0.1 mol L^{-1} KBr and $MnTMpyP^{4+}$.	84A120
13.32	**2-Hydroxy-2,2-dimethylethyl[5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(III) ion**							
13.32.1	**Water**							
	$HOC(CH_3)_2CH_2MnTMpyP^{4+} + H_2O \rightarrow MnTMpyP^{5+}$ + *tert*-BuOH + OH^-	~$7 \times 10^3 s^{-1}$	6.8			p.r.	D.k. in N_2O-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH and $MnTMpyP^{4+}$.	84A120
13.33	**Dichlorohydroxy(1,4,7,11-tetraazacyclotetradecane)manganese(IV) ion**							
13.33.1	**First-order reaction**							
	$[HOMn(cyclam)Cl_2]^+ \rightarrow$	$1.3 \times 10^5 s^{-1}$				p.r.	D.k. in N_2O-satd. soln. contg. $Mn(cyclam)Cl_2^+$; reaction suggested to represent loss of ligand.	87A488
13.34	**Dichloro-*meso*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydroxy)manganese(IV) ion**							
13.34.1	**First-order reaction**							
	$[HO\text{-}meso\text{-}Mn(aneN_4)Cl_2]^+ \rightarrow$	$5.0 \times 10^3 s^{-1}$				p.r.	D.k. in N_2O-satd. soln. contg. *meso*-$Mn(aneN_4)Cl_2^+$; reaction suggested to represent loss of ligand.	87A488
13.35	**Dichloro-*rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydroxy)manganese(IV) ion**							
13.35.1	**First-order reaction**							
	$[HO\text{-}rac\text{-}Mn(aneN_4)Cl_2]^+ \rightarrow$	$9.0 \times 10^3 s^{-1}$				p.r.	D.k. in N_2O-satd. soln. contg. *rac*-$Mn(aneN_4)Cl_2^+$; reaction suggested to represent loss of ligand.	87A488
13.36	**Manganese(V)**							
13.36.1	**Manganate(VI) ion**							
	$Mn(V) + MnO_4^{2-} \rightarrow Mn(IV) + MnO_4^-$	$<4 \times 10^4$	13	0.1	22	p.r.	Estd. from abs. changes in Ar-satd. soln. contg. MnO_4^{2-} and 0.1 mol L^{-1} OH^-.	81A057

TABLE 14. Rate constants for molybdenum transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
14.1	**18-Molybdodiphosphate ion(7-), conjugate acid**							
14.1.1	**18-Molybdodiphosphate ion(7-), conjugate acid**							
	$HP_2Mo_{18}O_{62}^{6-} + HP_2Mo_{18}O_{62}^{6-} \rightarrow P_2Mo_{18}O_{62}^{6-} + H_2P_2Mo_{18}O_{62}^{6-}$	1.0×10^4	2		22	p.r.	P.b.k. at 750 nm in N_2O-satd. soln. contg. ~10^{-4} mol L^{-1} $P_2Mo_{18}O_{62}^{6-}$ and 0.5 mol L^{-1} alcohol.	82A107
14.2	**Bis(μ-oxo)(ethylenediaminetetraacetato)bis[oxomolybdate(IV)(V)] ion**							
14.2.1	**Oxygen**							
	$[Mo_2O_4(EDTA)]^{3-} + O_2 \rightarrow$	$\sim 2 \times 10^8$			25	p.r.	D.k. in soln. contg. (0.2-2.0) × 10^{-4} mol L^{-1} $Mo_2O_4(EDTA)^{2-}$, 0.1 mol L^{-1} 1-BuOH and (1-5) × 10^{-6} mol L^{-1} O_2; concn. of transient ~1 × 10^{-5} mol L^{-1}.	85A363
14.3	**Bis(μ-oxo)bis[aqua(oxalato)oxomolybdate(IV)(V) ion**							
14.3.1	**Oxygen**							
	$[Mo_2O_4(ox)_2(H_2O)_2]^{3-} + O_2 \rightarrow$	$\sim 1 \times 10^8$			25	p.r.	D.k. in soln. contg. (0.2-2.0) × 10^{-4} mol L^{-1} $Mo_2O_4(ox)(H_2O)_2^{2-}$, 0.1 mol L^{-1} 1-BuOH and (1-5) × 10^{-6} mol L^{-1} O_2; concn. of transient ~1 × 10^{-5} mol L^{-1}.	85A363
14.4	**Octacyanomolybdate(V) ion**							
14.4.1	**10-Methylphenothiazine**							
	$Mo(CN)_8^{3-} + MPTH \rightarrow Mo(CN)_8^{4-} + [MPTH]^{\bullet+}$	9.6×10^7	1		22	p.r.	D.k. at 520 nm in N_2O-satd. soln. contg. 0.17 mol L^{-1} EtOH, 2 × 10^{-4} mol L^{-1} $Mo(CN)_8^{4-}$, 1 × 10^{-5} mol L^{-1} MPTH, 0.10 mol L^{-1} $HClO_4$ and 0.2 mol L^{-1} NaBr; k_r = 3.3 × 10^7 L mol^{-1} s^{-1}	83N00
14.5	***cis*-Octaaqua-μ-oxo-bis(oxo)dimolybdenum(IV) ion**							
14.5.1	**First-order reaction**							
	cis-$Mo_2O_3(H_2O)_8^{2+} \rightarrow$ *trans*-$Mo_2O_3(H_2O)_8^{2+}$	2.4×10^4 s^{-1}	0.7	0.5		f.p.	D.k. in deaerated soln. (satd. with ethylene) contg. 0.2 mol L^{-1} $HClO_4$ and 7.5 × 10^{-5} mol L^{-1} $Mo_2O_4(H_2O)_6^{2+}$.	89A42
14.6	**Hexaaquadi-μ-oxodioxodimolybdenum(V,VI) ion**							
14.6.1	**First-order reaction**							
	$Mo_2O_4(OH_2)_6^{3+} \rightarrow$	2.9×10^3 s^{-1}	2	0.5		p.r.	D.k. at 290 nm in N_2O-satd. soln. contg. 0.01 mol L^{-1} $HClO_4$ and 7.5 × 10^{-5} mol L^{-1} $Mo_2O_4(H_2O)_6^{2+}$.	89A42

TABLE 15. Rate constants for nickel transients

No. Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.1 Nickel(I) ion							
15.1.1 Hydroxyl							
$Ni^+ + {}^{\bullet}OH \rightarrow Ni^{2+} + OH^-$	2×10^{10}				p.r.	D.k. at 300 nm in Ar-satd. soln. contg. 10^{-4} mol L^{-1} $NiSO_4$; value obtained by computer fit assuming $2k({}^{\bullet}OH + {}^{\bullet}OH) = 1 \times 10^{10}$ L mol^{-1} s^{-1}.	741037
15.1.2 Hydroxymethyl							
$Ni^+ + {}^{\bullet}CH_2OH \rightarrow NiCH_2OH^+$	4.2×10^9				p.r.	D.k. at 300 nm, p.b.k. at 250 nm and condy. change in Ar-satd. soln. contg. 10^{-4} mol L^{-1} $NiSO_4$ and 0.1 mol L^{-1} MeOH; value obtained by computer fit.	741037
15.1.3 Carbon dioxide radical anion							
$Ni^+ + {}^{\bullet}CO_2^- \rightarrow NiCO_2$	6.6×10^9				p.r.	D.k. at 300 nm, p.b.k. at 250 nm and condy. change in Ar-satd. soln. contg. 5×10^{-5} mol L^{-1} $NiSO_4$ and 5×10^{-5} mol L^{-1} formate ion; value obtained by computer fit; product suggested to undergo protonation.	741037
15.1.4 1-Hydroxyethyl							
$Ni^+ + CH_3\dot{C}HOH \rightarrow NiCHOHCH_3^+$	2.3×10^9				p.r.	D.k. at 300 nm, p.b.k. at 250 nm and condy. change in Ar-satd. soln. contg. 10^{-4} mol L^{-1} $NiSO_4$ and EtOH; value obtained by computer fit.	741037
15.1.5 1-Hydroxy-1-methylethyl							
$Ni^+ + (CH_3)_2\dot{C}OH \rightarrow NiCOH(CH_3)_2^+$	1.4×10^9				p.r.	D.k. at 300 nm, p.b.k. at 250 nm and condy. change in Ar-satd. soln. contg. 10^{-4} mol L^{-1} $NiSO_4$ and 2-PrOH; value obtained by computer fit.	741037
15.1.6 2-Hydroxy-2,2-dimethylethyl							
$Ni^+ + {}^{\bullet}CH_2C(CH_3)_2OH \rightarrow Ni^{2+} + OH^- + CH_2{=}C(CH_3)_2$	3×10^9				p.r.	D.k. at 300 nm, p.b.k. at 250 nm and condy. change in Ar-satd. soln. contg. 10^{-4} mol L^{-1} $NiSO_4$ and 0.5 mol L^{-1} *tert*-BuOH; value obtained by computer fit.	741037
15.1.7 Cyclopentyl							
$Ni^+ + c\text{-}\dot{C}_5H_9 \rightarrow c\text{-}C_5H_9Ni^+$	2.8×10^9				p.r.	D.k. at 300 nm, p.b.k. at 250 nm and condy. change in Ar-satd. soln. contg. 10^{-4} mol L^{-1} $NiSO_4$ and cyclopentane; value obtained by computer fit.	741037
15.1.8 Bromate ion							
$Ni^+ + BrO_3^- \rightarrow$	$\leq 8.4 \times 10^6$		0.08		p.r.	D.k. at 313 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$, 0.001 mol L^{-1} MeOH and $(2.5\text{-}5) \times 10^{-3}$ mol L^{-1} BrO_3^-.	68G855
15.1.9 Tris(ethylenediamine)cobalt(III) ion							
$Ni^+ + Co(en)_3^{3+} \rightarrow$	$\leq 5 \times 10^6$	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428
15.1.10 *cis*-Dichlorobis(ethylenediamine)cobalt(III) ion							
$Ni^+ + cis\text{-}Co(en)_2Cl_2^+ \rightarrow$	5.9×10^8	5-6	0.08		p.r.	D.k. at 350 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428
15.1.11 *trans*-Dichlorobis(ethylenediamine)cobalt(III) ion							
$Ni^+ + trans\text{-}Co(en)_2Cl_2^+ \rightarrow$	8.3×10^8	5-6	0.08		p.r.	D.k. at 350 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.1	**Nickel(I) ion** — Continued							
15.1.12	**Carbonatobis(ethylenediamine)cobalt(III) ion**							
	$Ni^+ + Co(en)_2CO_3^+ \rightarrow$	$\leq 5 \times 10^6$	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428
15.1.13	***cis*-Bis(ethylenediamine)difluorocobalt(III) ion**							
	$Ni^+ + cis\text{-}Co(en)_2F_2^+ \rightarrow$	$\leq 5 \times 10^6$	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428
15.1.14	**Aquabis(ethylenediamine)fluorocobalt(III) ion**							
	$Ni^+ + Co(en)_2(H_2O)F^{2+} \rightarrow$	$\leq 5 \times 10^6$	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428
15.1.15	***cis*-Amminechlorobis(ethylenediamine)cobalt(III) ion**							
	$Ni^+ + cis\text{-}Co(en)_2(NH_3)Cl^{2+} \rightarrow$	4.7×10^8	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428
15.1.16	***cis*-Nitroamminebis(ethylenediamine)cobalt(III) ion**							
	$Ni^+ + cis\text{-}Co(en)_2(NH_3)NO_2^{2+} \rightarrow$	3.3×10^8	5-6	0.08		p.r.	D.k. at 350 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428
15.1.17	**Hexaamminecobalt(III) ion**							
	$Ni^+ + Co(NH_3)_6^{3+} \rightarrow$	$\leq 5 \times 10^6$	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428
15.1.18	**Pentaammine(bromo)cobalt(III) ion**							
	$Ni^+ + Co(NH_3)_5Br^{2+} \rightarrow$	1.1×10^9	4.0	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428
15.1.19	**Pentaammine(chloro)cobalt(III) ion**							
	$Ni^+ + Co(NH_3)_5Cl^{2+} \rightarrow$	6.5×10^8	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428
15.1.20	**Pentaammine(cyano)cobalt(III) ion**							
	$Ni^+ + Co(NH_3)_5(CN)^{2+} \rightarrow$	3.3×10^8	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428
15.1.21	**Pentaammine(fluoro)cobalt(III) ion**							
	$Ni^+ + Co(NH_3)_5F^{2+} \rightarrow$	$\leq 5 \times 10^6$	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428
15.1.22	**Pentaammine(aqua)cobalt(III) ion**							
	$Ni^+ + Co(NH_3)_5(H_2O)^{3+} \rightarrow$	$\leq 5 \times 10^6$	4.0	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428
15.1.23	**Pentaammine(hydroxy)cobalt(III) ion**							
	$Ni^+ + Co(NH_3)_5OH^{2+} \rightarrow$	1.3×10^7	7.6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428
15.1.24	**Pentaammine(azido)cobalt(III) ion**							
	$Ni^+ + Co(NH_3)_5(N_3)^{2+} \rightarrow$	5.8×10^8	5-6	0.08		p.r.	D.k. at 350 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428

TABLE 15. Rate constants for nickel transients — Continued

No. Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.1 Nickel(I) ion — Continued							
15.1.25 Pentaammine(thiocyanato-*N*)cobalt(III) ion							
$Ni^+ + Co(NH_3)_5(NCS)^{2+} \rightarrow$	4.1×10^8	5-6	0.08		p.r.	D.k. at 350 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428
15.1.26 (Acetato)pentaamminecobalt(III) ion							
$Ni^+ + Co(NH_3)_5(OAc)^{2+} \rightarrow$	$\leq 5 \times 10^6$	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	690428
15.1.27 μ-5-Pyrimidinecarboxylatobis[hydroxotris(ammine)cobalt(III)] ion							
$Ni^+ + 5\text{-pmCO}_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	$\leq 1 \times 10^7$	4.0		22	p.r.	D.k. in Ar-satd. soln. contg. 0.01 mol L^{-1} $NiSO_4$ and 0.1 mol L^{-1} *tert*-BuOH.	82A146
15.1.28 μ-4-Pyrimidinecarboxylatobis[hydroxotris(ammine)cobalt(III)] ion							
$Ni^+ + 4\text{-pmCO}_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	2.7×10^8	4.0		22	p.r.	D.k. in Ar-satd. soln. contg. 0.01 mol L^{-1} $NiSO_4$ and 0.1 mol L^{-1} *tert*-BuOH.	82A146
15.1.29 Copper(II) ion							
$Ni^+ + Cu^{2+} \rightarrow$	$\leq 2.4 \times 10^7$		0.08		p.r.	D.k. at 313 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	68G855
15.1.30 Hydrogen peroxide							
$Ni^+ + H_2O_2 \rightarrow Ni^{2+} + {}^{\bullet}OH + OH^-$	3.2×10^7			25	p.r.		761072
	5×10^7				p.r.	D.k. at 300 nm and condy. change in Ar-satd. soln. contg. 1×10^{-4} mol L^{-1} $NiSO_4$; value obtained from computer fit assuming $2k({}^{\bullet}OH + {}^{\bullet}OH) = 1 \times 10^{10}$ L mol^{-1} s^{-1}.	741037
	4.3×10^7		0.08		p.r.	D.k. at 313 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	68G855
15.1.31 Hydrogen ion							
$Ni^+ + H^+ \rightarrow$	$\leq 10^6$		0.08		p.r.	D.k. at 313 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	68G855
15.1.32 Iodate ion							
$Ni^+ + IO_3^- \rightarrow$	2.2×10^8		0.08		p.r.	D.k. at 313 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	68G855
15.1.33 Permanganate ion							
$Ni^+ + MnO_4^- \rightarrow$	7.2×10^9			20	p.r.	D.k. at 545 nm in Ar-satd. or deaerated soln. contg. 10^{-5} mol L^{-1} MnO_4^- and (0.2, 0.75 or 1.45) $\times 10^{-3}$ mol L^{-1} Ni^{2+}.	650385
15.1.34 Nitrite ion							
$Ni^+ + NO_2^- \rightarrow$	1.5×10^8		0.08		p.r.	D.k. at 313 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	68G855
15.1.35 Nitrate ion							
$Ni^+ + NO_3^- \rightarrow$	$\leq 1.4 \times 10^6$		0.08		p.r.	D.k. at 313 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	68G855
15.1.36 Nitrous oxide							
$Ni^+ + N_2O \rightarrow NiO^+ + N_2$	9.1×10^6			25	p.r.	D.k. in N_2O-satd. soln. contg. 0.5 mol L^{-1} $NiSO_4$; studied at 1-30 °C, E_a = 40.6 kJ mol^{-1}.	761072

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.1	**Nickel(I) ion** — Continued							
15.1.36	**Nitrous oxide** — Continued							
		$\leq 6.3 \times 10^6$				p.r.	D.k. at 313 nm in N_2O-satd. soln. contg. 1.0 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	68G855
15.1.37	**Oxygen**							
	$Ni^+ + O_2 \rightarrow NiO_2^+$	1.4×10^9		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $NiSO_4$ and 0.001 mol L^{-1} MeOH.	68G855
		2.2×10^9			18	p.r.	D.k. in soln. contg. Ni^{2+}.	66A001
15.1.38	**Hexaammineruthenium(III) ion**							
	$Ni^+ + Ru(NH_3)_6^{3+} \rightarrow$	4.0×10^8		0.08		p.r.	D.k. in soln. contg. 0.02 mol L^{-1} $NiSO_4$ and varied $[Ru(NH_3)_6^{3+}]$.	701229
15.1.39	**Peroxodisulfate ion**							
	$Ni^+ + S_2O_8^{2-} \rightarrow Ni^{2+} + SO_4^{\bullet -} + SO_4^{2-}$	1.5×10^8		0.049	25	p.r.	D.k. in deaerated soln. contg. 0.05 mol L^{-1} Ni^{2+} and (0.5-10) $\times 10^{-4}$ mol L^{-1} $S_2O_8^{2-}$.	761072
15.1.40	**Allyl alcohol**							
	$Ni^+ + H_2C{=}CHCH_2OH \rightarrow [Ni(CH_2CHCH_2OH)]^+$	$\sim 10^8$			25	p.r.	D.k. in deaerated soln. contg. 0.01 mol L^{-1} $NiSO_4$, 1.2×10^{-3} mol L^{-1} allyl alcohol and 1.24 mol L^{-1} MeOH.	761072
15.1.41	**1,4-Benzoquinone**							
	$Ni^+ + Q \rightarrow Ni^{2+} + Q^{\bullet -}$	2.3×10^8	6.0		25	p.r.	P.b.k. at 430 nm in deaerated soln. contg. 0.01 mol L^{-1} Ni^{2+}, 1 mol L^{-1} *tert*-BuOH and (2-4) $\times 10^{-5}$ mol L^{-1} Q.	761134
15.1.42	**2-Methyl-1,4-naphthoquinone**							
	$Ni^+ + 2\text{-}CH_3NQ \rightarrow Ni^{2+} + [2\text{-}CH_3NQ]^{\bullet -}$	2.4×10^9	7.0		~25	p.r.	P.b.k. at 395 nm in soln. contg. 0.005 mol L^{-1} $NiSO_4$, 1 mol L^{-1} *tert*-BuOH, (2.5-5.0) $\times 10^{-5}$ mol L^{-1} 2-CH_3-NQ and 0.001 mol L^{-1} phosphate.	751032 731047
15.1.43	**4-Pyrimidinecarboxylate ion**							
	$Ni^+ + 4\text{-}pmCO_2^- \rightarrow Ni^{2+} + [4\text{-}pmCO_2]^{\bullet 2-}$	4×10^8				p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH, 0.01 mol L^{-1} $NiSO_4$ and 8×10^{-4} mol L^{-1} 4-$pmCO_2^-$.	82A146
15.1.44	**Tetranitromethane**							
	$Ni^+ + C(NO_2)_4 \rightarrow Ni^{2+} + C(NO_2)_3^- + {}^{\bullet}NO_2$	1.4×10^9	5.9		25	p.r.	P.b.k. in deaerated soln. contg. 1 mol L^{-1} *tert*-BuOH, 0.01 mol L^{-1} Ni^{2+} and (32-136) $\times 10^{-6}$ mol L^{-1} tetranitromethane.	761134
15.2	**Tetracyanonickelate(I) ion**							
15.2.1	**First-order reaction**							
	$Ni(CN)_4^{3-} \rightarrow Ni(CN)_3^{2-} + CN^-$	8.1×10^3 s^{-1}			20	p.r.	P.b.k. at 350 nm and d.k. at 240 nm in N_2O-satd. soln. contg. 0.53 or 4.4×10^{-4} mol L^{-1} $Ni(CN)_4^{2-}$ and 0.1 mol L^{-1} formate ion; $k_r = 8 \times 10^7$ L mol^{-1} s^{-1} [78Z002].	741072
15.3	**Tris(cyano)nickelate(I) ion**							
15.3.1	**Tris(cyano)nickelate(I) ion**							
	$Ni(CN)_3^{2-} + Ni(CN)_3^{2-} \rightarrow Ni_2(CN)_6^{4-}$	7.4×10^7			20	p.r.	P.b.k. at 313 nm in N_2O-satd. soln. contg. 0.06 or 2×10^{-4} mol L^{-1} $Ni(CN)_4^{2-}$ and 0.1 mol L^{-1} formate ion.	74107

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.4	**1,4,7,10-Tetraazacyclotridecanenickel(I) ion**							
15.4.1	**First-order reaction**							
	$Ni([13]aneN_4)^+ \rightarrow$	8.8×10^3 s^{-1}	5.5			p.r.	D.k. in Ar-satd. soln. contg. 2×10^{-4} mol L^{-1} $Ni([13]aneN_4)^{2+}$ and 0.1 mol L^{-1} formate ion; ligand loss reaction suggested.	85A145
15.4.2	**Nitrous oxide**							
	$Ni([13]aneN_4)^+ + N_2O + 2\ H_3O^+ \rightarrow Ni([13]aneN_4)^{2+} + N_2 + 3\ H_2O$	8.4×10^7	6.0			p.r.	D.k. at 370 nm and p.b.k. at 525 nm in Ar-satd. soln. contg. 2×10^{-4} $Ni([13]aneN_4)^{2+}$, 0.1 mol L^{-1} formate ion and 0.002-0.02 mol L^{-1} N_2O.	85A145
15.5	**9-Methyl-9-nitro-1,4,7,11-tetraazacyclotridecanenickel(II) ion, electron adduct**							
15.5.1	**First-order reaction**							
	$Ni(MeNO_2[13]aneN_4)^+ \rightarrow$	3.5×10^3 s^{-1}			22	p.r.	D.k. at 290 nm in soln. contg. 0.001 mol L^{-1} $Ni(MeNO_2[13]aneN_4)^{2+}$ and 0.1 mol L^{-1} *tert*-BuOH.	88A391
15.6	**1,4,8,11-Tetraazacyclotetradecanenickel(I) ion**							
15.6.1	**Hexaamminecobalt(III) ion**							
	$Ni(cyclam)^+ + Co(NH_3)_6^{3+} \rightarrow Ni(cyclam)^{2+} + Co(NH_3)_6^{2+}$	6.2×10^6				p.r.		85A032
15.6.2	**Nitrous oxide**							
	$Ni(cyclam)^+ + N_2O + 2\ H_3O^+ \rightarrow Ni(cyclam)^{2+} + N_2 + 3\ H_2O$	3.2×10^7				p.r.		85A032
15.6.3	**Oxygen**							
	$Ni(cyclam)^+ + O_2 \rightarrow Ni(cyclam)^{2+} + O_2^{\cdot-}$	2.5×10^9				p.r.		85A032
15.6.4	**Hexaammineruthenium(III) ion**							
	$Ni(cyclam)^+ + Ru(NH_3)_6^{3+} \rightarrow Ni(cyclam)^{2+} + Ru(NH_3)_6^{2+}$	6.4×10^8				p.r.		85A032
15.7	**1,4,8,11-Tetramethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion**							
15.7.1	**Hexaamminecobalt(III) ion**							
	$Ni(Me_4[14]aneN_4)^+ + Co(NH_3)_6^{3+} \rightarrow Ni(Me_4[14]aneN_4)^{2+} + Co(NH_3)_6^{2+}$	8.0×10^5				p.r.		85A032
15.7.2	**Nitrous oxide**							
	$Ni(Me_4[14]aneN_4)^+ + N_2O + 2\ H_3O^+ \rightarrow Ni(Me_4[14]aneN_4)^{2+} + N_2 + 3\ H_2O$	8.3×10^2				p.r.		85A032
15.7.3	**Oxygen**							
	$Ni(Me_4[14]aneN_4)^+ + O_2 \rightarrow Ni(Me_4[14]aneN_4)^{2+} + O_2^{\cdot-}$	1.6×10^9				p.r.		85A032
15.7.4	**Hexaammineruthenium(III) ion**							
	$Ni(Me_4[14]aneN_4)^+ + Ru(NH_3)_6^{3+} \rightarrow Ni(Me_4[14]aneN_4)^{2+} + Ru(NH_3)_6^{2+}$	4.9×10^7				p.r.		85A032
15.8	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion**							
15.8.1	**Hexaamminecobalt(III) ion**							
	$Ni(aneN_4)^+ + Co(NH_3)_6^{3+} \rightarrow Ni(aneN_4)^{2+} + Co(NH_3)_6^{2+}$	1.9×10^5	7.0	0.016-0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. $(2.5\text{-}5.0) \times 10^{-3}$ mol L^{-1} $Ni(aneN_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and $(2.5\text{-}10) \times 10^{-4}$ mol L^{-1} $Co(NH_3)_6^{3+}$.	761039

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.8	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion — Continued**							
15.8.2	**Tris(ethylenediamine)cobalt(III) ion**							
	$Ni(aneN_4)^+ + Co(en)_3^{3+} \rightarrow Ni(aneN_4)^{2+} + Co(en)_3^{2+}$	1.1×10^5	7.0	0.016-0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} $Ni(aneN_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-10) × 10^{-4} mol L^{-1} $Co(en)_3^{3+}$.	761039
15.8.3	**Aqua(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)hydroxycobalt(III) ion**							
	$Ni(aneN_4)^+ + Co(4,11\text{-}dieneN_4)(H_2O)OH^{2+} \rightarrow Ni(aneN_4)^{2+} + Co(4,11\text{-}dieneN_4)(H_2O)OH^+$	1.1×10^6	7.0	0.016-0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} $Ni(aneN_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-10) × 10^{-4} mol L^{-1} $Co(4,11\text{-}dieneN_4)(H_2O)OH^{2+}$.	761039
15.8.4	**Dihydroxy(2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene)cobalt(III) ion**							
	$Ni(aneN_4)^+ + Co(Me_4tetraeneN_4)(OH)_2^+ \rightarrow Ni(aneN_4)^{2+} + Co(Me_4tetraeneN_4)(OH)_2$	1.7×10^7	7.0	0.016-0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} $Ni(aneN_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-10) × 10^{-4} mol L^{-1} $Co(Me_4tetraeneN_4)(OH)_2^+$.	761039
15.8.5	**Tris(2,2′-bipyridine)cobalt(III) ion**							
	$Ni(aneN_4)^+ + Co(bpy)_3^{3+} \rightarrow Ni(aneN_4)^{2+} + Co(bpy)_3^{2+}$	1.3×10^9	7.0	0.016-0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} $Ni(aneN_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-10) × 10^{-4} mol L^{-1} $Co(bpy)_3^{3+}$.	761039
15.8.6	**Tris(2,2′-bipyridine)chromium(III) ion**							
	$Ni(aneN_4)^+ + Cr(bpy)_3^{3+} \rightarrow Ni(aneN_4)^{2+} + Cr(bpy)_3^{2+}$	7.7×10^8	7.0	0.016-0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} $Ni(aneN_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-10) × 10^{-4} mol L^{-1} $Cr(bpy)_3^{3+}$.	761039
15.8.7	**Tris(2,2′-bipyridine)iron(III) ion**							
	$Ni(aneN_4)^+ + Fe(bpy)_3^{3+} \rightarrow Ni(aneN_4)^{2+} + Fe(bpy)_3^{2+}$	6.4×10^7	7.0	0.016-0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} $Ni(aneN_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-10) × 10^{-4} mol L^{-1} $Fe(bpy)_3^{3+}$.	761039
15.8.8	**Hydrogen ion**							
	$Ni(aneN_4)^+ + H^+ \rightarrow$	1.1×10^5	0.5-1.25	0.06-0.3		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. 0.003 mol L^{-1} $Ni(aneN_4)^{2+}$ and 1 mol L^{-1} *tert*-BuOH.	761039
15.8.9	**Dihydrogen phosphate ion**							
	$Ni(aneN_4)^+ + H_2PO_4^- \rightarrow$	$<10^4$	5.50	0.01-0.1		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. 0.003 mol L^{-1} $Ni(aneN_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH and 0.01-0.1 mol L^{-1} $H_2PO_4^{2-}$.	761039
15.8.10	**Nitrous oxide**							
	$Ni(aneN_4)^+ + N_2O \rightarrow$	3.9×10^7	7.0	0.01		p.r.	D.k. at 380 nm in soln. contg. 0.003 mol L^{-1} $Ni(aneN_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, (7.5-25) × 10^{-4} mol L^{-1} N_2O and 0.001 mol L^{-1} phosphate buffer.	761039
15.8.11	**Oxygen**							
	$Ni(aneN_4)^+ + O_2 \rightarrow Ni(aneN_4)^{2+} + O_2^{\cdot -}$	1.5×10^9	4.0			p.r.	D.k. at 300 nm in He-satd. soln. contg. 0.1 mol L^{-1} formate ion, 1 × 10^{-4} mol L^{-1} $Ni(aneN_4)^{2+}$ and varied [O_2].	92A165

TABLE 15. Rate constants for nickel transients — Continued

Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.8 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion — Continued							
15.8.11 Oxygen — Continued							
	1.6×10^9	7.0			p.r.	D.k. at 380 nm in soln. contg. 0.003 mol L^{-1} Ni(aneN$_4$)$^{2+}$, 1 mol L^{-1} *tert*-BuOH, (7-25) × 10^{-5} mol L^{-1} O_2 and 0.001 mol L^{-1} phosphate buffer.	761039
15.8.12 Hexaammineruthenium(III) ion							
Ni(aneN$_4$)$^+$ + Ru(NH$_3$)$_6^{3+}$ → Ni(aneN$_4$)$^{2+}$ + Ru(NH$_3$)$_6^{2+}$	6.9×10^8	4	0.01		p.r.	N_2-satd. soln. contg. alcohol.	88A334
	3.8×10^8	7.0	0.016-0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} Ni(aneN$_4$)$^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-10) × 10^{-4} mol L^{-1} Ru(NH$_3$)$_6^{3+}$.	761039
15.8.13 Pentaammine(nitroso)ruthenium(III) ion							
Ni(aneN$_4$)$^+$ + Ru(NH$_3$)$_5$NO^{3+} → Ni(aneN$_4$)$^{2+}$ + Ru(NH$_3$)$_5$NO^{2+}	7.4×10^7	7.0	0.016-0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} Ni(aneN$_4$)$^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-10) × 10^{-4} mol L^{-1} Ru(NH$_3$)$_5$NO^{3+}.	761039
15.8.14 Acetic acid							
Ni(aneN$_4$)$^+$ + CH$_3$CO$_2$H →	1.2×10^4	4.85	0.015-0.06		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. 0.003 mol L^{-1} Ni(aneN$_4$)$^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and 0.005-0.05 mol L^{-1} acetate buffer.	761039
15.8.15 9,10-Anthraquinone-2,6-disulfonate ion							
Ni(aneN$_4$)$^+$ + 2,6-diSO$_3$AQ^{2-} → Ni(aneN$_4$)$^{2+}$ + [2,6-diSO$_3$AQ]$^{\cdot 3-}$	4.8×10^9	7.0	0.004		p.r.	D.k. or p.b.k. in Ar-satd. soln. contg. 0.001 mol L^{-1} Ni(aneN$_4$)$^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-5.0) × 10^{-5} mol L^{-1} 2,6-diSO$_3$AQ^{2-}.	761039
15.8.16 1,4-Benzoquinone							
Ni(aneN$_4$)$^+$ + Q → Ni(aneN$_4$)$^{2+}$ + Q$^{\cdot -}$	4.8×10^9	7.0	0.004		p.r.	D.k. or p.b.k. in Ar-satd. soln. contg. 0.001 mol L^{-1} Ni(aneN$_4$)$^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-5.0) × 10^{-5} mol L^{-1} Q.	761039
15.8.17 3-Benzoylpyridine							
Ni(aneN$_4$)$^+$ + 3-C$_6$H$_5$COpy →	2.5×10^8	7.0	0.004		p.r.	D.k. or p.b.k. in Ar-satd. soln. contg. 0.001 mol L^{-1} Ni(aneN$_4$)$^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-5.0) × 10^{-5} mol L^{-1} 3-C$_6$H$_5$COpy.	761039
15.8.18 Fluorescein dianion							
Ni(aneN$_4$)$^+$ + Fl^{2-} →	3.2×10^9	7.0	0.004		p.r.	D.k. or p.b.k. in Ar-satd. soln. contg. 0.001 mol L^{-1} Ni(aneN$_4$)$^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-5.0) × 10^{-5} mol L^{-1} Fl^{2-}.	761039
15.8.19 Iodomethane							
Ni(aneN$_4$)$^+$ + CH$_3$I →	4.6×10^8	9.2	0.01		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. 0.003 mol L^{-1} Ni(aneN$_4$)$^{2+}$, 1 mol L^{-1} *tert*-BuOH, (2.5-5.0) × 10^{-4} mol L^{-1} CH$_3$I and 0.001 mol L^{-1} tetraborate buffer.	761039

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.9	**1,4,5,7,7,8,11,12,14,14-Decamethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion**							
15.9.1	**Hexaamminecobalt(III) ion**							
	$Ni(Me_{10}cyclam)^+ + Co(NH_3)_6^{3+} \rightarrow Ni(Me_{10}cyclam)^{2+} + Co(NH_3)_6^{2+}$	1.7×10^4				p.r.		85A032
15.9.2	**Hexaamminebis(μ-hydroxy)-μ-(trifluoroacetato)dicobalt(III) ion**							
	$Ni(Me_{10}cyclam)^+ + CF_3CO_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	3.0×10^5			22	p.r.	D.k. at 335 nm in Ar-satd. soln.	83A140
15.9.3	**Hexaammine-μ-(difluoroacetato)bis(μ-hydroxy)dicobalt(III) ion**							
	$Ni(Me_{10}cyclam)^+ + CHF_2CO_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	1.8×10^5			22	p.r.	D.k. at 335 nm in Ar-satd. soln.	83A140
15.9.4	**Hexaammine-μ-(fluoroacetato)bis(μ-hydroxy)dicobalt(III) ion**							
	$Ni(Me_{10}cyclam)^+ + CH_2FCO_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	1.4×10^5			22	p.r.	D.k. at 335 nm in Ar-satd. soln.	83A140
15.9.5	**μ-Acetatohexaamminebis(μ-hydroxy)dicobalt(III) ion**							
	$Ni(Me_{10}cyclam)^+ + CH_3CO_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	8.8×10^4			22	p.r.	D.k. at 335 nm in Ar-satd. soln.	83A140
15.9.6	**Nitrous oxide**							
	$Ni(Me_{10}cyclam)^+ + N_2O \rightarrow$	<0.1				p.r.		85A032
15.9.7	**Oxygen**							
	$Ni(Me_{10}cyclam)^+ + O_2 \rightarrow Ni(Me_{10}cyclam)^{2+} + O_2^{\bullet-}$	4×10^7				p.r.		85A032
15.9.8	**Hexaammineruthenium(III) ion**							
	$Ni(Me_{10}cyclam)^+ + Ru(NH_3)_6^{3+} \rightarrow Ni(Me_{10}cyclam)^{2+} + Ru(NH_3)_6^{2+}$	3.0×10^7				p.r.		85A032
15.10	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(I) ion**							
15.10.1	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanesilver(II) ion**							
	$Ni(4,11\text{-dieneN}_4)^+ + Ag(aneN_4)^{2+} \rightarrow Ni(4,11\text{-dieneN}_4)^{2+} + Ag(aneN_4)^+$	5.7×10^8	4	0.03		p.r.	D.k. or p.b.k. in N_2-satd. soln. contg. alcohol.	88A33
15.10.2	**Hexaamminecobalt(III) ion**							
	$Ni(4,11\text{-dieneN}_4)^+ + Co(NH_3)_6^{3+} \rightarrow Ni(4,11\text{-dieneN}_4)^{2+} + Co(NH_3)_6^{2+}$	1.9×10^6	7.0	0.016-0.028		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. $(2.5\text{-}5.0) \times 10^{-3}$ mol L^{-1} $Ni(4,11\text{-dieneN}_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and $(2.5\text{-}10) \times 10^{-4}$ mol L^{-1} $Co(NH_3)_6^{3+}$.	761039
15.10.3	**Tris(ethylenediamine)cobalt(III) ion**							
	$Ni(4,11\text{-dieneN}_4)^+ + Co(en)_3^{3+} \rightarrow Ni(4,11\text{-dieneN}_4)^{2+} + Co(en)_3^{2+}$	1.1×10^6	4	0.01		p.r.	D.k. or p.b.k. in N_2-satd. soln. contg. alcohol.	88A33
		1.1×10^6	7.0	0.016-0.028		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. $(2.5\text{-}5.0) \times 10^{-3}$ mol L^{-1} $Ni(4,11\text{-dieneN}_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and $(2.5\text{-}10) \times 10^{-4}$ mol L^{-1} $Co(en)_3^{3+}$.	76103
15.10.4	**Tris(2,2′-bipyridine)cobalt(III) ion**							
	$Ni(4,11\text{-dieneN}_4)^+ + Co(bpy)_3^{3+} \rightarrow Ni(4,11\text{-dieneN}_4)^{2+} + Co(bpy)_3^{2+}$	1.3×10^9	7.0	0.016-0.028		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. $(2.5\text{-}5.0) \times 10^{-3}$ mol L^{-1} $Ni(4,11\text{-dieneN}_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and $(2.5\text{-}10) \times 10^{-4}$ mol L^{-1} $Co(bpy)_3^{3+}$.	76103

TABLE 15. Rate constants for nickel transients — Continued

Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.10 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(I) ion — Continued							
15.10.5 Aqua(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)hydroxycobalt(III) ion							
Ni(4,11-dieneN$_4$)$^+$ + Co(4,11-dieneN$_4$)(H$_2$O)OH^{2+} → Ni(4,11-dieneN$_4$)$^{2+}$ + Co(4,11-dieneN$_4$)(H$_2$O)OH$^+$	2.6×10^6	7.0	0.016-0.028		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} Ni(4,11-dieneN$_4$)$^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-10) × 10^{-4} mol L^{-1} Co(4,11-dieneN$_4$)(H$_2$O)OH^{2+}.	761039
15.10.6 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(III) ion							
Ni(4,11-dieneN$_4$)$^+$ + Co(Me$_4$tetraeneN$_4$)$^{3+}$ → Ni(4,11-dieneN$_4$)$^{2+}$ + Co(Me$_4$tetraeneN$_4$)(H$_2$O)$_2^{2+}$	4.0×10^7	4	0.01		p.r.	D.k. or p.b.k. in N$_2$-satd. soln. contg. alcohol.	88A334
15.10.7 Dihydroxy(2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene)cobalt(III) ion							
Ni(4,11-dieneN$_4$)$^+$ + Co(Me$_4$tetraeneN$_4$)(OH)$_2^+$ → Ni(4,11-dieneN$_4$)$^{2+}$ + Co(Me$_4$tetraeneN$_4$)(OH)$_2$	3.6×10^7	7.0	0.016-0.028		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} Ni(4,11-dieneN$_4$)$^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-10) × 10^{-4} mol L^{-1} Co(Me$_4$tetraeneN$_4$)(OH)$_2^+$.	761039
15.10.8 Tris(2,2′-bipyridine)chromium(III) ion							
Ni(4,11-dieneN$_4$)$^+$ + Cr(bpy)$_3^{3+}$ → Ni(4,11-dieneN$_4$)$^{2+}$ + Cr(bpy)$_3^{2+}$	3.1×10^8	4	0.01		p.r.	D.k. or p.b.k. in N$_2$-satd. soln. contg. alcohol.	88A334
	1.1×10^8	7.0	0.016-0.028		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} Ni(4,11-dieneN$_4$)$^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-10) × 10^{-4} mol L^{-1} Cr(bpy)$_3^{3+}$.	761039
15.10.9 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenecopper(II) ion							
Ni(4,11-dieneN$_4$)$^+$ + Cu(Me$_2$pyo[14]trieneN$_4$)$^{2+}$ → Ni(4,11-dieneN$_4$)$^{2+}$ + Cu(Me$_2$pyo[14]trieneN$_4$)$^+$	1.0×10^8	4	0.01		p.r.	D.k. or p.b.k. in N$_2$-satd. soln. contg. alcohol.	88A334
15.10.10 Tris(2,2′-bipyridine)iron(III) ion							
Ni(4,11-dieneN$_4$)$^+$ + Fe(bpy)$_3^{3+}$ → Ni(4,11-dieneN$_4$)$^{2+}$ + Fe(bpy)$_3^{2+}$	2.2×10^6	7.0	0.016-0.028		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} Ni(4,11-dieneN$_4$)$^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-10) × 10^{-4} mol L^{-1} Fe(bpy)$_3^{3+}$	761039
15.10.11 Hydrogen ion							
Ni(4,11-dieneN$_4$)$^+$ + H$^+$ →	1.3×10^6	<1.25	0.06-0.3		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.003 mol L^{-1} Ni(4,11-dieneN$_4$)$^{2+}$ and 1 mol L^{-1} *tert*-BuOH. Reaction may involve proton transfer to the metal center to give a hydrido complex.	761039
15.10.12 Nitrous oxide							
Ni(4,11-dieneN$_4$)$^+$ + N$_2$O →	1.8×10^7	7.0			p.r.	D.k. at 460 nm in soln. contg. 0.003 mol L^{-1} Ni(4,11-dieneN$_4$)$^{2+}$, 1 mol L^{-1} *tert*-BuOH, (7.5-25) × 10^{-4} mol L^{-1} N$_2$O and and 0.001 mol L^{-1} phosphate buffer.	761039
15.10.13 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenenickel(II) ion							
Ni(4,11-dieneN$_4$)$^+$ + Ni(Me$_2$pyo[14]trieneN$_4$)$^{2+}$ → Ni(4,11-dieneN$_4$)$^{2+}$ + Ni(Me$_2$pyo[14]trieneN$_4$)$^+$	2.1×10^7	4	0.01		p.r.	D.k. or p.b.k. in N$_2$-satd. soln. contg. alcohol.	88A334

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.10	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(I) ion** — Continued							
15.10.14	**Oxygen**							
	$Ni(4,11\text{-dieneN}_4)^+ + O_2 \rightarrow Ni(4,11\text{-dieneN}_4)^{2+} + O_2^{\cdot -}$	1.7×10^9	7.0			p.r.	D.k. at 460 nm in soln. contg. 0.003 mol L^{-1} $Ni(4,11\text{-dieneN}_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, (7-25) × 10^{-5} mol L^{-1} O_2 and 0.001 mol L^{-1} phosphate buffer.	761039
15.10.15	**Dihydrogen phosphate ion**							
	$Ni(4,11\text{-dieneN}_4)^+ + H_2PO_4^- \rightarrow$	2.4×10^5	5.5	0.01-0.1		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.003 mol L^{-1} $Ni(4,11\text{-dieneN}_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH and 0.01-0.1 mol L^{-1} $H_2PO_4^{2-}$.	761039
15.10.16	**Hexaammineruthenium(III) ion**							
	$Ni(4,11\text{-dieneN}_4)^+ + Ru(NH_3)_6^{3+} \rightarrow Ni(4,11\text{-dieneN}_4)^{2+} + Ru(NH_3)_6^{2+}$	4.5×10^8	4	0.01		p.r.	D.k. or p.b.k. in N_2-satd. soln. contg. alcohol.	88A334
		4.5×10^8	7.0	0.016-0.028		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} $Ni(4,11\text{-dieneN}_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-10) × 10^{-4} mol L^{-1} $Ru(NH_3)_6^{3+}$.	761039
15.10.17	**Pentaammine(nitroso)ruthenium(III) ion**							
	$Ni(4,11\text{-dieneN}_4)^+ + Ru(NH_3)_5NO^{3+} \rightarrow Ni(4,11\text{-dieneN}_4)^{2+} + Ru(NH_3)_5NO^{2+}$	3.5×10^7	7.0	0.016-0.028		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. (2.5-5.0) × 10^{-3} mol L^{-1} $Ni(4,11\text{-dieneN}_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-10) × 10^{-4} mol L^{-1} $Ru(NH_3)_5NO^{3+}$.	761039
15.10.18	**Acetic acid**							
	$Ni(4,11\text{-dieneN}_4)^+ + CH_3CO_2H \rightarrow$	1.9×10^5	4.85	0.015-0.06		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.003 mol L^{-1} $Ni(4,11\text{-dieneN}_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH and 0.005-0.05 mol L^{-1} acetate buffer.	761039
15.10.19	**9,10-Anthraquinone-2,6-disulfonate ion**							
	$Ni(4,11\text{-dieneN}_4)^+ + 2,6\text{-diSO}_3AQ^{2-} \rightarrow Ni(4,11\text{-dieneN}_4)^{2+} + [2,6\text{-diSO}_3AQ]^{\cdot 3-}$	5.0×10^9	7.0	0.004		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.001 mol L^{-1} $Ni(4,11\text{-dieneN}_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-5) × 10^{-5} mol L^{-1} $2,6\text{-diSO}_3AQ^{2-}$.	761039
15.10.20	**1,4-Benzoquinone**							
	$Ni(4,11\text{-dieneN}_4)^+ + Q \rightarrow Ni(4,11\text{-dieneN}_4)^{2+} + Q^{\cdot -}$	3.8×10^9	7.0	0.004		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.001 mol L^{-1} $Ni(4,11\text{-dieneN}_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-5) × 10^{-5} mol L^{-1} Q.	761039
15.10.21	**3-Benzoylpyridine**							
	$Ni(4,11\text{-dieneN}_4)^+ + 3\text{-C}_6H_5COpy \rightarrow$	7.5×10^8	7.0	0.004		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.001 mol L^{-1} $Ni(4,11\text{-dieneN}_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-5) × 10^{-5} mol L^{-1} 3-C_6H_5COpy.	761039
15.10.22	**Eosin dianion**							
	$Ni(4,11\text{-dieneN}_4)^+ + Eos \rightarrow$	2.7×10^9	7.0	0.004		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.001 mol L^{-1} $Ni(4,11\text{-dieneN}_4)^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-5) × 10^{-5} mol L^{-1} Eos.	761039

TABLE 15. Rate constants for nickel transients — Continued

No. Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.10 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(I) ion — Continued							
15.10.23 Fluorescein dianion							
Ni(4,11-dieneN$_4$)$^+$ + Fl^{2-} →	3.3×10^9	7.0	0.004		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.001 mol L^{-1} Ni(4,11-dieneN$_4$)$^{2+}$, 1 mol L^{-1} *tert*-BuOH, 0.001 mol L^{-1} phosphate buffer and (2.5-5) × 10^{-5} mol L^{-1} Fl^{2-}.	761039
15.10.24 Iodomethane							
Ni(4,11-dieneN$_4$)$^+$ + CH$_3$I →	1.3×10^8	9.2	0.01		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.003 mol L^{-1} Ni(4,11-dieneN$_4$)$^{2+}$, 1 mol L^{-1} *tert*-BuOH, (2.5-5) × 10^{-5} mol L^{-1} CH$_3$I and 0.001 mol L^{-1} tetraborate buffer.	761039
15.11 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-1,4,8,11-tetraenenickel(I) ion							
15.11.1 Tris(2,2′-bipyridine)chromium(III) ion							
Ni(tetraeneN$_4$)$^+$ + Cr(bpy)$_3$$^{3+}$ → Ni(tetraeneN$_4$)$^{2+}$ + Cr(bpy)$_3$$^{2+}$	8.0×10^8	4	0.01		p.r.	D.k. or p.b.k. in N$_2$-satd. soln. contg. alcohol.	88A334
15.11.2 Hexaammineruthenium(III) ion							
Ni(tetraeneN$_4$)$^+$ + Ru(NH$_3$)$_6$$^{3+}$ → Ni(tetraeneN$_4$)$^{2+}$ + Ru(NH$_3$)$_6$$^{2+}$	3.0×10^8	4	0.01		p.r.	D.k. or p.b.k. in N$_2$-satd. soln. contg. alcohol.	88A334
15.12 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(I) ion							
15.12.1 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(I) ion							
Ni(Me$_2$pyo[14]aneN$_4$)$^+$ + Ni(Me$_2$pyo[14]aneN$_4$)$^+$ →	2.5×10^8				p.r.	D.k. at 290 and 320 nm in N$_2$-satd. soln. contg. 10^{-4} mol L^{-1} Ni(Me$_2$pyo[14]aneN$_4$)$^{2+}$ and 0.01 mol L^{-1} Br$^-$. Reaction in competition with Ni(I) + Ni(III), $k \sim 10^8$-10^9 L mol^{-1} s^{-1}.	81A144
15.13 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenenickel(I) ion							
15.13.1 Tris(2,2′-bipyridine)chromium(III) ion							
Ni(Me$_2$pyo[14]trieneN$_4$)$^+$ + Cr(bpy)$_3$$^{3+}$ → Ni(Me$_2$pyo[14]trieneN$_4$)$^{2+}$ + Cr(bpy)$_3$$^{2+}$	5.1×10^8	4	0.01		p.r.	D.k. or p.b.k. in N$_2$-satd. soln. contg. alcohol.	88A334
15.13.2 Hexaammineruthenium(III) ion							
Ni(Me$_2$pyo[14]trieneN$_4$)$^+$ + Ru(NH$_3$)$_6$$^{3+}$ → Ni(Me$_2$pyo[14]trieneN$_4$)$^{2+}$ + Ru(NH$_3$)$_6$$^{2+}$	2.3×10^8	4	0.01		p.r.	D.k. or p.b.k. in N$_2$-satd. soln. contg. alcohol.	88A334
15.14 8-Methyl-8-nitro-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1^{13,15}]octadecanenickel(II) ion, electron adduct							
15.14.1 First-order reaction							
Ni(MeNO$_2$[18]aneN$_6$)$^+$ →	1.8×10^3 s^{-1}			22	p.r.	D.k. at 290 nm in soln. contg. 0.001 mol L^{-1} Ni(MeNO$_2$[18]aneN$_6$)$^{2+}$ and 0.1 mol L^{-1} *tert*-BuOH.	88A391
15.15 8-Amino-8-methyl-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1^{13,15}]octadecanenickel(I) ion							
15.15.1 First-order reaction							
Ni(MeNH$_2$[18]aneN$_6$)$^+$ →	3.5×10^3 s^{-1}			22	p.r.	D.k. at 360 nm in soln. contg. 0.001 mol L^{-1} Ni(MeNH$_2$[18]aneN$_6$)$^{2+}$ and 0.1 mol L^{-1} *tert*-BuOH.	88A391

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.16	**3,7-Bis(2-aminoethyl)-1,3,5,7-tetraazabicyclo[3.3.1]nonanenickel(I) ion**							
15.16.1	**First-order reaction**							
	$NiL^+ \rightarrow$	2.2×10^4 s^{-1}			22	p.r.	D.k. at 360 nm in soln. contg. 0.001 mol L^{-1} NiL^{2+} and 0.1 mol L^{-1} *tert*-BuOH.	88A391
15.17	**Nitrilotriacetatonickelate(I) ion**							
15.17.1	**Nitrilotriacetatonickelate(I) ion**							
	$NiNTA^{2-} + NiNTA^{2-} \rightarrow (NiNTA)_2^{4-}$	7.5×10^8	5-9			p.r.	D.k. in soln. contg. $NiNTA^-$ and 0.1 mol L^{-1} *tert*-BuOH.	80A194
15.18	***N*-Methyl-5,10,15,20-tetrakis(4-sulfonatophenyl)porphinatonickelate(II), radical anion**							
15.18.1	**First-order reaction**							
	$[Ni(N\text{-}Me)TPPS]^{\cdot 4-} \rightarrow CH_3NiTPPS^{4-}$	2.0×10^2 s^{-1}				p.r.	D.k. in Ar-satd. soln. contg. (1-10) × 10^{-5} mol L^{-1} $Ni(N\text{-}Me)TPPS^{3-}$ and 1% 2-PrOH.	92G183
15.19	**Hydroxymethylnickel(II) ion**							
15.19.1	**Water**							
	$NiCH_2OH^+ + H_2O \rightarrow Ni^{2+} + MeOH + OH^-$	7 s^{-1}				p.r.	D.k. at 250 nm and condy. change in Ar-satd. soln. contg. 10^{-4} mol L^{-1} $NiSO_4$ and 0.1 mol L^{-1} MeOH.	741037
15.19.2	**Hydrogen peroxide**							
	$NiCH_2OH^+ + H_2O_2 \rightarrow$	7.3×10^3				p.r.	Condy. change in Ar-satd. soln. contg. $NiSO_4$ and MeOH.	741037
15.20	**Carboxylatonickel(II)**							
15.20.1	**Water**							
	$NiCO_2 + H_2O \rightarrow$	< 1 s^{-1}				p.r.	D.k. at 250 nm and condy. change in Ar-satd. soln. contg. $NiSO_4$ and formate ion; $NiCO_2$ is probably protonated.	741037
15.21	**1-Hydroxyethylnickel(II) ion**							
15.21.1	**Water**							
	$NiCHOHCH_3^+ + H_2O \rightarrow Ni^{2+} + EtOH + OH^-$	5 s^{-1}				p.r.	D.k. at 250 nm and condy. change in Ar-satd. soln. contg. $NiSO_4$ and EtOH.	741037
15.21.2	**Hydrogen peroxide**							
	$NiCHOHCH_3^+ + H_2O_2 \rightarrow$	2.3×10^4				p.r.	Condy. change in Ar-satd. soln. contg. $NiSO_4$ and EtOH.	741037
15.22	**1-Hydroxy-1-methylethylnickel(II) ion**							
15.22.1	**Water**							
	$NiCOH(CH_3)_2^+ + H_2O \rightarrow$	< 1 s^{-1}				p.r.	D.k. at 250 nm and condy. change in Ar-satd. soln. contg. $NiSO_4$ and 2-PrOH.	741037
15.22.2	**Hydrogen peroxide**							
	$NiCOH(CH_3)_2^+ + H_2O_2 \rightarrow$	1.1×10^6				p.r.	Condy. change in Ar-satd. soln. contg. 5×10^{-4} mol L^{-1} $NiSO_4$ and 0.005 mol L^{-1} 2-PrOH.	741037
15.23	**1-Ethoxyethylnickel(II) ion**							
15.23.1	**Water**							
	$NiCH(CH_3)OC_2H_5^+ + H_2O \rightarrow$	< 1 s^{-1}				p.r.	D.k. at 250 nm and condy. change in Ar-satd. soln. contg. $NiSO_4$ and diethyl ether.	741037

TABLE 15. Rate constants for nickel transients — Continued

No. Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.23 1-Ethoxyethylnickel(II) ion — Continued							
15.23.2 Hydrogen peroxide							
$NiCH(CH_3)OC_2H_5^+ + H_2O_2 \rightarrow$	1.3×10^3				p.r.	Condy. change in Ar-satd. soln. contg. $NiSO_4$ and diethyl ether.	741037
15.24 Cyclopentylnickel(II) ion							
15.24.1 Water							
$c\text{-}C_5H_9Ni^+ + H_2O \rightarrow Ni^{2+} + c\text{-}C_5H_{10} + OH^-$	49 s^{-1}				p.r.	D.k. at 250 nm and condy. change in Ar-satd. soln. contg. $NiSO_4$ and cyclopentane.	741037
15.24.2 Hydrogen peroxide							
$c\text{-}C_5H_9Ni^+ + H_2O_2 \rightarrow$	$<5 \times 10^5$				p.r.	Condy. change in Ar-satd. soln. contg. $NiSO_4$ and cyclopentane.	741037
15.25 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(II) ion, OH reaction product							
15.25.1 Hydrogen peroxide							
$Ni(ancN_4\text{-}H)^{2+} + H_2O_2 \rightarrow$	2×10^4	5		22	p.r./f.p.	D.k.	79A038
15.26 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(II) ion, OH reaction product							
15.26.1 First-order reaction							
$Ni(4,11\text{-dieneN}_4\text{-H})^{2+} \rightarrow$	1×10^6 s^{-1}			22	p.r./f.p.	Value obtained by computer simulation; $k_r = 1 \times 10^3$ s^{-1}.	79A038
15.26.2 Hydrogen ion							
$Ni(4,11\text{-dieneN}_4\text{-H})^{2+} + H^+ \rightarrow Ni(4,11\text{-dieneN}_4)^{3+}$	6×10^7			22	p.r./f.p.	Value obtained by computer simulation; $k_r = 1 \times 10^3$ s^{-1}.	79A038
15.26.3 Hydrogen peroxide							
$Ni(4,11\text{-dieneN}_4\text{-H})^{2+} + H_2O_2 \rightarrow$	5×10^2	5		22	p.r./f.p.		79A038
15.27 Iminodiacetatonickelate(II), H-abstraction product							
15.27.1 First-order reaction							
$Ni(IDA\text{-}H) \rightarrow$	2.6×10^5 s^{-1}	7			p.r.	D.k. in N_2O-satd. soln. contg. 0.01 mol L^{-1} Ni(IDA).	81A023
15.27.2 Oxygen							
$Ni(IDA\text{-}H) + O_2 \rightarrow$	3×10^4	7			p.r.	D.k. in soln. satd. with various mixtures of N_2O and O_2 contg. Ni(IDA).	81A023
15.28 Bis(iminodiacetato)nickelate(II), H-abstraction product							
15.28.1 Oxygen							
$Ni(IDA)(IDA\text{-}H)^{2-} + O_2 \rightarrow$	5×10^3	7			p.r.	D.k. in soln. satd. with various mixtures of N_2O and O_2 contg. $Ni(IDA)_2^{2-}$.	81A023
15.28.2 Ferricyanide ion							
$Ni(IDA)(IDA\text{-}H)^{2-} + Fe(CN)_6^{3-} \rightarrow$	7×10^4	7			p.r.	D.k. at 420 nm in N_2O-satd. soln. contg. $Ni(IDA)_2^{2-}$ and $Fe(CN)_6^{3-}$.	81A023
15.29 Nitrilotriacetatonickelate(II), H-abstraction product							
15.29.1 Bromide ion							
$Ni(NTA\text{-}H)^- + Br^- \rightarrow$	2×10^3				p.r.	D.k. in N_2O-satd. soln. contg. 4×10^{-4} mol L^{-1} NiNTA and Br^-.	78A436
15.29.2 Copper(II) ion							
$Ni(NTA\text{-}H)^- + Cu^{2+} \rightarrow$	7.8×10^7				p.r.	D.k. at 290 nm in N_2O-satd. soln. contg. $NiNTA^-$ and Cu^{2+}.	80A194

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.29	**Nitrilotriacetatonickelate(II), H-abstraction product** — Continued							
15.29.3	**Iodide ion**							
	$Ni(NTA\text{-}H)^- + I^- \rightarrow$	4×10^2				p.r.	D.k. in N_2O-satd. soln. contg. 4×10^{-4} mol L^{-1} NiNTA, I^- and $HClO_4$.	78A436
15.29.4	**Hexachloroiridate(IV) ion**							
	$Ni(NTA\text{-}H)^- + IrCl_6^{2-} \rightarrow$	3.6×10^7	7			p.r.	D.k. at 490 nm ($IrCl_6^{2-}$) and d.k. at 290 nm (radical) in N_2O-satd. soln. contg. $NiNTA^-$ and $IrCl_6^{2-}$.	80A194
15.29.5	**Nickel(II) ion**							
	$Ni(NTA\text{-}H)^- + Ni^{2+} \rightarrow$	3.6×10^3				p.r.	D.k. at 290 nm in N_2O-satd. soln. contg. $NiNTA^-$ and Ni^{2+}.	80A194
15.29.6	**Oxygen**							
	$Ni(NTA\text{-}H)^- + O_2 \rightarrow$	3.9×10^3				p.r.	D.k. at 290 nm in soln. contg. $NiNTA^-$ and $N_2O\text{-}O_2$ (1:1).	80A194
		4.0×10^3				p.r.	D.k. in N_2O-satd. soln. contg. 4×10^{-4} mol L^{-1} NiNTA and O_2.	78A436
15.30	**Ethylenediaminetetraacetatonickelate(II), H-abstraction product**							
15.30.1	**Ethylenediaminetetraacetatonickelate(II) ion**							
	$Ni(EDTA\text{-}H)^{2-} + NiEDTA^{2-} \rightarrow$	9.3×10^4				f.p./pi	D.k.; reaction suggested to produce $Ni(I)EDTA^{3-}$.	91A292
15.31	**Amminenickel(III) ions**							
15.31.1	**Hydrazine**							
	$Ni(III)(NH_3)_n + H_2NNH_2 \rightarrow$	4×10^6	11.3			p.r.	D.k. at 300 nm in N_2O-satd. soln. contg. (1-2) $\times 10^{-3}$ mol L^{-1} $NiSO_4$, (1-5) $\times 10^{-4}$ mol L^{-1} hydrazine and 0.67 mol L^{-1} NH_3.	720460
15.31.2	**Amminenickel(III) ions**							
	$Ni(III)(NH_3)_n + Ni(III)(NH_3)_n \rightarrow$	$<1.8 \times 10^7$	11.3			p.r.	D.k. at 300 nm in N_2O-satd. soln. contg. 0.67 mol L^{-1} NH_3 and (5-200) $\times 10^{-5}$ mol L^{-1} $NiSO_4$.	720460
15.32	**Ethylenediaminenickel(III) ions**							
15.32.1	**Ethylenediaminenickel(III) ions**							
	$Ni(en)_n^{3+} + Ni(en)_n^{3+} \rightarrow$	3.9×10^4 to 1.3×10^7	8.5-10			p.r.	D.k. at 300 nm in N_2O-satd. soln. contg. (2-100) $\times 10^{-5}$ mol L^{-1} $NiSO_4$ and (6-400) $\times 10^{-5}$ mol L^{-1} ethyenediamine; k is a function of pH, [$NiSO_4$] and [ethylenediamine].	720461
15.33	**Glycinatonickel(III) ion**							
15.33.1	**Glycinatonickel(III) ion**							
	$Ni(Gly)_n^{(3-n)+} + Ni(Gly)_n^{(3-n)+} \rightarrow$	$\sim 8 \times 10^8$	8.9, 10			p.r.	D.k. at 350 nm in N_2O-satd. soln. contg. (1-20) $\times 10^{-4}$ mol L^{-1} $NiSO_4$ and (3-60) $\times 10^{-4}$ mol L^{-1} glycine; k is a function of pH, [$NiSO_4$] and [glycine].	720461
15.34	**Bis(1,4,7-triazacyclononane)nickel(III) ion**							
15.34.1	**Tryptophan**							
	$Ni(tacn)_2^{3+} + TrpH \rightarrow Ni(tacn)_2^{2+} + Trp^{\cdot} + H^+$	5×10^4	7			p.r.	D.k. at 520 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} KBr, 0.011 mol L^{-1} tryptophan, (0-10) $\times 10^{-3}$ mol L^{-1} $Ni(tacn)_2(ClO_4)_2$, and 0.01 mol L^{-1} phosphate buffer; $k_r = 4.8 \times 10^5$ L mol^{-1} s^{-1}.	91A015

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.35	**1,4,7,10-Tetraazacyclotridecanenickel(III) ion**							
15.35.1	**First-order reaction**							
	$Ni([13]aneN_4)^{3+} \rightarrow$	2.5×10^2 s^{-1}	3.3			p.r.	D.k. at ~550 nm and p.b.k. at ~300 nm in N_2O-satd. soln. contg. (1-10) × 10^{-4} mol L^{-1} $Ni([13]aneN_4)^{2+}$ and perchlorate ion; process suggested to represent configurational isomerization; followed by first-order reaction, k = 0.017 s^{-1}. In the presence of 0.1 mol L^{-1} Na_2SO_4, $k = 1 \times 10^4$ s^{-1}; product suggested to be stabilized by axial sulfate ligands.	86A470
15.36	**9-Methyl-9-nitro-1,4,7,11-tetraazacyclotridecanenickel(III) ion**							
15.36.1	**First-order reaction**							
	$Ni(MeNO_2[13]aneN_4)^{3+} \rightarrow$	3.6×10^3 s^{-1}			22	p.r.	D.k. at 520 nm in N_2O-satd. soln.	88A391
15.37	**11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion**							
15.37.1	**First-order reaction**							
	$Ni(10,13\text{-}dieneN_4)^{3+} \rightarrow$	(1.0 to 7.0) × 10^2 s^{-1}	3.6		22	p.r.	D.k. in N_2O-satd. soln. contg. $Ni(10,13\text{-}dieneN_4)^{2+}$ and 0.1 mol L^{-1} NaBr; pK_a = 8.8.	82A060
15.38	**11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion, conjugate base**							
15.38.1	**11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion, conjugate base**							
	$Ni(10,13\text{-}dieneN_4\text{-}H)^{2+}$ + $Ni(10,13\text{-}dieneN_4\text{-}H)^{2+} \rightarrow$	3.5×10^8	10.6		22	p.r.	D.k. in N_2O-satd. soln. contg. $Ni(10,13\text{-}dieneN_4\text{-}H)^{2+}$ and 0.1 mol L^{-1} NaBr; $k = 3.9 \times 10^8$ L mol^{-1} s^{-1} at pH 8.2. Product suggested to be dimer.	82A060
15.39	**Aquabromo-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion**							
15.39.1	**First-order reaction**							
	$Ni(trifluoro\text{-}10,13\text{-}dieneN_4)(H_2O)Br^{2+} \rightarrow$	1×10^3 s^{-1} 7.6×10^4 s^{-1}	4.8 8.4			p.r.	D.k. in soln. contg. 0.001 mol L^{-1} acetate or phosphate buffer. Reaction suggested to represent deprotonation of ligand and loss of Br^-.	84A277
15.40	**Diaqua-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion, conjugate base**							
15.40.1	**Diaqua-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion, conjugate base**							
	$Ni(trifluoro\text{-}10,13\text{-}dieneN_4\text{-}H)(H_2O)_2^{2+}$ + $Ni(trifluoro\text{-}10,13\text{-}dieneN_4\text{-}H)(H_2O)_2^{2+} \rightarrow$	7.5×10^7				p.r.	D.k. in N_2O-satd. soln. contg. Br^- and $Ni(L\text{-}H)(H_2O)^{2+}$; pK_a = 5.1 for $NiL(H_2O)_2^{3+}$.	84A277
15.41	**Aquamethyl(1,4,8,11-tetraazacyclotetradecane)nickel(III) ion**							
15.41.1	**First-order reaction**							
	$CH_3Ni(cyclam)(H_2O)^{2+} \rightarrow Ni(cyclam)^{2+} + {}^{\bullet}CH_3 + H_2O$	57 s^{-1}	3.0			p.r.	Derived from p.b.k. at 300 nm for formation of $CH_3OONi(cyclam)(H_2O)^{2+}$ in N_2O-satd. soln. contg. $Ni(cyclam)^{2+}$, O_2 and 0.1 mol L^{-1} DMSO; $k_r = 6.5 \times 10^8$ L mol^{-1} s^{-1}; $\Delta V\ddagger = 24.4 \times 10^{-3}$ L mol^{-1} [90A321].	88A444
15.41.2	**Hexaaquachromium(II) ion**							
	$CH_3Ni(cyclam)(H_2O)^{2+} + Cr(H_2O)_6^{2+} \rightarrow Ni(cyclam)^{2+} + (H_2O)_5CrCH_3^{2+} + 2\ H_2O$	1.1×10^5	3.0			p.r.	D.k. at 300 nm soln. contg. 0.001 mol L^{-1} $Ni(cyclam)^{2+}$, 1×10^{-4} mol L^{-1} Cr^{2+} and 0.1 mol L^{-1} DMSO.	88A444

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.42	**1,4,8,11-Tetraazacyclotetradecanenickel(III) ion**							
15.42.1	**First-order reaction**							
	$Ni(cyclam)^{3+} \rightarrow$	7.5×10^1 s^{-1} 1.3×10^4 s^{-1}	3.1 6			p.r.	D.k. in N_2O-satd. soln. contg. 0.3 mol L^{-1} ClO_4^- or 0.1 mol L^{-1} SO_4^{2-} and $Ni(cyclam)^{2+}$; followed by further d.k., $k = 0.36$ and 3.5 s^{-1} at pH 3 and 6, respectively. Transient stabilized by the presence of sulfate ions, $K \sim 10^5$ L^2 mol^{-2} [81A285].	80A350
15.42.2	**Hydroxide ion**							
	$Ni(cyclam)^{3+} + OH^- \rightarrow Ni(cyclam\text{-}H)^{2+} + H_2O$	1.5×10^5	9-11	0.3		p.r.	D.k. in N_2O-satd. soln. contg. $Ni(aneN_4)(ClO_4)_2$.	81A285
15.43	**β-*rac*-(5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane)nickel(III) ion**							
15.43.1	**First-order reaction**							
	$\beta\text{-}Ni(aneN_4)^{3+} \rightarrow$	2.6×10^3 s^{-1}	3.2			p.r.	D.k. in N_2O-satd. soln. contg. 1×10^{-4} mol L^{-1} $\beta\text{-}Ni(aneN_4)(ClO_4)_2$ and 0.3 mol L^{-1} $NaClO_4$; reaction attributed to isomerization; a subsequent first-order process has $k \sim 0.04$ s^{-1} at pH 3.0-6.0 and is attributed to oxidation of the ligand by the tervalent nickel.	81A285
15.43.2	**Hydroxide ion**							
	$\beta\text{-}Ni(aneN_4)^{3+} + OH^- \rightarrow \beta\text{-}Ni(aneN_4\text{-}H)^{2+} + H_2O$	2.7×10^4	9-11	0.3		p.r.	D.k. in N_2O-satd. soln. contg. $Ni(aneN_4)(ClO_4)_2$.	81A285
15.44	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(III) ion**							
15.44.1	**Perhydroxyl**							
	$Ni(aneN_4)^{3+} + HO_2^{\bullet} \rightarrow O_2 + Ni(aneN_4)^{2+} + H^+$	1.0×10^5	2.0		22	p.r./f.p.	D.k.	79A038
15.44.2	**Superoxide radical anion**							
	$Ni(aneN_4)^{3+} + O_2^{\bullet -} \rightarrow O_2 + Ni(aneN_4)^{2+}$	2.1×10^9	6.2		22	p.r./f.p.	D.k.	79A038
15.44.3	**Iron(II) ion**							
	$Ni(aneN_4)^{3+} + Fe^{2+} \rightarrow Ni(aneN_4)^{2+} + Fe^{3+}$	4.2×10^4	1		22	p.r./f.p.	D.k.	79A038
15.44.4	**Hydroxide ion**							
	$Ni(aneN_4)^{3+} + OH^- \rightarrow Ni(aneN_4\text{-}H)^{2+} + H_2O$	2.2×10^4	9-11	0.3		p.r.	D.k. in N_2O-satd. soln. contg. $Ni(aneN_4)(ClO_4)_2$.	81A285
15.44.5	**Sulfate ion**							
	$Ni(aneN_4)^{3+} + SO_4^{2-} \rightarrow Ni(aneN_4)SO_4^+$	1.0×10^6	3.2-5.2	0.03	22	p.r.	P.b.k. at 320 nm in N_2O-satd. soln. contg. 3×10^{-5} to 0.01 mol L^{-1} SO_4^{2-} and $Ni(aneN_4)^{2+}$.	79A249
15.45	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanedi(phosphato)nickel(III) ion**							
15.45.1	**Ascorbate ion**							
	$Ni(aneN_4)(HPO_4)_2^- + AH^- \rightarrow$	2×10^5	7.0			p.r.	D.k. in air-satd. soln. contg. $Ni(aneN_4)^{2+}$, 0.005 mol L^{-1} formate ion and 0.02 mol L^{-1} HPO_4^{2-}.	90A422
15.46	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(III) ion**							
15.46.1	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(I) ion**							
	$Ni(4,11\text{-}dieneN_4)^{3+} + Ni(4,11\text{-}dieneN_4)^+ \rightarrow$	8×10^7	5	→0		p.r.	D.k. at 450 nm and 535 nm in soln. contg. 2×10^{-4} mol L^{-1} $Ni(4,11\text{-}dieneN_4)^{2+}$.	78A299

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.46	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(III) ion — Continued**							
15.46.2	**Perhydroxyl**							
	$Ni(4,11\text{-}dieneN_4)^{3+} + HO_2^{\bullet} \rightarrow Ni(4,11\text{-}dieneN_4)^{2+} + O_2 + H^+$	1.6×10^5	2.0		22	p.r./f.p.	D.k.	79A038
15.46.3	**Superoxide radical anion**							
	$Ni(4,11\text{-}dieneN_4)^{3+} + O_2^{\bullet -} \rightarrow Ni(4,11\text{-}dieneN_4)^{2+} + O_2$	1.6×10^9	6.2		22	p.r./f.p.	D.k.	79A038
15.46.4	**Iron(II) ion**							
	$Ni(4,11\text{-}dieneN_4)^{3+} + Fe^{2+} \rightarrow Ni(4,11\text{-}dieneN_4)^{2+} + Fe^{3+}$	2.1×10^4	1		22	p.r./f.p.	D.k.	79A038
		2×10^5				p.r.		78A299
15.46.5	**Hydrogen peroxide**							
	$Ni(4,11\text{-}dieneN_4)^{3+} + H_2O_2 \rightarrow$	2.3×10^3	1		22	p.r./f.p.		79A038
15.46.6	**Iodide ion**							
	$Ni(4,11\text{-}dieneN_4)^{3+} + I^- \rightarrow$	3×10^4				p.r.		78A299
15.46.7	**Hydroxide ion**							
	$Ni(4,11\text{-}dieneN_4)^{3+} + OH^- \rightarrow Ni(4,11\text{-}dieneN_4\text{-}H)^{2+} + H_2O$	1.2×10^3	9-11	0.3		p.r.	D.k. in N_2O-satd. soln. contg. $Ni(4,11\text{-}dieneN_4)(ClO_4)_2$.	81A285
15.47	**5,7,7,12,14,14-Hexamethyl-1,4,7,11-tetraazacyclotetradeca-4,11-diene(hydroxo)nickel(III) ion**							
15.47.1	**First-order reaction**							
	$Ni(4,11\text{-}dieneN_4)OH^+ \rightarrow$	~0.02 s^{-1} ~0.01 s^{-1}	3.5 4.9			p.r.	D.k. in N_2O-satd. soln. contg. (1-10) × 10^{-5} mol L^{-1} $Ni(4,11\text{-}dieneN_4)^{2+}$; uncertain whether first- or second-order.	79A002
15.48	**Bromo(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)nickel(III) ion**							
15.48.1	**Water**							
	$Ni(4,11\text{-}dieneN_4)Br^{2+} + H_2O \rightarrow Ni(4,11\text{-}dieneN_4)(H_2O)^{3+} + Br^-$	120 s^{-1}	3.0			p.r.	D.k. in N_2O-satd. soln. contg. (1-10) × 10^{-5} mol L^{-1} $Ni(4,11\text{-}dieneN_4)^{2+}$ and 0.01-0.1 mol L^{-1} Br^-; k_r = 1300 L mol^{-1} s^{-1}; at pH 8.2, $k = 2.5 \times 10^5$ s^{-1}; pK_a of $Ni(4,11\text{-}dieneN_4)(H_2O)^{3+}$ = 3.45.	79A002
15.48.2	**Bromide ion**							
	$Ni(4,11\text{-}dieneN_4)Br^{2+} + Br^- \rightarrow Ni(4,11\text{-}dieneN_4)^{2+} + Br_2^{\bullet -}$	~40	3.0			p.r.	D.k. in N_2O-satd. soln. contg. (1-10) × 10^{-5} mol L^{-1} $Ni(4,11\text{-}dieneN_4)^{2+}$ and 0.01-0.1 mol L^{-1} Br^-; $k_r = 9 \times 10^9$ L mol^{-1} s^{-1}.	79A002
15.49	**Dichloro(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)nickel(III) ion**							
15.49.1	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanesilver(II) ion**							
	$Ni(4,11\text{-}dieneN_4)Cl_2^+ + Ag(aneN_4)^{2+} \rightarrow Ni(4,11\text{-}dieneN_4)Cl_2 + Ag(aneN_4)^{3+}$	4.8×10^8	4	0.1		p.r.	D.k. or p.h.k. in N_2O-satd. soln.	88A334
15.50	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-1,4,8,11-tetraenenickel(III) ion**							
15.50.1	**Perhydroxyl**							
	$Ni(tetraeneN_4)^{3+} + HO_2^{\bullet} \rightarrow Ni(tetraeneN_4)^{2+} + O_2 + H^+$	8.5×10^5	2.0			p.r./f.p.	D.k.	79A038
15.50.2	**Superoxide radical anion**							
	$Ni(tetraeneN_4)^{3+} + O_2^{\bullet -} \rightarrow Ni(tetraeneN_4)^{2+} + O_2$	1.0×10^9	6.2			p.r./f.p.	D.k.	79A038
15.50.3	**Iron(II) ion**							
	$Ni(tetraeneN_4)^{3+} + Fe^{2+} \rightarrow Ni(tetraeneN_4)^{2+} + Fe^{3+}$	3.6×10^4	1		22	p.r./f.p.	D.k.	79A038

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.50	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-1,4,8,11-tetraenenickel(III) ion** — Continued							
15.50.4	**Hydrogen peroxide**							
	$Ni(tetraeneN_4)^{3+} + H_2O_2 \rightarrow$	3.3×10^3	1		22	p.r./f.p.	D.k.	79A038
15.50.5	**Manganese(II) ion**							
	$Ni(tetraeneN_4)^{3+} + Mn^{2+} \rightarrow Ni(tetraeneN_4)^{2+} + Mn^{3+}$	1.5×10^2	1		22	p.r./f.p.	D.k.	79A038
15.51	**1,4,8,12-Tetraazacyclopentadecanenickel(III) ion**							
15.51.1	**First-order reaction**							
	$Ni([15]aneN_4)^{3+} \rightarrow$	5.0×10^4 s^{-1}	3.3			p.r.	D.k. at 550 nm and p.b.k. at ~300 nm in N_2O-satd. soln. contg. (1-10) × 10^{-4} mol L^{-1} $Ni([15]aneN_4)^{2+}$ and perchlorate or sulfate ion; process suggested to represent configurational isomerization; followed by first-order reaction, k = 0.33 and 0.14 s^{-1} in the presence of perchlorate or sulfate ions, respectively.	86A470
15.52	**1,4,7,10,13-Pentaazacyclohexadecanenickel(III) ion**							
15.52.1	**1,4,7,10,13-Pentaazacyclohexadecanenickel(III) ion**							
	$Ni([16]aneN_5)^{3+} + Ni([16]aneN_5)^{3+} \rightarrow$	5.1×10^4	3.0-11.5			p.r.	D.k.; unclear whether k or $2k$. Reaction preceded by first-order decay, $k = 6 \times 10^3$ s^{-1}, suggested to represent intramolecular rearrangement.	83A32
15.52.2	**Iron(II) ion**							
	$Ni([16]aneN_5)^{3+} + Fe^{2+} \rightarrow$	$\leq 1 \times 10^3$	3.3			p.r.	No effect on d.k. by addn. of 1×10^{-4} mol L^{-1} $FeSO_4$.	83A32
15.52.3	**Oxygen**							
	$Ni([16]aneN_5)^{3+} + O_2 \rightarrow$	2×10^3	3.5			p.r.		83A32
15.53	**8-Methyl-8-nitro-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1^{13,15}]octadecanenickel(III) ion**							
15.53.1	**First-order reaction**							
	$Ni(MeNO_2[18]aneN_6)^{3+} \rightarrow$	8.1×10^3 s^{-1}			22	p.r.	D.k. at 545 nm in N_2O-satd. soln.	88A3
15.54	**8-Amino-8-methyl-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1^{13,15}]octadecanenickel(III) ion**							
15.54.1	**First-order reaction**							
	$Ni(MeNH_2[18]aneN_6)^{3+} \rightarrow$	1.5×10^3 s^{-1}			22	p.r.	D.k. at 545 nm in N_2O-satd. soln.	88A3
15.55	**3,7-Bis(2-aminoethyl)-1,3,5,7-tetraazabicyclo[3.3.1]nonanenickel(III) ion**							
15.55.1	**First-order reaction**							
	$NiL^{3+} \rightarrow$	3.5×10^3 s^{-1}			22	p.r.	D.k. at 530 nm in N_2O-satd. soln.	88A3
15.56	**Diaqua-α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion**							
15.56.1	**First-order reaction**							
	$Ni(Me_2pyo[14]aneN_4)(H_2O)_2^{3+} \rightarrow Ni(Me_2pyo[14]aneN_4)(H_2O)(OH)^{2+} + H^+$	~220 s^{-1}	4.5, 4.8			p.r.	Estd. from d.k. in N_2O-satd. soln. contg. $Ni(Me_2pyo[14]aneN_4)^{2+}$ and low [Br^-]; pK_a = 4. The product eliminates water to produce $Ni(Me_2pyo[14]aneN_4)(OH)^{2+}$.	81A

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.57	**Hydroxy-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion**							
15.57.1	**Hydroxide ion**							
	$Ni(Me_2pyo[14]aneN_4)(OH)^{2+} + OH^- \rightarrow Ni(Me_2pyo[14]aneN_4\text{-}H)(OH)^+ + H_2O$	1.4×10^7	8.5-10.5			p.r.	D.k. at 550 nm in N_2O-satd. soln. contg. 10^{-4} mol L^{-1} $Ni(Me_2pyo[14]aneN_4)^{2+}$ and 0.01 mol L^{-1} Br^-. Rate constant for deprotonation of ligand estimated to be 70 s^{-1} at pH ≤ 8; $k = 1.5 \times 10^7$ L mol^{-1} s^{-1} in N_2O-satd. soln. contg. SCN^- [82A106].	81A144
15.58	**Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion**							
15.58.1	**Hydroxide ion**							
	$Ni(Me_2pyo[14]aneN_4)(H_2O)Br^{2+} + OH^- \rightarrow Ni(Me_2pyo[14]aneN_4)(OH)^{2+} + Br^- + H_2O$	~6.1×10^9 ~5.2×10^9	5.5 8.7			p.r.	D.k. in unbuffered N_2O-satd. soln. contg. 10^{-4} mol L^{-1} $Ni(Me_2pyo[14]aneN_4)^{2+}$ and (5-25) × 10^{-3} mol L^{-1} Br^-. Reaction is faster in solution buffered at pH 5-9 with phosphate or tetraborate. Dependence on pH and [buffer] is complex.	81A144
15.58.2	**Water**							
	$Ni(Me_2pyo[14]aneN_4)(H_2O)Br^{2+} + H_2O \rightarrow Ni(Me_2pyo[14]aneN_4)(H_2O)_2^{3+} + Br^-$	7.2×10^2 s^{-1}	<4.0			p.r.	D.k. at 320 nm in N_2O-satd. soln. contg. $Ni(Me_2pyo[14]aneN_4)^{2+}$ and Br^-; $k_r = 2.6 \times 10^5$ L mol^{-1} s^{-1}.	81A144
15.59	**Aqua-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-triene(thiocyanato)nickel(III) ion**							
15.59.1	**Aqua-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-triene(thiocyanato)nickel(III) ion**							
	$Ni(Me_2pyo[14]aneN_4)(H_2O)SCN^{2+} + Ni(Me_2pyo[14]aneN_4)(H_2O)SCN^{2+} \rightarrow$	6.5×10^5	3.2			p.r.	D.k. in N_2O-satd. soln. contg. $Ni(Me_2pyo[14]aneN_4)^{2+}$ and SCN^-.	82A106
15.60	**α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene(hydroxo)nickel(III) ion**							
15.60.1	**Hydroxide ion**							
	$Ni(Me_2pyo[14]trieneN_4)(OH)^{2+} + OH^- \rightarrow Ni(Me_2pyo[14]trieneN_4\text{-}H)(OH)^+ + H_2O$	2.5×10^6	alk.			p.r.	D.k. in N_2O-satd. soln. contg. $Ni(Me_2pyo[14]trieneN_4)^{2+}$ and SCN^-.	82A106
15.61	**α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenebis(hydroxo)nickel(III) ion**							
15.61.1	**Hydroxide ion**							
	$Ni(Me_2pyo[14]trieneN_4)(OH)_2^+ + OH^- \rightarrow Ni(Me_2pyo[14]trieneN_4\text{-}H)(OH)_2 + H_2O$	1.0×10^5	alk.			p.r.	D.k. in N_2O-satd. soln. contg. $Ni(Me_2pyo[14]trieneN_4)^{2+}$ and SCN^-.	82A106
15.62	**Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenenickel(III) ion**							
15.62.1	**Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenenickel(III) ion**							
	$Ni(Me_2pyo[14]trieneN_4)Br^{2+} + Ni(Me_2pyo[14]trieneN_4)Br^{2+} \rightarrow$	1.1×10^7	3.2			p.r.	D.k. in N_2O-satd. soln. contg. $Ni(Me_2pyo[14]trieneN_4)^{2+}$ and Br^-.	82A106
15.63	**Aqua-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene(thiocyanato)nickel(III) ion**							
15.63.1	**Aqua-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene(thiocyanato)nickel(III) ion**							
	$Ni(Me_2pyo[14]trieneN_4)(H_2O)SCN^{2+} + Ni(Me_2pyo[14]trieneN_4)(H_2O)SCN^{2+} \rightarrow$	5.0×10^7	3.2			p.r.	D.k. in N_2O-satd. soln. contg. $Ni(Me_2pyo[14]trieneN_4)^{2+}$ and SCN^-.	82A106
15.63.2	**Thiocyanate ion**							
	$Ni(Me_2pyo[14]trieneN_4)(H_2O)SCN^{2+} + SCN^- \rightarrow H_2O + Ni(Me_2pyo[14]trieneN_4)(SCN)_2^+$	1.0×10^6	3.2			p.r.	D.k. in N_2O-satd. soln. contg. $Ni(Me_2pyo[14]trieneN_4)^{2+}$ and SCN^-; $k_r = 3 \times 10^3$ s^{-1}.	82A106

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.64	**α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenebis(thiocyanato)nickel(III) ion**							
15.64.1	**α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenebis(thiocyanato)nickel(III) ion**							
	$Ni(Me_2pyo[14]trieneN_4)(SCN)_2^+ + Ni(Me_2pyo[14]trieneN_4)(SCN)_2^+ \rightarrow$	1.6×10^8	3.2			p.r.	D.k. in N_2O-satd. soln. contg. $Ni(Me_2pyo[14]trieneN_4)^{2+}$ and SCN^-.	82A106
15.65	**Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenickel(III) ion**							
15.65.1	**Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenickel(III) ion**							
	$Ni(Me_2pyo[14]hexaeneN_4)(H_2O)Br^{2+} + Ni(Me_2pyo[14]hexaeneN_4)(H_2O)Br^{2+} \rightarrow$	6.9×10^7	3.2			p.r.	D.k. in N_2O-satd. soln. contg. $Ni(Me_2pyo[14]hexaeneN_4)^{2+}$ and Br^-.	82A106
15.65.2	**Hydroxide ion**							
	$Ni(Me_2pyo[14]hexaeneN_4)(H_2O)Br^{2+} + OH^- \rightarrow Br^- + Ni(Me_2pyo[14]hexaeneN_4)(H_2O)OH^{2+}$	$\sim 4.7 \times 10^9$				p.r.	D.k. in N_2O-satd. soln. contg. $Ni(Me_2pyo[14]hexaeneN_4)^{2+}$ and Br^-; $k_r = \sim 6.9 \times 10^5$ L mol^{-1} s^{-1}.	82A106
15.65.3	**Bromide ion**							
	$Ni(Me_2pyo[14]hexaeneN_4)(H_2O)Br^{2+} + Br^- \rightarrow H_2O + Ni(Me_2pyo[14]hexaeneN_4)Br_2^+$	$\sim 8.0 \times 10^5$				p.r.	D.k. in N_2O-satd. soln. contg. $Ni(Me_2pyo[14]hexaeneN_4)^{2+}$ and Br^-; $k_r = \sim 6 \times 10^3$ s^{-1}.	82A106
15.66	**Dibromo-α,2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenickel(III) ion**							
15.66.1	**Dibromo-α,2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenickel(III) ion**							
	$Ni(Me_2pyo[14]hexaeneN_4)Br_2^+ + Ni(Me_2pyo[14]hexaeneN_4)Br_2^+ \rightarrow$	2.8×10^8	3.2			p.r.	D.k. in N_2O-satd. soln. contg. $Ni(Me_2pyo[14]hexaeneN_4)^{2+}$ and Br^-.	82A106
15.67	**Aqua-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaene(thiocyanato)nickel(III) ion**							
15.67.1	**Thiocyanate ion**							
	$Ni(Me_2pyo[14]hexaeneN_4)(H_2O)SCN^{2+} + SCN^- \rightarrow H_2O + Ni(Me_2pyo[14]hexaeneN_4)(SCN)_2^+$	6.0×10^6	3.2,7			p.r.	D.k. in N_2O-satd. soln. contg. $Ni(Me_2pyo[14]hexaeneN_4)^{2+}$ and SCN^-.	82A106
15.68	**α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenebis(thiocyanato)nickel(III) ion**							
15.68.1	**α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenebis(thiocyanato)nickel(III) ion**							
	$Ni(Me_2pyo[14]hexaeneN_4)(SCN)_2^+ + Ni(Me_2pyo[14]hexaeneN_4)(SCN)_2^+ \rightarrow$	3.7×10^8	3.2			p.r.	D.k. in N_2O-satd. soln. contg. $Ni(Me_2pyo[14]hexaeneN_4)^{2+}$ and SCN^-.	82A106
15.69	**Bromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenickel(III) ion**							
15.69.1	**Dibromine radical ion**							
	$Ni(Me_2pyo[14]hexaeneN_4)Br^{2+} + Br_2^{\bullet -} \rightarrow Ni(Me_2pyo[14]hexaeneN_4)^{2+} + Br_2 + Br^-$	1.0×10^{10}	3.2			p.r.	Calcd. from d.k. at 360 nm in soln. contg. 4.6×10^{-6} mol L^{-1} $Ni(Me_2pyo[14]hexaeneN_4)^{2+}$ and 0.001 mol L^{-1} Br^- assuming $2k(Br_2^{\bullet -} + Br_2^{\bullet -}) = 4.5 \times 10^9$, $k(Br_2^{\bullet -} + Ni(Me_2pyo[14]hexaeneN_4)^{2+}) = 1.1 \times 10^{10}$ L mol^{-1} s^{-1}.	82A087
15.70	**Ethylenediaminetetraacetatonickelate(III) ion**							
15.70.1	**Water**							
	$NiEDTA^- + H_2O \rightarrow NiEDTA(H_2O)^-$	1.1×10^3 s^{-1}	11.4	0.2		f.p./pi	D.k. at 300 nm in N_2O-satd. soln. contg. $NiEDTA^{2-}$ and Na_2CO_3; $k = 2 \times 10^3$ s^{-1} associated with similar spectral changes observed for the product of reaction of $NiEDTA^{2-}$ with OH [751135].	91A292

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
15.70	**Ethylenediaminetetraacetatonickelate(III) ion** — Continued							
15.70.2	**Carbonate ion**							
	$NiEDTA^- + CO_3^{2-} \rightarrow NiEDTA^{2-} + CO_3^{\cdot -}$	8.8×10^4	11.4	0.2		f.p./pi	D.k. at 600 nm in N_2O-satd. soln. contg. $NiEDTA^{2-}$ and Na_2CO_3; $k_r = 4.5 \times 10^7$ L mol^{-1} s^{-1}.	91A292
15.71	**Hydroxy(ethylenediaminetetraacetato)nickelate(III) ion**							
15.71.1	**First-order reaction**							
	$NiEDTA(OH)^{2-} \rightarrow Ni(EDTA\text{-}H)^{2-} + H_2O$	1.4×10^2 s^{-1}	11.4-13			f.p./pi		91A292
15.72	**Aqua(ethylenediaminetetraacetato)nickelate(III) ion**							
15.72.1	**Iodide ion**							
	$NiEDTA(H_2O)^- + I^- \rightarrow$	* 5.5×10^5	11.4	0.2		f.p./pi	D.k. at 300 nm in N_2O-satd. soln. contg. $NiEDTA^{2-}$ and Na_2CO_3.	91A292
		* 1.3×10^3	4-9			p.r.	D.k. at 300 nm in N_2O-satd. soln. contg. $NiEDTA^{2-}$ and I^-.	751135
							* Unexplained discrepancy in these data.	
15.72.2	**Oxygen**							
	$NiEDTA(H_2O)^- + O_2 \rightarrow$	6.5×10^2				p.r.	D.k. at 300 nm in N_2O-satd. soln. contg. $NiEDTA^{2-}$ and O_2.	751135
15.73	**Dioxonickel(IV) ion**							
15.73.1	**First-order reaction**							
	$NiO_2^+ \rightarrow Ni^{2+} + O_2^{\cdot -}$	780 s^{-1}	5.7		25	p.r.	Estd. from p.b.k. (nitroform anion) in soln. contg. (5-100) $\times 10^{-3}$ mol L^{-1} Ni^{2+}, (31.8-106.4) $\times 10^{-6}$ mol L^{-1} tetranitromethane, 1 mol L^{-1} *tert*-BuOH and (2.6 or 13) $\times 10^{-4}$ mol L^{-1} O_2.	761134
15.74	**Dioxonickel(IV) ion, protonated**							
15.74.1	**First-order reaction**							
	$NiO_2H^{2+} \rightarrow Ni^{2+} + HO_2^{\cdot}$	≥ 2800 s^{-1}	3.0		25	p.r.	Estd. from p.b.k. (nitroform anion) in soln. contg. (5-100) $\times 10^{-3}$ mol L^{-1} Ni^{2+}, (31.8-106.4) $\times 10^{-6}$ mol L^{-1} tetranitromethane, 1 mol L^{-1} *tert*-BuOH and (2.6 or 13) $\times 10^{-4}$ mol L^{-1} O_2; $pK_a = 3.2$.	761134

TABLE 16. Rate constants for osmium transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
16.1	**Tris(2,2'-bipyridine)osmium(III) ion**							
16.1.1	**Iron(II) ion**							
	$Os(bpy)_3^{3+} + Fe^{2+} \rightarrow Os(bpy)_3^{2+} + Fe^{3+}$	1.4×10^4	~0		20	f.p./oq	Calcd. from current-time curve; soln. contg. 0.5 mol L^{-1} H_2SO_4, 3×10^{-4} mol L^{-1} $Os(bpy)_3^{2+}$ and $[Fe^{2+}] = [Fe^{3+}]$ (OQ).	80E224
16.2	**Tris(5,5'-dimethyl-2,2'-bipyridine)osmium(III) ion**							
16.2.1	**Iron(II) ion**							
	$Os(5,5'\text{-}Me_2bpy)_3^{3+} + Fe^{2+} \rightarrow Os(5,5'\text{-}Me_2bpy)_3^{2+} + Fe^{3+}$	1.0×10^3	~0		20	f.p./oq	Calcd. from current-time curve; soln. contg. 0.5 mol L^{-1} H_2SO_4, 3×10^{-4} mol L^{-1} $Os(5,5'\text{-}Me_2bpy)_3^{2+}$ and $[Fe^{2+}] = [Fe^{3+}]$ (OQ).	80E224
16.3	**Tris(1,10-phenanthroline)osmium(III) ion**							
16.3.1	**Iron(II) ion**							
	$Os(phen)_3^{3+} + Fe^{2+} \rightarrow Os(phen)_3^{2+} + Fe^{3+}$	1.1×10^4	~0		20	f.p./oq	Calcd. from current-time curve; soln. contg. 0.5 mol L^{-1} H_2SO_4, 1.5×10^{-4} mol L^{-1} $Os(phen)_3^{2+}$ and $[Fe^{2+}] = [Fe^{3+}]$ (OQ).	80E224
16.4	**Tris(5-chloro-1,10-phenanthroline)osmium(III) ion**							
16.4.1	**Iron(II) ion**							
	$Os(5\text{-}Clphen)_3^{3+} + Fe^{2+} \rightarrow Os(5\text{-}Clphen)_3^{2+} + Fe^{3+}$	7.0×10^4	~0		20	f.p./oq	Calcd. from current-time curve; soln. contg. 0.5 mol L^{-1} H_2SO_4, 2×10^{-4} mol L^{-1} $Os(5\text{-}Clphen)_3^{2+}$ and $[Fe^{2+}] = [Fe^{3+}]$ (OQ).	80E224

TABLE 17. Rate constants for lead transients

No. Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
17.1 Lead atom							
17.1.1 Lead atom							
$Pb^0 + Pb^0 \rightarrow Pb_2$	7.5×10^8	5.4			p.r.	D.k. at 300 nm and 660 nm in Ar-satd. soln. contg. 2×10^{-4} mol L^{-1} $Pb(ClO_4)_2$ and 2×10^{-3} mol L^{-1} formate. Species could be Pb_2^{2+}.	92A206
17.1.2 Silver(I) ion							
$Pb^0 + Ag^+ \rightarrow PbAg^+$	8.2×10^8	4			p.r.	D.k. at 660 nm in soln. contg. 1×10^{-4} mol L^{-1} Pb^{2+}, 0.01 mol L^{-1} formate and varied [Ag^+]. Value obtained from computer fit.	92A348
17.2 Lead(I) ion							
17.2.1 Lead(I) ion							
$Pb^+ + Pb^+ \rightarrow Pb^0 + Pb^{2+}$	4.1×10^9	5.4			p.r.	P.b.k. at 660 nm in Ar-satd. soln. contg. 1×10^{-4} to 0.5 mol L^{-1} $Pb(ClO_4)_2$ and 2×10^{-3} mol L^{-1} formate; p.b.k. at 300 nm gave $k = 2.8 \times 10^9$ L mol^{-1} s^{-1}.	92A206
17.2.2 Oxygen							
$Pb^+ + O_2 \rightarrow Pb^{2+} + O_2^{\bullet -}$	3.9×10^9				p.r.	D.k. in soln. contg. Pb^{2+}.	66A001
17.2.3 1,4-Benzoquinone							
$Pb^+ + Q \rightarrow Pb^{2+} + Q^{\bullet -}$	4.1×10^9	6.3		25	p.r.	P.b.k. at 430 nm in soln. contg. Pb(II) acetate and 1 mol L^{-1} *tert*-BuOH. Pb^+ may be complexed to acetate.	761134
17.2.4 2-Methyl-1,4-naphthoquinone							
$Pb^+ + 2\text{-}CH_3NQ \rightarrow Pb^{2+} + [2\text{-}CH_3NQ]^{\bullet -}$	3.7×10^9	7			p.r.	P.b.k. in soln. contg. 5×10^{-3} mol L^{-1} $Pb(ClO_4)_2$, 5×10^{-5} mol L^{-1} 2-CH_3-NQ and 1 mol L^{-1} *tert*-BuOH.	751032 731047
17.3 Lead(I)							
17.3.1 Hexaamminecobalt(III) ion							
$Pb(I) + Co(NH_3)_6^{3+} \rightarrow Pb(II) + Co(NH_3)_6^{2+}$	5.6×10^7		0.06	29	p.r.	D.k. at 315 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $PbCl_2$, 0.001 mol L^{-1} MeOH and 1.5×10^{-4} mol L^{-1} $Co(NH_3)_6^{3+}$.	78A206
17.3.2 Pentaammine(aqua)cobalt(III) ion							
$Pb(I) + Co(NH_3)_5(H_2O)^{3+} \rightarrow Pb(II) + Co(NH_3)_5(H_2O)^{2+}$	2.3×10^8		0.06	29	p.r.	D.k. at 315 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $PbCl_2$, 0.001 mol L^{-1} MeOH and 1.5×10^{-4} mol L^{-1} $Co(NH_3)_5(H_2O)^{3+}$.	78A206
17.3.3 Pentaammine(chloro)cobalt(III) ion							
$Pb(I) + Co(NH_3)_5Cl^{2+} \rightarrow Pb(II) + Co(NH_3)_5Cl^+$	2.6×10^8		0.06	29	p.r.	D.k. at 315 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $PbCl_2$, 0.001 mol L^{-1} MeOH and 1.5×10^{-4} mol L^{-1} $Co(NH_3)_5Cl^{2+}$.	78A206
17.3.4 Pentaammine(bromo)cobalt(III) ion							
$Pb(I) + Co(NH_3)_5Br^{2+} \rightarrow Pb(II) + Co(NH_3)_5Br^+$	4.8×10^8		0.06	29	p.r.	D.k. at 315 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $PbCl_2$, 0.001 mol L^{-1} MeOH and 1.5×10^{-4} mol L^{-1} $Co(NH_3)_5Br^{2+}$.	78A206
17.3.5 Tetraamminediaquacobalt(III) ion							
$Pb(I) + Co(NH_3)_4(H_2O)_2^{3+} \rightarrow Pb(II) + Co(NH_3)_4(H_2O)_2^{2+}$	3.0×10^8		0.06	29	p.r.	D.k. at 315 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $PbCl_2$, 0.001 mol L^{-1} MeOH and 1.5×10^{-4} mol L^{-1} $Co(NH_3)_4(H_2O)_2^{3+}$.	78A206

TABLE 17. Rate constants for lead transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
17.3	**Lead(I)** — Continued							
17.3.6	**Trinitrotrisamminecobalt(III)**							
	$Pb(I) + Co(NH_3)_3(NO_2)_3 \rightarrow Pb(II) + Co(NH_3)_3(NO_2)_3^-$	2.0×10^9		0.06	29	p.r.	D.k. at 315 and 275 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $PbCl_2$, 0.001 mol L^{-1} MeOH and 1.5×10^{-4} mol L^{-1} $Co(NH_3)_3(NO_3)_3$.	78A206
17.3.7	**Tris(ethylenediamine)cobalt(III) ion**							
	$Pb(I) + Co(en)_3^{3+} \rightarrow Pb(II) + Co(en)_3^{2+}$	7.9×10^7		0.06	29	p.r.	D.k. at 315 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $PbCl_2$, 0.001 mol L^{-1} MeOH and 1.5×10^{-4} mol L^{-1} $Co(en)_3^{3+}$.	78A206
17.3.8	**Trioxalatocobaltate(III) ion**							
	$Pb(I) + Co(C_2O_4)_3^{3-} \rightarrow Pb(II) + Co(C_2O_4)_3^{4-}$	6.0×10^8		0.06	29	p.r.	D.k. at 315 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} $PbCl_2$, 0.001 mol L^{-1} MeOH and 1.5×10^{-4} mol L^{-1} $Co(C_2O_4)_3^{3-}$.	78A206
17.4	**Tetrakis(1-methylpyridinium-4-yl)porphinatolead(II) radical cation**							
17.4.1	**Tetrakis(1-methylpyridinium-4-yl)porphinatolead(II) radical cation**							
	$[PbTMpyP]^{\cdot 5+} + [PbTMpyP]^{\cdot 5+} \rightarrow PbTMpyP^{4+} + PbTMpyP^{6+}$	5.4×10^7	9			p.r.	D.k. at 750 nm and p.b.k. at 425 nm in N_2O-satd. soln. contg. $PbTMpyP^{4+}$ and 0.01 mol L^{-1} KBr; unclear whether k or $2k$. $PbTMpyP^{6+}$ represents a Pb(IV) species; subsequent decay of the Pb(IV) species occurs with $k = 0.93$ and 2 s^{-1} at pH 9 and 12, respectively.	86A241
17.5	**Tetrakis(1-methylpyridinium-3-yl)porphinatolead(II) radical cation**							
17.5.1	**Tetrakis(1-methylpyridinium-3-yl)porphinatolead(II) radical cation**							
	$[Pb(3\text{-}TMpyP)]^{\cdot 5+} + [Pb(3\text{-}TMpyP)]^{\cdot 5+} \rightarrow Pb(3\text{-}TMpyP)^{4+} + Pb(3\text{-}TMpyP)^{6+}$	7.4×10^7	9			p.r.	D.k. at 750 nm and p.b.k. at 425 nm in N_2O-satd. soln. contg. $Pb(3\text{-}TMpyP)^{4+}$ and 0.01 mol L^{-1} KBr; unclear whether k or $2k$. $Pb(3\text{-}TMpyP)^{6+}$ represents a Pb(IV) species; subsequent decay of the Pb(IV) species occurs with $k = 0.93$ and 2 s^{-1} at pH 9 and 12, respectively.	86A241
17.6	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoplumbate(II) radical cation**							
17.6.1	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoplumbate(II) radical cation**							
	$[PbTPPS]^{\cdot 3-} + [PbTPPS]^{\cdot 3-} \rightarrow$	1.6×10^7	7			p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. 0.01 mol L^{-1} KBr.	86S115
17.7	**Lead(III)**							
17.7.1	**Lead(III)**							
	$Pb(III) + Pb(III) \rightarrow Pb(II) + Pb(IV)$	4.8×10^8	<0			p.r.	D.k. in soln. contg. 11 mol L^{-1} HCl and Pb(II) and Pb(IV).	84A446
17.8	**Dihydroxylead(III) ion**							
17.8.1	**Dihydroxylead(III) ion**							
	$Pb(OH)_2^+ + Pb(OH)_2^+ \rightarrow Pb(OH)^+ + Pb(OH)_3^+$	3.5×10^9	5-7			p.r.	D.k. in N_2O-satd. soln. contg. $Pb(ClO_4)_2$.	90A095
17.9	**Tetrahydroxyplumbate(III) ion**							
17.9.1	**Tetrahydroxyplumbate(III) ion**							
	$Pb(OH)_4^- + Pb(OH)_4^- \rightarrow Pb(OH)_3^- + PbO(OH)^+ + H_2O + 2\ OH^-$	2.1×10^9	11.4			p.r.	D.k. at 280 nm and condy. change in N_2O-satd. soln. contg. $Pb(OH)_3^-$.	90A095

TABLE 17. Rate constants for lead transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
17.9	**Tetrahydroxyplumbate(III) ion** — Continued							
17.9.2	**2-Methyl-2-propanol**							
	$Pb(OH)_4^- + tert\text{-}BuOH \rightarrow$	5.0×10^5	13			p.r.	D.k. at 280 nm in Ar-satd. soln. contg. $Pb(OH)_6^{2-}$ and 0.02-0.1 mol L^{-1} *tert*-BuOH.	90A095
17.9.3	**2-Propanol**							
	$Pb(OH)_4^- + 2\text{-PrOH} + OH^- \rightarrow Pb(OH)_3^- + (CH_3)_2\dot{C}O^- + 2\,H_2O$	1.2×10^4	13			γ-r.	Estd. from yield of $Pb(OH)_3^-$ formed by a chain reaction in soln. contg. 2.2×10^{-4} mol L^{-1} $Pb(OH)_6^{2-}$ and 0.1 mol L^{-1} 2-PrOH.	90A095
17.10	**Hydroxy(oxo)lead(IV) ion**							
17.10.1	**Hydroxide ion**							
	$PbO(OH)^+ + OH^- \rightarrow PbO(OH)_2$	6×10^5	11.4			p.r.	Condy. change in N_2O-satd. soln. contg. 5×10^{-4} mol L^{-1} $Pb(OH)_3^-$; $k = 5 \times 10^6$ L mol^{-1} s^{-1} was derived for subsequent dimerization of the product.	90A095

TABLE 18. Rate constants for palladium transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
18.1	**Palladium(I) ion**							
18.1.1	**Palladium(III) ion**							
	$Pd^{+} + Pd^{3+} \rightarrow 2\ Pd^{2+}$	1×10^{9}	0			p.r.	D.k. at 250 nm and 290 nm in Ar-satd. soln. contg. 1 mol L^{-1} $HClO_4$ and (5-10) $\times 10^{-5}$ mol L^{-1} $Pd(ClO_4)_2$. In N_2O-satd. soln. a slower reaction was also observed, $k \sim 4 \times 10^{7}$ L mol^{-1} s^{-1}, suggested to represent $Pd^{3+} + Pd^{3+}$ and/or $Pd^{3+} + H_2O_2$.	94A210
18.2	**Bis(hydroxyprolinato)palladate(I) ion**							
18.2.1	**Bis(hydroxyprolinato)palladate(I) ion**							
	$Pd(HypO)_2^{-} + Pd(HypO)_2^{-} \rightarrow$	1.4×10^{8}	6.0			p.r.	D.k. at 260 nm in N_2-satd. soln. contg. 0.5 mol L^{-1} *tert*-BuOH and $Pd(HypO)_2$. Unclear whether k or $2k$.	93A224
18.3	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatopalladate(II) radical anion**							
18.3.1	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatopalladate(II) radical anion**							
	$[PdTPPS]^{\cdot 5-} + [PdTPPS]^{\cdot 5-} \rightarrow$	2.4×10^{7} 1.3×10^{8}	6.8 12			p.r.	D.k. in N_2-satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and $PdTPPS^{4-}$. Reaction suggested to be disproportionation, ΔG = 31 kJ mol^{-1}.	83C026

TABLE 19. Rate constants for platinum transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
19.1	**Triammineaquaplatinum(I) ion**							
19.1.1	**Water**							
	$Pt(NH_3)_3(H_2O)^+ + H_2O \rightarrow Pt(NH_3)_2(H_2O)_2^+ + NH_3$	4.2×10^4 s^{-1}	4.1-7		~23	p.r.	D.k. in soln. contg. $Pt(NH_3)_4^{2+}$ and alcohol; average of two values obtained from optical and conductivity measurements. Reaction preceded by rapid release of NH_3.	81A353
		1.2×10^4 s^{-1}	11.4		~23	p.r.	D.k. in soln. contg. $Pt(NH_3)_4^{2+}$ and 2.0 mol L^{-1} 2-PrOH; condy. decrease gave $k = 1.2 \times 10^4$ s^{-1}; implies pK_a of product ~11.	81A353
19.2	***cis*-Diamminedichloroplatinate(I) ion**							
19.2.1	**Water**							
	cis-$Pt(NH_3)_2Cl_2^- + H_2O \rightarrow$ *cis*-$Pt(NH_3)_2Cl(H_2O) + Cl^-$	1.3×10^6 s^{-1}	6-8			p.r.	P.b.k. at 390 nm in deaerated soln. contg. (0.25-1) × 10^{-3} mol L^{-1} *cis*-$Pt(NH_3)_2Cl_2$, 0.1 mol L^{-1} NaCl and 1.0 mol L^{-1} *tert*-BuOH; for loss of second Cl^-, $k = 380$ s^{-1}; subsequent second-order decay ($k = 5.5 \times 10^7$ L mol^{-1} s^{-1}) may represent disproportionation of product.	85A090
19.3	***trans*-Diamminedichloroplatinate(I) ion**							
19.3.1	**Water**							
	trans-$Pt(NH_3)_2Cl_2^- + H_2O \rightarrow$ *trans*-$Pt(NH_3)_2Cl(H_2O) + Cl^-$	3.1×10^4 s^{-1}				p.r.	P.b.k. at 390 nm in deaerated soln. contg. *trans*-$Pt(NH_3)_2Cl_2$, 0.1 mol L^{-1} NaCl and 1.0 mol L^{-1} *tert*-BuOH; for loss of second Cl^-, $k = 870$ s^{-1}.	85A090
19.4	**Tetrabromoplatinate(I) ion**							
19.4.1	**First-order reaction**							
	$PtBr_4^{3-} \rightarrow$	3.2×10^3 s^{-1}	2			p.r.	D.k. at 320 nm in Ar-satd. soln. contg. 0.01 mol L^{-1} $HClO_4$, *tert*-BuOH and $PtBr_4^{2-}$.	92A259
19.5	**Tetrachloroplatinate(I) ion**							
19.5.1	**Tetrachloroplatinate(I) ion**							
	$PtCl_4^{3-} + PtCl_4^{3-} \rightarrow$	2.1×10^9				p.r.	D.k. at 310 nm in deaerated soln. contg. (0.25-1.0) × 10^{-4} mol L^{-1} $PtCl_4^{2-}$ and 0.002 mol L^{-1} MeOH; $k = 1.6 \times 10^9$ L mol^{-1} s^{-1} in the presence of 0.1 mol L^{-1} KCl and 0.002 mol L^{-1} MeOH; $k = \sim 1.3 \times 10^9$ L mol^{-1} s^{-1} in the presence of 0.005 mol L^{-1} H_2SO_4 and 0.001 mol L^{-1} MeOH.	690144
19.6	**Tetracyanoplatinate(I) ion**							
19.6.1	**Nitrous oxide**							
	$Pt(CN)_4^{3-} + N_2O \rightarrow$	1.8×10^7				p.r.	D.k. at 360 nm in soln. contg. 5×10^{-4} mol L^{-1} $Pt(CN)_4^{2-}$, 0.001 mol L^{-1} NaOH, 0.01 mol L^{-1} MeOH and (1.2-2.4) × 10^{-4} mol L^{-1} N_2O.	690144
19.6.2	**Oxygen**							
	$Pt(CN)_4^{3-} + O_2 \rightarrow$	3.5×10^9				p.r.	D.k. at 360 nm in soln. contg. 5×10^{-4} mol L^{-1} $Pt(CN)_4^{2-}$, 0.001 mol L^{-1} NaOH, 0.01 mol L^{-1} MeOH and (9-18) × 10^{-6} mol L^{-1} O_2.	690144

TABLE 19. Rate constants for platinum transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
19.7	**Bis(ethylenediamine)platinum(I) ion**							
19.7.1	**Bis(ethylenediamine)platinum(I) ion**							
	$Pt(en)_2^+ + Pt(en)_2^+ \rightarrow$	4.5×10^8			~25	p.r.	D.k. at 300 nm in soln. contg. ~1.1×10^{-4} mol L^{-1} $Pt(en)_2^{2+}$ and 0.1-0.5 mol L^{-1} 2-PrOH or 1.24 mol L^{-1} MeOH; unclear whether k or $2k$.	751188
19.8	**Chloro(diethylenetriamine)platinum(I)**							
19.8.1	**First-order reaction**							
	$Pt(dien)Cl \rightarrow$	2.3×10^5 s^{-1}			~25	p.r.	D.k. at 260-400 nm in soln. contg. ~1.6 or ~2.3×10^{-4} mol L^{-1} $Pt(dien)Cl^+$ and 0.1-0.5 mol L^{-1} 2-PrOH or 1.24 mol L^{-1} MeOH; reaction may represent substitution of Cl^- by H_2O. Product disappears by second-order kinetics, $k = 2.3 \times 10^7$ L mol^{-1} s^{-1}; unclear whether k or $2k$.	751188
19.9	***cis*-Bis(glycinato)platinate(I) ion**							
19.9.1	***cis*-Bis(glycinato)platinate(I) ion**							
	cis-$Pt(Gly)_2^- +$ *cis*-$Pt(Gly)_2^- \rightarrow$	4.2×10^9			~25	p.r.	D.k. at 250-310 nm in deaerated soln. contg. 4.5×10^{-5} mol L^{-1} *cis*-$Pt(Gly)_2$ and 1.0 mol L^{-1} 2-PrOH; unclear whether k or $2k$.	771053
19.10	***trans*-Bis(glycinato)platinate(I) ion**							
19.10.1	***trans*-Bis(glycinato)platinate(I) ion**							
	trans-$Pt(Gly)_2^- +$ *trans*-$Pt(Gly)_2^- \rightarrow$	4.2×10^9			~25	p.r.	D.k. at 250-270 nm in deaerated soln. contg. 3.0 or 4.5×10^{-5} mol L^{-1} *trans*-$Pt(Gly)_2$ and 1.0 mol L^{-1} 2-PrOH; unclear whether k or $2k$.	771053
19.11	**Bis(ethylenediamine)platinum(II), H reaction product**							
19.11.1	***Bis(ethylenediamine)platinum(II), H reaction product***							
	$Pt(en)_2^{2+}/H + Pt(en)_2^{2+}/H \rightarrow$	1.4×10^8	2-3		~25	p.r.	D.k. at 420 nm in soln. contg. 4.1×10^{-4} mol L^{-1} $Pt(en)_2^{2+}$, 0.1-1 mol L^{-1} *tert*-BuOH and 0.001-0.01 mol L^{-1} $HClO_4$; unclear whether k or $2k$.	751188
19.12	**Chloro(diethylenetriamine)platinum(II), H reaction product**							
19.12.1	**Chloro(diethylenetriamine)platinum(II), H reaction product**							
	$Pt(dien)Cl^+/H + Pt(dien)Cl^+/H \rightarrow$	3.4×10^9	2-3		~25	p.r.	D.k. at 410 nm in soln. contg. 3.1 or 4.2×10^{-4} mol L^{-1} $Pt(dien)Cl^+$, 0.1-1 mol L^{-1} *tert*-BuOH and 0.001-0.01 mol L^{-1} $HClO_4$; unclear whether k or $2k$.	751188
19.13	**Chloro(tetraethyldiethylenetriamine)platinum(II), H reaction product**							
19.13.1	**Chloro(tetraethyldiethylenetriamine)platinum(II), H reaction product**							
	$Pt(Et_4dien)Cl^+/H + Pt(Et_4dien)Cl^+/H \rightarrow$	6.6×10^{10}	2-3			p.r.	D.k. at 290 nm in soln. contg. 1.0 and 1.9 $\times 10^{-4}$ mol L^{-1} $Pt(Et_4dien)Cl^+$, 0.1-1 mol L^{-1} *tert*-BuOH and 0.001-0.01 mol L^{-1} $HClO_4$; unclear whether k or $2k$.	751188

TABLE 19. Rate constants for platinum transients — Continued

No	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
19.14	***cis*-Bis(glycinato)platinum(II), H reaction product**							
19.14.1	**First-order reaction**							
	cis-Pt(Gly)$_2$/H →	7.3×10^3 s^{-1}	2		~25	p.r.	D.k. at 250-310 nm in deaerated soln. contg. ~1 × 10^{-4} mol L^{-1} *cis*-Pt(Gly)$_2$, 0.01 mol L^{-1} $HClO_4$ and 0.5 mol L^{-1} *tert*-BuOH.	771053
19.15	***trans*-Bis(glycinato)platinum(II), H reaction product**							
19.15.1	**First-order reaction**							
	trans-Pt(Gly)$_2$/H →	2.5×10^5 s^{-1}	2		~25	p.r.	P.b.k. at 320-370 nm in deaerated soln. contg. (1.5-10) × 10^{-5} mol L^{-1} *trans*-Pt(Gly)$_2$, 0.01 mol L^{-1} $HClO_4$ and 0.5 mol L^{-1} *tert*-BuOH. A subsequent first-order decay observed at 250-360 nm, k = 6.4×10^3 s^{-1}.	771053
19.16	**Octahydrogen tetrakis(μ-diphosphito)diplatinate(I)(II) ion**							
19.16.1	**First-order reaction**							
	$[Pt_2(P_2O_5H_2^{2-})_4]^{5-}$ →	2.9×10^4 s^{-1}	6.8			p.r.	D.k. at 420 nm in N_2-satd. soln. contg. 5 × 10^{-5} mol L^{-1} $Pt_2(P_2O_5H_2^{2-})_4^{4-}$, 1% *tert*-BuOH and 2 × 10^{-3} mol L^{-1} phosphate buffer.	84A241
19.17	**Tetraamminehydridoplatinum(III) ion**							
19.17.1	**First-order reaction**							
	$Pt(NH_3)_4(H)^{2+}$ →	2.2×10^4 s^{-1}	1.1-2.9		~23	p.r.	D.k. in soln. contg. (0.15-2.45) × 10^{-4} mol L^{-1} $Pt(NH_3)_4^{2+}$ and 0.1-2.0 mol L^{-1} *tert*-BuOH; no condy. change observed on the same time frame suggests reaction may represent rearrangement of the hydride.	81A353
		2.0×10^3 s^{-1}	1.1-2.9		~23	p.r.	Rearranged hydride; p.b.k. below 400 nm in soln. contg. *tert*-BuOH; average of two values obtained from optical and condy. measurements; reaction may represent loss of NH_3.	81A353
19.18	**Tetraammine(aqua)hydroxyplatinum(III) ion**							
19.18.1	**First-order reaction**							
	$Pt(NH_3)_4(H_2O)(OH)^{2+}$ →	1.3×10^5 s^{-1}	3.3-10.2		~23	p.r.	D.k. or p.b.k. at different wavelengths in N_2O-satd. soln. contg. $Pt(NH_3)_4^{2+}$. Average of two values obtained as intercepts from pH studies. Reaction may represent H_2O elimination to give $Pt(NH_3)_3(NH_2)^{2+}$ in competition with protonation or deprotonation of $Pt(NH_3)_4(H_2O)(OH)^{2+}$ to give $Pt(NH_3)_4(H_2O)_2^{3+}$ or $Pt(NH_3)_4(OH)_2^{+}$, respectively.	82A074
19.18.2	**Hydrogen ion**							
	$Pt(NH_3)_4(H_2O)(OH)^{2+} + H^+$ → $Pt(NH_3)_4(H_2O)_2^{3+}$	7.0×10^9	<5.6		~23	p.r.	P.b.k. at 340, 350 and 510-540 nm in N_2O-satd. soln. contg. ~6 × 10^{-4} mol L^{-1} $Pt(NH_3)_4^{2+}$ and varied [H^+]; reaction in competition with H_2O elimination to give $Pt(NH_3)_3(NH_2)^{2+}$; $k_r = 3 \times 10^3$ s^{-1}; pK_a of $Pt(NH_3)_4(H_2O)_2^{3+}$ = ~6.4, ~9.8.	82A074

TABLE 19. Rate constants for platinum transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
19.18	**Tetraammine(aqua)hydroxyplatinum(III) ion** — Continued							
19.18.3	**Hydroxide ion**							
	$Pt(NH_3)_4(H_2O)(OH)^{2+} + OH^- \rightarrow Pt(NH_3)_4(OH)_2^+ + H_2O$	8.3×10^9	7-9.6		~23	p.r.	D.k. at 270-290 nm, p.b.k. at 340-530 nm and decrease in condy. in N_2O-satd. soln. contg. 1.1 or 5.0×10^{-4} mol L^{-1} $Pt(NH_3)_4^{2+}$; effect of [OH^-]; reaction in competition with H_2O elimination to give $Pt(NH_3)_3(NH_2)^{2+}$; $k_r = 5 \times 10^5$ s^{-1}; pK_a of $Pt(NH_3)_4(H_2O)(OH)^{2+}$ = ~9.8.	82A074
19.19	**Tetraamminebis(hydroxy)platinum(III) ion**							
19.19.1	**First-order reaction**							
	$Pt(NH_3)_4(OH)_2^+ \rightarrow$	1.8×10^6 s^{-1}	8.7		~23	p.r.	Absorption and condy. change in soln. contg. *tert*-BuOH and *trans*-$Pt(NH_3)_4(OH)_2^{2+}$. Reaction may represent competition between NH_3 elimination and proton transfer from water to give $Pt(NH_3)_4(H_2O)_2^{3+}$.	82A074
19.20	**Tetraamminebis(aqua)platinum(III) ion**							
19.20.1	**Tetraamminebis(aqua)platinum(III) ion**							
	$Pt(NH_3)_4(H_2O)_2^{3+} + Pt(NH_3)_4(H_2O)_2^{3+} \rightarrow$	1.4×10^6	3.3		~23	p.r.	D.k. at 260 nm and increase in condy. in N_2O-satd. soln. contg. $Pt(NH_3)_4^{2+}$; pK_a of $Pt(NH_3)_4(H_2O)_2^{3+}$ = ~6.4, ~9.8.	82A074
19.20.2	**Chloride ion**							
	$Pt(NH_3)_4(H_2O)_2^{3+} + Cl^- \rightarrow Pt(NH_3)_4(H_2O)Cl^{2+} + H_2O$	1.9×10^9	3.35, 3.7		~23	p.r.	P.b.k. at 270 nm in N_2O-satd. soln. contg. $Pt(NH_3)_4^{2+}$ and 1 or 4×10^{-5} mol L^{-1} Cl^-; product decays by second-order kinetics with $k = 7.5 \times 10^6$ L mol^{-1} s^{-1}.	86A017
19.21	**Tetraammineplatinum(II), $Cl_2^{\cdot-}$ reaction product**							
19.21.1	**First-order reaction**							
	$Pt(NH_3)_4^{2+}/Cl_2^{\cdot-} \rightarrow$	7.6×10^3 s^{-1}	0.3			p.r.	D.k. at 270 nm in He-satd. soln. contg. 2×10^{-4} mol L^{-1} $Pt(NH_3)_4^{2+}$ and 0.5 mol L^{-1} HCl. Reaction may represent equilibration between $Pt(NH_3)_4Cl_2^+$ and $Pt(NH_3)_4(H_2O)Cl^{2+}$; a subsequent complex decay has been approximated to a second-order decay, $k \sim 1 \times 10^7$ L mol^{-} s^{-1} at 270 nm.	86A017
19.22	***cis*-Diamminedichloroplatinum(II), OH reaction product**							
19.22.1	**First-order reaction**							
	cis-$Pt(NH_3)_2Cl_2/OH \rightarrow$	3.4×10^4 s^{-1}				p.r.	D.k. in N_2O-satd. soln. contg. *cis*-$Pt(NH_3)_2Cl_2$; reaction may represent loss of one Cl^-; for loss of second Cl^-, $k = 370$ s^{-1}. Product decays by second-order kinetics, probably disproportionation, $k = 1.8 \times 10^7$ L mol^{-1} s^{-1}.	85A090
19.23	***trans*-Diamminedichloroplatinum(II), OH reaction product**							
19.23.1	**First-order reaction**							
	trans-$Pt(NH_3)_2Cl_2/OH \rightarrow$	6.3×10^4 s^{-1}				p.r.	D.k. in N_2O-satd. soln. contg. *trans*-$Pt(NH_3)_2Cl_2$; reaction may represent loss of one Cl^-; for loss of second Cl^-, $k = 810$ s^{-1}. Product decays by second-order kinetics, probably disproportionation, $k = 8 \times 10^7$ L mol^{-1} s^{-1}.	85A090

TABLE 19. Rate constants for platinum transients — Continued

No. Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
19.24 *cis*-Dichlorobis(isopropylamine)-*trans*-dihydroxyplatinate(III) ion							
19.24.1 First-order reaction							
cis-$PtCl_2(OH)_2(2\text{-}PrNH_2)_2^- \rightarrow$	6.0×10^6 s^{-1}				p.r.	P.b.k. at 390 nm in deaerated soln. contg. *cis*-$PtCl_2(OH)_2(2\text{-}PrNH_2)$ and 1.0 mol L^{-1} *tert*-BuOH; reaction may represent loss of one Cl^-; for loss of second Cl^-, $k = 1200$ s^{-1}. Product decays by second-order kinetics, probably disproportionation, $k = 6.5 \times 10^6$ L mol^{-1} s^{-1}.	85A090
19.25 Tetrachloroplatinate(II), $Cl_2^{\cdot-}$ reaction product							
19.25.1 First-order reaction							
$PtCl_4^{2-}/Cl_2^{\cdot-} \rightarrow$	3×10^5 s^{-1}	0.3		~25	p.r.	D.k. in soln. contg. $PtCl_4^{2-}$ and 0.5 mol L^{-1} HCl; reaction probably associated with change in number of chloride ligands and/or substitution of Cl^- by H_2O; followed by second-order reaction, $k = \sim 1 \times 10^9$ L mol^{-1} s^{-1}.	751188
19.25.2 Copper(II) ions							
$PtCl_4^{2-}/Cl_2^{\cdot-}$ + Cu(II) $\rightarrow$	1.5×10^8	0.3	0.5	~25	p.r.	D.k. in soln. contg. (1-2) $\times 10^{-4}$ mol L^{-1} $PtCl_4^{2-}$, 0.5 mol L^{-1} HCl and (0.5-1.2) $\times 10^{-4}$ mol L^{-1} $CuCl_2$.	751188
19.26 Hexachloroplatinate(III) ion							
19.26.1 Water							
$PtCl_6^{3-} + 2\ H_2O \rightarrow PtCl_4(H_2O)(OH)^{2-} + H^+ + 2\ Cl^-$	* 4.8×10^5 s^{-1}	4.4, 5.1		20-28	p.r.	D.k. at 279-309 nm and p.b.k. at 435-450 nm in Ar-satd. soln. contg. 0.11 or 0.51 mol L^{-1} *tert*-BuOH and 1 or 3.8×10^{-4} mol L^{-1} $PtCl_6^{2-}$; condy. increase gave $k = 4.2 \times 10^5$ s^{-1}; pK_a of $PtCl_4(H_2O)_2^-$ = 3.5 [87A472].	89A203
	* 1.1×10^5 s^{-1}	5-9		~20	p.r.	P.b.k. at 410 nm, d.k. at 440 nm, condy. increase (in acidic soln.) and decrease (in alkaline soln.) in Ar-satd. soln. contg. ~1 $\times 10^{-4}$ mol L^{-1} $PtCl_6^{2-}$ and 0.01 mol L^{-1} *tert*-BuOH.	89A250
						* Unexplained discrepancy in these data.	
19.27 Pentachloroplatinate(III) ion							
19.27.1 First-order reaction							
$PtCl_5^{2-} \rightarrow$	4.8×10^9 s^{-1}	2			f.p.	D.k. at 450-460 and 635-644 nm in aerated soln. contg. 5×10^{-3} mol L^{-1} $PtCl_6^{2-}$ and 1×10^{-2} mol L^{-1} $HClO_4$. Reaction suggested to represent solvation or aquation.	87A088
19.28 Aquapentachloroplatinate(III) ion							
19.28.1 Water							
$PtCl_5(H_2O)^{2-} + H_2O \rightarrow PtCl_4(H_2O)_2^- + Cl^-$	5×10^5 s^{-1}	2.6		20-28	p.r.	P.b.k. at 450 nm in Ar-satd. soln. contg. 0.11 mol L^{-1} *tert*-BuOH and 0.98 or 2.0×10^{-4} mol L^{-1} $PtCl_6^{2-}$. Reaction suggested to be preceded by Cl–abstraction by H-atom.	89A203
	4.8×10^5 s^{-1}	3.0-4.4			f.p.	P.b.k. at 435 nm in soln. contg. 4.0×10^{-5} mol L^{-1} $PtCl_6^{2-}$. Reaction suggested to be preceded by rapid hydration of $PtCl_5^{2-}$.	89A203

TABLE 19. Rate constants for platinum transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
19.29	**Aquatetrachlorohydroxyplatinate(III) ion**							
19.29.1	**First-order reaction**							
	* $PtCl_4(H_2O)(OH)^{2-} \rightarrow PtCl_2(OH)_2^- + H^+ + 2\ Cl^-$	1.5×10^5 s^{-1}	2.2-2.6		20-28	p.r.	P.b.k. at 410-470 nm in Ar-satd. soln. contg. 0.11 mol L^{-1} *tert*-BuOH and (1-2) $\times 10^{-4}$ mol L^{-1} $PtCl_6^{2-}$; condy. increase gave $k = 1.3 \times 10^5$ s^{-1}.	89A203
		1.4×10^5 s^{-1}	2.0-4.5		20-28	f.p.	P.b.k. at 400-480 nm in Ar-satd. soln. contg. (1-8) $\times 10^{-5}$ mol L^{-1} $PtCl_6^{2-}$; condy. increase gave $k = 1.7 \times 10^5$ s^{-1}.	89A203
		1.4×10^5 s^{-1}	3.4-4.6		20-28	p.r.	P.b.k. at 259-470 nm in N_2O-satd. soln. contg. (8.5-51) $\times 10^{-5}$ mol L^{-1} $PtCl_4^{2-}$; condy. increase gave $k = 1.4 \times 10^5$ s^{-1}; $k = 1.2 \times 10^5$ s^{-1} at pH 9 (1×10^5 s^{-1} by condy.); $k = 4 \times 10^4$ s^{-1} at pH 10; $k = 1.2 \times 10^4$ s^{-1} at pH 11.1; in alkaline soln. transient could be $PtCl_4(OH)_2^{3-}$.	89A203
		1.1×10^5 s^{-1}	4.0-5.1		20-28	p.r.	P.b.k. at 369-480 nm in Ar-satd. soln. contg. 0.11 mol L^{-1} *tert*-BuOH and (1-4) $\times 10^{-4}$ mol L^{-1} $PtCl_6^{2-}$; condy. increase gave $k = 1.1 \times 10^5$ s^{-1}. * For a different interpretation of this process and structure of the reactant see the following entry.	89A203
19.30	**Tetrachlorohydroxyplatinate(III)**							
19.30.1	**Water**							
	* $PtCl_4(OH)^{2-} + H_2O \rightarrow PtCl_4(OH)_2^{3-} + H^+$	1.6×10^5 s^{-1}	5-9			p.r.	P.b.k. at 410 nm, d.k. at 450 nm and condy. increase (in acidic soln.) and decrease (in alkaline soln.) in N_2O-satd. soln. contg. ~1×10^4 mol L^{-1} $PtCl_4^{2-}$. * For a different interpretation of this process and structure of the reactant see the previous entry.	89A250
19.31	**Dichlorobis(hydroxy)platinate(III) ion**							
19.31.1	**Ferrocyanide ion**							
	$PtCl_2(OH)_2^- + Fe(CN)_6^{4-} \rightarrow$	8.2×10^5	5.8-6.0	→0	20-28	p.r.	D.k. at 410 nm in N_2O-satd. soln. contg. 5×10^{-4} mol L^{-1} $PtCl_4^{2-}$ and (2.5-5.0) $\times 10^{-5}$ mol L^{-1} $Fe(CN)_6^{4-}$.	89A203
19.32	**Tetrabromo(hydroxy)platinate(III) ion**							
19.32.1	**Water**							
	$PtBr_4(OH)^{2-} + H_2O \rightarrow PtBr_4(OH)_2^{3-} + H^+$	1.0×10^5 s^{-1}				p.r.	D.k. at 530 nm, p.b.k. at 420 nm and condy. change at pH 3.7 and 8.5 and 21 °C, in N_2O-satd. soln. contg. 1×10^{-4} mol L^{-1} $PtBr_4^{2-}$.	92A259
19.33	**Hexabromoplatinate(III) ion**							
19.33.1	**Water**							
	$PtBr_6^{3-} + H_2O \rightarrow PtBr_5(OH)^{3-} + H^+ + Br^-$	3.7×10^4 s^{-1}				p.r.	D.k. at 540 nm and p.b.k. at 440 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH and 0.001 mol L^{-1} $PtBr_6^{2-}$ and condy. change in Ar-satd. soln. contg. 1×10^{-4} mol L^{-1} $PtBr_6^{2-}$ at pH 4.0 and 9.25.	92A259

TABLE 19. Rate constants for platinum transients — Continued

No. Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
19.34 Bis(ethylenediamine)platinum(II), $Cl_2^{\cdot-}$ reaction product							
19.34.1 First-order reaction							
$Pt(en)_2^{2+}/Cl_2^{\cdot-} \rightarrow$	1.3×10^3 s^{-1}	0.3		~25	p.r.	D.k. in deaerated soln. contg. $Pt(en)_2^{2+}$ and 0.5 mol L^{-1} HCl; followed by another first-order reaction, $k = 7.7$ s^{-1}.	751188
19.34.2 Copper(II) ion							
$Pt(en)_2^{2+}/Cl_2^{\cdot-} + Cu(II) \rightarrow$	2×10^8	0.3	0.5	~25	p.r.	D.k. in deaerated soln. contg. (1-2) × 10^{-4} mol L^{-1} $Pt(en)_2^{2+}$, 0.5 mol L^{-1} HCl and (5-12) × 10^{-5} mol L^{-1} $CuCl_2$.	751188
19.34.3 Iron(II) ions							
$Pt(en)_2^{2+}/Cl_2^{\cdot-} + Fe(II) \rightarrow$	2.5×10^5	0.3	0.5	~25	p.r.	D.k. in deaerated soln. contg. (1-2) × 10^{-4} mol L^{-1} $Pt(en)_2^{2+}$, 0.5 mol L^{-1} HCl and 6.1×10^{-4} mol L^{-1} $FeCl_2$.	751188
19.35 Chlorobis(ethylenediamine)platinum(III) ion							
19.35.1 Chlorobis(ethylenediamine)platinum(III) ion							
$Pt(en)_2Cl^{2+} + Pt(en)_2Cl^{2+} \rightarrow$	1.8×10^7	3.3		23	p.r.	D.k. at 260 nm and condy. increase in N_2O-satd. soln. contg. 1×10^{-4} mol L^{-1} $Pt(en)_2^{2+}$ and (1-2) × 10^{-5} mol L^{-1} Cl^-.	80A286
	2.5×10^7	3.4			p.r.	D.k. in N_2O-satd. soln. contg. $Pt(en)_2^{2+}$ and 10^{-5} mol L^{-1} Cl^-.	80A286
	2.1×10^7	2.0			f.p.	D.k. in soln. contg. $Pt(en)_2Cl_2^{2+}$, (0-1) × 10^{-5} mol L^{-1} Cl^- and 0-0.5 mol L^{-1} *tert*-BuOH.	80A286
	2.2×10^7	2		~25	p.r.	D.k. at 260-300 nm in soln. contg. (8-20) × 10^{-4} mol L^{-1} *trans*-$Pt(en)_2Cl_2^{2+}$, 0.01 mol L^{-1} $HClO_4$ and 0.11-2 mol L^{-1} *tert*-BuOH.	751188
19.35.2 Copper(II) ion							
$Pt(en)_2Cl^{2+} + Cu(II) \rightarrow$	2.7×10^5	2.1			p.r.	D.k. at 260 and 280 nm in N_2O-satd. soln. contg. (1.83-9.86) × 10^{-4} mol L^{-1} $Pt(en)_2^{2+}$, 5×10^{-6} mol L^{-1} Cl^- and 1.3 or 2.25×10^{-4} mol L^{-1} Cu^{2+}. Mechanism of reaction may be complex as the rate constants were appreciably higher (25-50%) at the lower [Cu(II)] employed.	761093
	3.2×10^5	2.0			f.p.	D.k. at 260-280 nm in N_2O-satd. soln. contg. (0.85-1.28) × 10^{-4} mol L^{-1} $Pt(en)_2Cl_2^{2+}$, 1 or 2×10^{-4} mol L^{-1} Cu^{2+} and 0.5 mol L^{-1} *tert*-BuOH. Mechanism of reaction may be complex as the rate constants were appreciably higher (25-50%) at the lower [Cu(II)] employed.	761093
19.36 quabis(ethylenediamine)hydroxyplatinum(III) ion							
19.36. First-order reaction							
$Pt(en)_2(H_2O)(OH)^{2+} \rightarrow Pt(en)(en\text{-}H)^{2+} + 2\,H_2O$	3×10^5 s^{-1}	<4.5		~23	p.r.	D.k. at 260 nm, p.b.k. at 340 nm and condy. change in N_2O-satd. soln. contg. $Pt(en)_2^{2+}$.	80A286
	2.5×10^5 s^{-1}	4.0-9.6			p.r.	D.k. in N_2O-satd. soln. contg. (2.5-5.1) × 10^{-4} mol L^{-1} $Pt(en)_2^{2+}$; average of two values obtained as intercepts from plots of k_{obs} vs [H^+] and [OH^-], respectively.	761093
19.36.2 Hydroxide ion							
$Pt(en)_2(H_2O)(OH)^{2+} + OH^- \rightarrow Pt(en)(en\text{-}H)^{2+} + 2\,H_2O + OH^-$	3.1×10^{10}	7.0-9.6			p.r.	Effect of [OH^-] on d.k. in N_2O-satd. soln. contg. (2.5-5.1) × 10^{-4} mol L^{-1} $Pt(en)_2^{2+}$.	80A286 761093

TABLE 19. Rate constants for platinum transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
19.36	**Aquabis(ethylenediamine)hydroxyplatinum(III) ion** — Continued							
19.36.3	**Hydrogen ion**							
	$Pt(en)_2(H_2O)(OH)^{2+} + H^+ \rightarrow Pt(en)_2(H_2O)_2^{3+}$	4.2×10^9	4.0-7.0			p.r.	D.k. in N_2O-satd. soln. contg. (2.5-5.0) × 10^{-4} mol L^{-1} $Pt(en)_2^{2+}$; $k_r = 6.6 \times 10^2$ s^{-1}.	80A286 761093
		5.4×10^9	<4.5		~23	p.r.	D.k. at 260 nm, p.b.k. at 340 nm and condy change in N_2O-satd. soln. contg. $Pt(en)_2^{2+}$.	80A286
19.37	**Bis(ethylenediamine)platinum(III) ion, deprotonated**							
19.37.1	**Bis(ethylenediamine)platinum(III) ion, deprotonated**							
	$Pt(en)(en\text{-}H)^{2+} + Pt(en)(en\text{-}H)^{2+} \rightarrow$	8.0×10^5	4.4-10.5		~23	p.r.	D.k. or condy. change (pH 8.9-10.5) in N_2O-satd. soln. contg. $Pt(en)_2^{2+}$.	80A286
		7.5×10^5	2.9-8.5			p.r.	D.k. at 330-480 nm in N_2O-satd. soln. contg. (1.83-9.86) × 10^{-4} mol L^{-1} $Pt(en)_2^{2+}$ and (0-2) × 10^{-3} mol L^{-1} Cl^-.	761093
19.37.2	**Copper(II) ion**							
	$Pt(en)(en\text{-}H)^{2+} + Cu(II) \rightarrow$	$<10^4$	6.3-6.6			p.r.	D.k. at 480 nm in N_2O-satd. soln. contg. (1.83-9.86) × 10^{-4} mol L^{-1} $Pt(en)_2^{2+}$ and 1.6 × 10^{-4} mol L^{-1} Cu^{2+}.	761093
19.37.3	**Ferrocyanide ion**							
	$Pt(en)(en\text{-}H)^{2+} + Fe(CN)_6^{4-} \rightarrow$	2.3×10^8	6.3-6.6			p.r.	D.k. at 480 nm in N_2O-satd. soln. contg. (1.83-9.86) × 10^{-4} mol L^{-1} $Pt(en)_2^{2+}$ and 2.4 × 10^{-5} mol L^{-1} $Fe(CN)_6^{4-}$; formation of $Fe(CN)_6^{3-}$ observed.	761093
19.37.4	**Oxygen**							
	$Pt(en)(en\text{-}H)^{2+} + O_2 \rightarrow$	$<10^5$	6.3-6.6			p.r.	D.k. at 340 and 480 nm in N_2O-satd. soln. contg. (1.83-9.86) × 10^{-4} mol L^{-1} $Pt(en)_2^{2+}$ and 1.8 × 10^{-4} mol L^{-1} O_2.	761093
19.37.5	**1-Hydroxy-1-methylethyl**							
	$Pt(en)(en\text{-}H)^{2+} + (CH_3)_2\dot{C}OH \rightarrow$	6.5×10^9	4.5,8.5		~23	p.r.	D.k. at 340 and 480 nm in deaerated soln. contg. $Pt(en)_2(OH)_2^{2+}$ and 2-PrOH. Value obtained from computer fit. Rate constants independent of concentrations of complex and alcohol.	80A286
19.37.6	**2-Hydroxy-2,2-dimethylethyl**							
	$Pt(en)(en\text{-}H)^{2+} + {}^{\bullet}CH_2C(CH_3)_2OH \rightarrow$	4×10^9	4.5,8.5		~23	p.r.	D.k. at 340 and 480 nm in deaerated soln. contg. $Pt(en)_2(OH)_2^{2+}$ and *tert*-BuOH. Value obtained from computer fit. Rate constants independent of concentrations of complex and alcohol.	80A286
19.38	**Diaquabis(ethylenediamine)platinum(III) ion**							
19.38.1	**Chloride ion**							
	$Pt(en)_2(H_2O)_2^{3+} + Cl^- \rightarrow Pt(en)_2(H_2O)Cl^{2+} + H_2O$	~3 × 10^8	3.3			p.r.	P.b.k. at 260 nm and condy. change in N_2O-satd. soln. contg. 1 × 10^{-4} mol L^{-1} $Pt(en)_2^{2+}$ and 1 or 2 × 10^{-5} mol L^{-1} Cl^-; k_r ~ 10^3 s^{-1}.	80A286
19.39	**Chloro(diethylenetriamine)platinum(II), $Cl_2^{\bullet-}$ reaction product**							
19.39.1	**Copper(II) ions**							
	$Pt(dien)Cl^+/Cl_2^{\bullet-} + Cu(II) \rightarrow$	3.2×10^8	0.3		~25	p.r.	D.k. in deaerated soln. contg. $Pt(dien)Cl^+$, 0.5 mol L^{-1} HCl and (0.5-1.2) × 10^{-4} mol L^{-1} $CuCl_2$.	751188

TABLE 19. Rate constants for platinum transients — Continued

No. Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
19.39 Chloro(diethylenetriamine)platinum(II), $Cl_2^{\cdot-}$ reaction product — Continued							
19.39.2 Chloro(diethylenetriamine)platinum(II), $Cl_2^{\cdot-}$ reaction product							
$Pt(dien)Cl^+/Cl_2^{\cdot-} + Pt(dien)Cl^+/Cl_2^{\cdot-}$	3.4×10^8	0.3		~25	p.r.	D.k. in deaerated soln. contg. $Pt(dien)Cl^+$, 0.5 mol L^{-1} HCl and 0.1-0.2 mol L^{-1} 2-PrOH; unclear whether k or $2k$.	751188
19.40 Chloro(diethylenetriamine)platinum(II), OH reaction product							
19.40.1 First-order reaction							
$Pt(dien)Cl^+/OH \rightarrow$	4.8×10^3 s^{-1}				p.r.	D.k. at 270 nm in N_2O-satd. soln. contg. 1.1×10^{-4} mol L^{-1} $Pt(dien)Cl^+$; followed by an intermediate complex decay and by a second-order decay with $k = 3.8 \times 10^4$ L mol^{-1} s^{-1}.	761093
19.41 Diethylenetriamine(pyridine)platinum(II) ion OH-adduct							
19.41.1 First-order reaction							
$[Pt(dien)pyOH]^{\cdot 2+} \rightarrow$	1.5×10^5 s^{-1}	3.5-9.7			p.r.	D.k. at 280 nm in N_2O-satd. soln. contg. $(2\text{-}25) \times 10^{-5}$ mol L^{-1} $Pt(dien)py^{2+}$	78A363
19.41.2 Diethylenetriamine(pyridine)platinum(II) ion							
$[Pt(dien)pyOH]^{\cdot 2+} + Pt(dien)py^{2+} \rightarrow$	$\sim 3 \times 10^9$	3.5-9.7			p.r.	D.k. at 280 nm in N_2O-satd. soln. contg. $(2\text{-}25) \times 10^{-5}$ mol L^{-1} $Pt(dien)py^{2+}$.	78A363
19.42 Chloro(tetraethyldiethylenetriamine)platinum(II), $Cl_2^{\cdot-}$ reaction product							
19.42.1 Copper(II) ions							
$Pt(Et_4dien)Cl^+/Cl_2^{\cdot-} + Cu(II) \rightarrow$	1.5×10^7	0.3		~25	p.r.	D.k. in soln. contg. $(1\text{-}2) \times 10^{-4}$ mol L^{-1} $Pt(Et_4dien)Cl^+$, $(0.5\text{-}1.2) \times 10^{-4}$ mol L^{-1} $CuCl_2$ and 0.5 mol L^{-1} HCl.	751188
19.42.2 Chloro(tetraethyldiethylenetriamine)platinum(II), $Cl_2^{\cdot-}$ reaction product							
$Pt(Et_4dien)Cl^+/Cl_2^{\cdot-} + Pt(Et_4dien)Cl^+/Cl_2^{\cdot-} \rightarrow$	$\sim 4 \times 10^5$	0.3		~25	p.r.	D.k. in soln. contg. $Pt(Et_4dien)Cl^+$, 0.1-0.2 mol L^{-1} 2-PrOH and 0.5 mol L^{-1} HCl; unclear whether k or $2k$.	751188
19.43 Chloro(tetraethyldiethylenetriamine)platinum(II), OH reaction product							
19.43.1 First-order reaction							
$Pt(Et_4dien)Cl^+/OH \rightarrow$	1.8 s^{-1}			~25	p.r.	D.k. at 280 and 360 nm and p.b.k. at 520 nm in N_2O-satd. soln. contg. 1.87 or 3.74 $\times 10^{-4}$ mol L^{-1} $Pt(Et_4dien)Cl^+$; preceded by other undefined processes.	761093
19.44 1,8-Diamino-3,6,10,13,16.19-hexaazabicyclo[6.6.6]eicosaneplatinum(III) ion							
19.44.1 First-order reaction							
$Pt(diamsar)^{3+} \rightarrow$	6×10^3 s^{-1}	6.8,10			p.r.	D.k. at 390 nm in He-satd. soln. contg. $Pt(diamsar)^{4+}$ and 0.1 mol L^{-1} *tert*-BuOH.	83A148
19.45 *cis*-Bis(glycinato)platinum(II), OH reaction product							
19.45.1 First-order reaction							
cis-$Pt(Gly)_2/OH \rightarrow$	1.1×10^3 s^{-1}	2.9		~25	p.r.	Absorbance changes at 250-260 and 340-390 nm in N_2O-satd. soln. contg. 2.5 $\times 10^{-4}$ mol L^{-1} *cis*-$Pt(Gly)_2$; subsequent changes at 290-330 and 400-420 nm gave $k = 4.2 \times 10^2$ s^{-1}.	771053

TABLE 19. Rate constants for platinum transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
19.45	***cis*-Bis(glycinato)platinum(II), OH reaction product** — Continued							
19.45.1	**First-order reaction** — Continued							
		2.2×10^6 s^{-1}	5.7-10		~25	p.r.	P.b.k. at 305-520 nm in N_2O-satd soln. contg. (2.4-4.35) × 10^{-4} mol L^{-1} *cis*-Pt(Gly)$_2$. At pH 10, $k = 7.2 \times 10^4$ s^{-1} from d.k. at 270-300 nm in soln. contg. 1.9 × 10^{-4} mol L^{-1} *cis*-Pt(gly)$_2$. At pH 4.8-10, $k = 2.0 \times 10^4$ L mol^{-1} s^{-1} from d.k. at 310-540 nm in soln. contg. (0.8-9.4) × 10^{-4} mol L^{-1} *cis*-Pt(gly)$_2$.	771053
19.45.2	**Copper(II) ion**							
	cis-Pt(Gly)$_2$/OH + Cu(II) →	1.7×10^7	3.0		~25	p.r.	P.b.k. at 360 and 520 nm in N_2O-satd. soln. contg. (1.09-3.08) × 10^{-4} mol L^{-1} *cis*-Pt(Gly)$_2$ and 1.2 or 3.4 × 10^{-4} mol L^{-1} Cu(ClO$_4$)$_2$.	771053
19.45.3	**Ferrocyanide ion**							
	cis-Pt(Gly)$_2$/OH + Fe(CN)$_6^{4-}$ →	3.7×10^9	2.9		~25	p.r.	D.k. at 260 and 270 nm and p.b.k. at 340-430 nm in N_2O-satd. soln. contg. (1.09-3.08) × 10^{-4} mol L^{-1} *cis*-Pt(Gly)$_2$ and 1.2 or 1.7 × 10^{-5} mol L^{-1} K$_4$Fe(CN)$_6$; variation of k with wavelength indicates some complexity.	771053
		3.0×10^8			~25	p.r.	P.b.k. at 340-520 nm in N_2O-satd. soln. contg. (1.09-3.08) × 10^{-4} mol L^{-1} *cis*-Pt(Gly)$_2$ and 3.2 or 9.1 × 10^{-5} mol L^{-1} K$_4$Fe(CN)$_6$; kinetics could be fitted to two consecutive reactions, the second with k = 3.7 × 10^7 L mol^{-1} s^{-1}.	771053
19.46	***trans*-Bis(glycinato)platinum(II), OH reaction product**							
19.46.1	**First-order reaction**							
	trans-Pt(Gly)$_2$/OH →	1.9×10^3 s^{-1}	2.9,3.0		~25	p.r.	Absorbance changes at 250-280 and 300-630 nm in N_2O-satd. soln. contg. (0.88 or 1.29) × 10^{-4} mol L^{-1} *trans*-Pt(Gly)$_2$. At pH 3.6, $k = 3.2 \times 10^3$ s^{-1} for 1.46 × 10^{-4} mol L^{-1} *trans*-Pt(Gly)$_2$; at pH 4.1, $k = 4.1 \times 10^3$ s^{-1} for 2.5 × 10^{-4} mol L^{-1} *trans*-Pt(Gly)$_2$. At pH 3-4.1 subsequent changes at 260-310 nm gave k = 2.4 × 10^2 s^{-1} for (0.88-2.5) × 10^{-4} mol L^{-1} *trans*-Pt(Gly)$_2$. At pH 2.9-4.3, k = 3.5 × 10^5 L mol^{-1} s^{-1} in soln. contg. (0.57-2.5) × 10^{-4} mol L^{-1} *trans*-Pt(Gly)$_2$. At pH ~5.7 and 6.3, $k = 1.6 \times 10^9$ L mol^{-1} s^{-1} in soln. contg. (0.97-2.16) × 10^{-4} mol L^{-1} *trans*-Pt(Gly)$_2$. At pH 10, k = ~9 × 10^5 s^{-1} from changes at 320-480 nm and k = ~1 × 10^5 s^{-1} from changes at 250-480 nm in soln. contg. (0.46-1.02) × 10^{-4} mol L^{-1} *trans*-Pt(Gly)$_2$. At pH 9 and ~10, k = 6.5 × 10^8 L mol^{-1} s^{-1} from changes at 300-520 nm in soln. contg. (0.46-1.97) × 10^{-4} mol L^{-1} *trans*-Pt(Gly)$_2$.	771053
19.46.2	**Copper(II) ion**							
	trans-Pt(Gly)$_2$/OH + Cu(II) →	4.2×10^3	2.9		~25	p.r.	D.k. at 260 nm in N_2O-satd. soln. contg. (1.09-3.08) × 10^{-4} mol L^{-1} *trans*-Pt(Gly)$_2$ and 0.82 or 1.47 × 10^{-4} mol L^{-1} Cu(ClO$_4$)$_2$; species involved represents second transient.	771053

TABLE 19. Rate constants for platinum transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
19.46	***trans*-Bis(glycinato)platinum(II), OH reaction product** — Continued							
19.46.3	**Copper(II) ions**							
	trans-Pt(Gly)$_2$/OH + Cu(II) →	9.9×10^6	10.0		~25	p.r.	P.b.k. at 370 nm in N_2O-satd. soln. contg. (1.09-3.08) × 10^{-4} mol L^{-1} *trans*-Pt(Gly)$_2$ and 0.58 or 2.42 × 10^{-4} mol L^{-1} $Cu(ClO_4)_2$.	771053
19.46.4	**Ferrocyanide ion**							
	trans-Pt(Gly)$_2$/OH + $Fe(CN)_6^{4-}$ →	2.5×10^9	3.3		~25	p.r.	D.k. at 270-300 nm and p.b.k. at 320-440 nm in N_2O-satd. soln. contg. (1.09-3.08) × 10^{-4} mol L^{-1} *trans*-Pt(Gly)$_2$ and 1.0 or 3.3 × 10^{-5} mol L^{-1} $K_4Fe(CN)_6$.	771053
		3.8×10^9	8.4		~25	p.r.	D.k. at 260-280 nm in N_2O-satd. soln. contg. (1.09-3.08) × 10^{-4} mol L^{-1} *trans*-Pt(Gly)$_2$ and 2.2 × 10^{-5} mol L^{-1} $K_4Fe(CN)_6$.	771053
19.47	**Octahydrogen tetrakis(μ-diphosphito)diplatinate(II)(III) ic**							
19.47.1	**Octahydrogen tetrakis(μ-diphosphito)diplatinate(II)(III) ion**							
	$[Pt_2(P_2O_5H_2^{2-})_4]^{3-}$ + $[Pt_2(P_2O_5H_2^{2-})_4]^{3-}$ →	6.7×10^8				p.r.	D.k. at 310 nm in N_2O-satd. soln. contg. $[Pt_2(P_2O_5^{2-})_4]^{4-}$; unclear whether k or $2k$.	86A578
19.47.2	**1,1'-Bis(2-sulfonatoethyl)-4,4'-bipyridinium radical anion**							
	$[Pt_2(P_2O_5H_2^{2-})_4]^{3-}$ + $[SEV]^{\cdot-}$ → $[Pt_2(P_2O_5H_2)_4]^{4-}$ + SEV	1×10^9			25	f.p./oq	D.k. in soln. contg. ~1 × 10^{-4} mol L^{-1} $[Pt_2(P_2O_5^{2-})_4]^{4-}$ and SEV (OQ).	81A344
19.47.3	**1,1'-Bis(3-sulfonatopropyl)-4,4'-bipyridinium radical anion**							
	$[Pt_2(P_2O_5H_2^{2-})_4]^{3-}$ + $[SPV]^{\cdot-}$ → $[Pt_2(P_2O_5H_2)_4]^{4-}$ + SPV	1.6×10^9				f.p./oq	D.k. at 600 nm in soln. contg. 2.7 × 10^{-5} mol L^{-1} $[Pt_2(P_2O_5^{2-})_4]^{4-}$ and 5 × 10^{-4} mol L^{-1} SPV (OQ).	85A161
19.48	***cis*-[Dichlorobis(1-(2-hydroxyethyl)-2-methyl-5-nitroimidazole-N^3)]platinum(III) ion**							
19.48.1	**Water**							
	$A_2Pt^{III}Cl_2^+ + H_2O \rightarrow A_2Pt^{III}(H_2O)Cl^{2+} + Cl^-$	7.1×10^4 s^{-1}				p.r.	D.k. in N_2O-satd. soln. contg. $A_2Pt^{II}Cl_2$; for loss of second Cl^-, $k = 820$ s^{-1}. Subsequent second-order decay ($k = 5 \times 10^7$ L mol^{-1} s^{-1}) may represent disproportionation of product.	85A090
19.49	***cis*-Dichlorobis(isopropylamine)-*trans*-dihydroxyplatinum(IV), OH reaction product**							
19.49.1	**Water**							
	$PtCl_2(OH)_2(2\text{-}PrNH_2)_2/OH + H_2O \rightarrow Pt(H_2O)Cl(OH)_2(2\text{-}PrNH_2)_2^{2+} + Cl^-$	1.1×10^3 s^{-1}				p.r.	D.k. in N_2O-satd. soln. contg. 2.5 × 10^{-4} mol L^{-1} complex; for loss of second Cl^-, $k = 20$ s^{-1}. Subsequent slower decay (k <10^5 L mol^{-1} s^{-1}) may represent disproportionation of product.	85A090

TABLE 20. Rate constants for rhenium transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
20.1	**Rhenate(VI) ion**							
20.1.1	**Rhenate(VI) ion**							
	$ReO_4^{2-} + ReO_4^{2-} \rightarrow$	1.7×10^9	7			p.r.	D.k. at 290 nm in N_2-satd. soln. contg. 0.1 mol L^{-1} *tert*-BuOH and ReO_4^-.	85A234

TABLE 21. Rate constants for rhodium transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
21.1	**Chlorotris[3-(diphenylphosphino)benzenesulfonato]rhodate(0) ion**							
21.1.1	**Hydrogen ion**							
	$RhCl(dpm)_3^{4-} + H^+ \rightarrow RhCl(H)(dpm)_3^{3-}$	6.0×10^9	5			p.r.	Ar-satd. soln. contg. 0.12 mol L^{-1} $RhCl(dpm)_3^{3-}$, 0.2 mol L^{-1} *tert*-BuOH and 0.02 mol L^{-1} phosphate.	87F040
21.2	**η^5-Pentamethylcyclopentadienyl(2,2'-bipyridine)rhodium(I) ion**							
21.2.1	**Hydrogen ion**							
	$(C_5Me_5)Rh^{I}(bpy) + H^+ \rightarrow (C_5Me_5)Rh^{III}H(bpy)^+$	1.6×10^6	acid			p.r.	Soln. contg. 5% 2-PrOH and $(C_5Me_5)Rh^{III}(bpy)L^+$ (L = I^- or OH^-).	87N149
21.3	**Tris(2,2'-bipyridine)rhodium(I) ion**							
21.3.1	**First-order reaction**							
	$Rh(bpy)_3^+ \rightarrow Rh(bpy)_2^+ + bpy$	5.0×10^4 s^{-1}				p.r.	P.b.k. at 500 nm in soln. contg. 10^{-3} mol L^{-1} $Rh(bpy)_3^{3+}$ and 0.1 mol L^{-1} 2-PrOH.	83A046
21.4	**Tetrakis[μ-(1,3-diisocyanopropane)]dirhodium(I)(II) ion**							
21.4.1	**Tetrakis[μ-(1,3-diisocyanopropane)]dirhodium(I)(II) ion**							
	$Rh_2(1,3\text{-diisocyanopropane})_4^{3+} + Rh_2(1,3\text{-diisocyanopropane})_4^{3+} \rightarrow [Rh_2(1,3\text{-diisocyanopropane})_4]_2^{6+}$	1.7×10^7 4×10^5	0.3	→0	25	f.p.	D.k. in soln. contg. (1-10) × 10^{-6} mol L^{-1} $[Rh_2(1,3\text{-diisocyanopropane})_4]_2^{6+}$ and 1 *N* H_2SO_4.	79A167
21.4.2	**Sulfatoiron(III) ion**							
	$Rh_2(1,3\text{-diisocyanopropane})_4^{3+} + FeSO_4^+ \rightarrow$	6.9×10^4	0.3		25	f.p.	D.k. at 440 and 700 nm in soln. contg. $[Rh_2(1,3\text{-diisocyanopropane})_4]_2^{6+}$, (0-7) × 10^{-4} mol L^{-1} $FeSO_4^+$ and 1 *N* H_2SO_4.	79A167
21.5	**η^5-Pentamethylcyclopentadienyl(2,2'-bipyridine)(hydroxy)rhodium(II) ion**							
21.5.1	**η^5-Pentamethylcyclopentadienyl(2,2'-bipyridine)(hydroxy)rhodium(II) ion**							
	$(C_5Me_5)Rh^{II}(bpy)(OH) + (C_5Me_5)Rh^{II}(bpy)(OH) \rightarrow (C_5Me_5)Rh^{I}(bpy) + (C_5Me_5)Rh^{III}(bpy)(OH)^+ + OH^-$	1.6×10^4 s^{-1}				p.r.	Soln. contg. 5% 2-PrOH and $(C_5Me_5)Rh^{III}(bpy)(OH)^+$; reaction between first- and second-order; *k* may represent ligand loss followed by rapid disproportionation.	87N149
21.6	**η^5-Pentamethylcyclopentadienyl(2,2'-bipyridine)(iodo)rhodium(II) ion**							
21.6.1	**η^5-Pentamethylcyclopentadienyl(2,2'-bipyridine)(iodo)rhodium(II) ion**							
	$(C_5Me_5)Rh^{II}(bpy)(I) + (C_5Me_5)Rh^{II}(bpy)(I) \rightarrow (C_5Me_5)Rh^{I}(bpy) + (C_5Me_5)Rh^{III}(bpy)(I)^+ + I^-$	1.6×10^3 s^{-1}				p.r.	Soln. contg. 5% 2-PrOH and $(C_5Me_5)Rh^{III}(bpy)(I)^+$; reaction between first- and second-order; *k* may represent ligand loss followed by rapid disproportionation.	87N149
21.7	**Aquatriamminerhodium(II) ion**							
21.7.1	**Water**							
	$Rh(NH_3)_3H_2O^{2+} + H_2O \rightarrow Rh(NH_3)_2(H_2O)_2^{2+} + NH_3$	40 s^{-1}	4			p.r.	Condy. change from $NH_3 + H^+ \rightarrow NH_4^+$ in Ar-satd. soln. contg. 0.5 mol L^{-1} *tert*-BuOH and 10^{-3} mol L^{-1} $Rh(NH_3)_5Cl^{2+}$ or $Rh(NH_3)_5H_2O^{3+}$.	751128
21.8	**Tetraamminerhodium(II) ion**							
21.8.1	**Water**							
	$Rh(NH_3)_4^{2+} + H_2O \rightarrow Rh(NH_3)_3H_2O^{2+} + NH_3$	3.5×10^2 s^{-1}	4			p.r.	Condy. change from $NH_3 + H^+ \rightarrow NH_4^+$ in Ar-satd. soln. contg. 0.5 mol L^{-1} *tert*-BuOH and 10^{-3} mol L^{-1} $Rh(NH_3)_5Cl^{2+}$ or $Rh(NH_3)_5H_2O^{3+}$.	751128

TABLE 21. Rate constants for rhodium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
21.8	**Tetraamminerhodium(II) ion** — Continued							
21.8.2	**Oxygen**							
	$Rh(NH_3)_4^{2+} + O_2 \rightarrow Rh(NH_3)_4O_2^{2+}$	3.1×10^8	4			p.r.	P.b.k. at 260 nm in soln. contg. 0.5 mol L^{-1} *tert*-BuOH, 10^{-3} mol L^{-1} $Rh(NH_3)_5H_2O^{3+}$ and various [O_2].	751128
21.8.3	**Tetraamminedibromorhodium(III) ion**							
	$Rh(NH_3)_4^{2+} + Rh(NH_3)_4Br_2^{+} \rightarrow Rh(NH_3)_4^{3+} + Rh(NH_3)_4Br_2$	$\sim 1.4 \times 10^6$	4			p.r.	Estd. from condy. increase in Ar-satd. soln. contg. 0.5 mol L^{-1} *tert*-BuOH and 10^{-3} mol L^{-1} $Rh(NH_3)_4Br_2^{+}$.	751128
21.8.4	**Tetraamminerhodium(II) ion**							
	$Rh(NH_3)_4^{2+} + Rh(NH_3)_4^{2+} \rightarrow Rh(NH_3)_4^{+} + Rh(NH_3)_4^{3+}$	$\sim 6 \times 10^6$	4			p.r.	Estd. from dependence of chain length in the $Rh(NH_3)_4^{2+} + Rh(NH_3)_4Br_2^{+}$ reaction on dose rate in Ar-satd. soln.	751128
21.9	**1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanerhodium(II) ion**							
21.9.1	**First-order reaction**							
	$Rh(sep)^{2+} \rightarrow Rh(sep)^{3+}$	0.5 s^{-1}	6.9		25	p.r.	D.k. at 340 nm in He-satd. soln. contg. (1-10) × 10^{-4} mol L^{-1} $Rh(sep)^{3+}$ and 0.02 mol L^{-1} phosphate buffer; reaction could involve reduction of water.	83A298
21.10	**Bis(2,2'-bipyridine)rhodium(II) ion**							
21.10.1	**Bis(2,2'-bipyridine)rhodium(II) ion**							
	$Rh(bpy)_2^{2+} + Rh(bpy)_2^{2+} \rightarrow [Rh(bpy)_2]_2^{4+}$	1.7×10^8	8.9		25	p.r.	Soln. contg. $Rh(bpy)_2(OH)_2^{+}$ and 2-PrOH. Reaction is pH dependent due to different aquated forms involved. The dimer dissociates to $Rh(bpy)_2(OH)_2^{+} + Rh(bpy)_2^{+}$ with $k = 9 \times 10^{-3}$ s^{-1} at 25 °C and $k = 8 \times 10^{-2}$ s^{-1} at 60 °C.	83A046
21.11	**Tris(2,2'-bipyridine)rhodium(II) ion**							
21.11.1	**First-order reaction**							
	$Rh(bpy)_3^{2+} \rightarrow Rh(bpy)_2^{2+} + bpy$	0.3 s^{-1}	5, 8.1			f.p./oq	D.k. in soln. contg. $Ru(bpy)_3^{2+}$, $Rh(bpy)_3^{3+}$(OQ) and EDTA.	87A460
		0.6 s^{-1}	8.8		25	p.r.	Soln. contg. $Rh(bpy)_3^{3+}$, 0.1 mol L^{-1} 2-PrOH and negligible [bpy]; $k = 4.3$ s^{-1} at 50 °C; $k_r = 3 \times 10^8$ L mol^{-1} s^{-1}.	83A046
		0.45 s^{-1}	3-10			p.r.	D.k. and p.b.k. in Ar-purged soln. contg. (2.5-50) × 10^{-5} mol L^{-1} $Rh(bpy)_3^{3+}$ and 0.1 mol L^{-1} formate ion or 0.1 mol L^{-1} 2-PrOH.	81A134
21.11.2	**Bis(2,2'-bipyridine)rhodium(II) ion**							
	$Rh(bpy)_3^{2+} + Rh(bpy)_2^{2+} \rightarrow Rh(bpy)_3^{3+} + Rh(bpy)_2^{+}$	3×10^8	8.9		25	p.r.	P.b.k. at 510 nm in soln. contg. $Rh(bpy)_3^{3+}$ and $Rh(bpy)_2(OH)_2^{+}$.	83A046
21.11.3	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanesilver(II) ion**							
	$Rh(bpy)_3^{2+} + Ag(aneN_4)^{2+} \rightarrow Rh(bpy)_3^{3+} + Ag(aneN_4)^{+}$	1.3×10^8	4	0.04		p.r		88A334
21.11.4	**Oxygen**							
	$Rh(bpy)_3^{2+} + O_2 \rightarrow Rh(bpy)_3^{3+} + O_2^{\cdot -}$	4.9×10^8	7.3			p.r.	D.k. at 250 nm in N_2O-satd. soln. contg. 2% air, $Rh(bpy)_3^{3+}$ and formate ion.	81A134
21.11.5	**1,1'-Dimethyl-4,4'-bipyridinium**							
	$Rh(bpy)_3^{2+} + MV^{2+} \rightarrow Rh(bpy)_3^{3+} + MV^{\cdot +}$	4×10^8	8.1			f.p./oq	P.b.k. in soln. contg. 3×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 5×10^{-3} mol L^{-1} $Rh(bpy)_3^{3+}$ (OQ), 0.1 mol L^{-1} TEOA and (0.3-3) × 10^{-4} mol L^{-1} MV^{2+}.	81N003 79A317

TABLE 21. Rate constants for rhodium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
21.12	**η^5-Pentamethylcyclopentadienyl(2,2'-bipyridine)hydridorhodium(III) ion**							
21.12.1	**Hydrogen ion**							
	$(C_5Me_5)Rh^{III}H(bpy)^+ + H^+ \rightarrow H_2 + (C_5Me_5)Rh^{III}(bpy)^{2+}$	1.8×10^3	<2			p.r.	Soln. contg. 5% 2-PrOH and $(C_5Me_5)Rh^{III}(bpy)L^+$ (L = I^- or OH^-). Reaction accompanied by ligand addition to reform $(C_5Me_5)Rh^{III}(bpy)L^+$.	87N149
21.13	**Tetraammine(superoxido)rhodium(III) ion**							
21.13.1	**Tetraammine(hydrido)rhodium(III) ion**							
	$Rh(NH_3)_4O_2^{2+} + Rh(NH_3)_4H^{2+} \rightarrow Rh(NH_3)_4O_2H^{2+} + Rh(NH_3)_4^{2+}$	$<4 \times 10^7$	1			f.p.	P.b.k. at 240 nm in soln. contg. 0.1 mol L^{-1} $HClO_4$ and $Rh(NH_3)_4H^{2+}$; estd. assuming chain reaction involving $k(Rh(NH_4)_4^{2+} + O_2) = 3.1 \times 10^8$ L mol^{-1} s^{-1}.	79A004

TABLE 22. Rate constants for ruthenium transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.1	**Pentaammine(dinitrogen)ruthenium(I) ion**							
22.1.1	**Pentaammine(dinitrogen)ruthenium(I) ion**							
	$Ru(NH_3)_5N_2^+ + Ru(NH_3)_5N_2^+ \rightarrow Ru(NH_3)_5N_2^{2+} + Ru(NH_3)_5N_2$	1.4×10^9			20	p.r.	D.k. in soln. contg. MeOH or *tert*-BuOH and $Ru(NH_3)_5N_2^{2+}$.	710234
22.2	**Bis(2,2′-bipyridine)bis(cyano)ruthenate(II) ion, electron adduct**							
22.2.1	**Bis(2,2′-bipyridine)bis(cyano)ruthenium(III) ion**							
	$Ru(bpy)_2(CN)_2^- + Ru(bpy)_2(CN)_2^+ \rightarrow$	2.0×10^{10}				f.p./pi	D.k. at 540 nm in deaerated soln. contg. 10^{-4} mol L^{-1} $Ru(bpy)_2(CN)_2$.	84A177
22.3	**Tris(2,2′-bipyridine)ruthenium(II) ion, electron adduct**							
22.3.1	**First-order reaction**							
	$Ru(bpy)_3^+ \rightarrow$	0.2 s^{-1}	11-13			p.r.	D.k. in soln. contg. $Ru(bpy)_3^{2+}$; independent of [OH^-], [$Ru(bpy)_3^{2+}$], or nature of the alcohol used to generate the reducing radicals ($^{\bullet}CH_2O^-$, $CH_3\dot{C}HO^-$, or $(CH_3)_2\dot{C}O^-$); radiation dose <2.5 Gy.	78A068
22.3.2	**Cobalt(II) ion**							
	$Ru(bpy)_3^+ + Co^{2+} \rightarrow Ru(bpy)_3^{2+} + Co^+$	$<1 \times 10^4$			25	f.p./rq	Soln. contg. $Ru(bpy)_3^{2+}$, 0.5 mol L^{-1} ascorbate ion (RQ) and 0.5 mol L^{-1} ascorbic acid.	82A278
22.3.3	**Hexaamminecobalt(III) ion**							
	$Ru(bpy)_3^+ + Co(NH_3)_6^{3+} \rightarrow Ru(bpy)_3^{2+} + Co(NH_3)_6^{2+}$	2.7×10^9	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (0.36-2.92) × 10^{-4} mol L^{-1} $Co(NH_3)_6^{3+}$.	86A161
		3.5×10^8	11	~10^{-3}		p.r.		84A255
22.3.4	**Tris(ethylenediamine)cobalt(III) ion**							
	$Ru(bpy)_3^+ + Co(en)_3^{3+} \rightarrow Ru(bpy)_3^{2+} + Co(en)_3^{2+}$	2.3×10^9	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (0.77-3.54) × 10^{-4} mol L^{-1} $Co(en)_3^{3+}$.	86A161
		3.2×10^8	11	~10^{-3}		p.r.		84A255
22.3.5	**2,2′-Bipyridinecobalt(II) ion**							
	$Ru(bpy)_3^+ + Co(bpy)^{2+} \rightarrow Ru(bpy)_3^{2+} + Co(bpy)^+$	7×10^8	7.3		25	f.p./rq	Soln. contg. $Ru(bpy)_3^{2+}$, 0.1 mol L^{-1} ascorbate ion (RQ) and 0.01 mol L^{-1} phosphate.	82A278
22.3.6	**4,4′-Dimethyl-2,2′-bipyridinecobalt(II) ion**							
	$Ru(bpy)_3^+ + Co(4,4'\text{-}Me_2bpy)^{2+} \rightarrow Ru(bpy)_3^{2+} + Co(4,4'\text{-}Me_2bpy)^+$	3×10^8	7.3		25	f.p./rq	Soln. contg. $Ru(bpy)_3^{2+}$, 0.1 mol L^{-1} ascorbate ion (RQ) and 0.01 mol L^{-1} phosphate.	82A278
22.3.7	**Tris(4,4′-dimethyl-2,2′-bipyridine)cobalt(II) ion**							
	$Ru(bpy)_3^+ + Co(4,4'\text{-}Me_2bpy)_3^{2+} \rightarrow Ru(bpy)_3^{2+} + Co(4,4'\text{-}Me_2bpy)_3^+$	3×10^9	7.3		25	f.p./rq	Soln. contg. $Ru(bpy)_3^{2+}$, 0.1 mol L^{-1} ascorbate ion (RQ) and 0.01 mol L^{-1} phosphate.	82A278
22.3.8	**5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,14-dienecobalt(II) ion**							
	$Ru(bpy)_3^+ + Co(4,14\text{-dieneN}_4)^{2+} \rightarrow Ru(bpy)_3^{2+} + Co(4,14\text{-dieneN}_4)^{3+}$	1.8×10^8			25	f.p./rq	D.k. in soln. contg. $Ru(bpy)_3^{2+}$ and Eu^{2+} (RQ).	79F046

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.3	**Tris(2,2′-bipyridine)ruthenium(II) ion, electron adduct** — Continued							
22.3.9	**1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(III) ion**							
	$Ru(bpy)_3^+ + Co(sep)^{3+} \rightarrow Ru(bpy)_3^{2+} + Co(sep)^{2+}$	$>2 \times 10^9$	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (0.86-2.85) × 10^{-4} mol L^{-1} $Co(sep)^{3+}$. Lower limit due to reaction of Eu^{2+} with $Co(sep)^{3+}$.	86A161
22.3.10	**Tris(2,2′-bipyridine)cobalt(III) ion**							
	$Ru(bpy)_3^+ + Co(bpy)_3^{3+} \rightarrow Ru(bpy)_3^{2+} + Co(bpy)_3^{2+}$	1.6×10^9	11	~10^{-3}		p.r.	D.k. in soln. contg. $Ru(bpy)_3^{2+}$ and 0.1 mol L^{-1} CH_3OH.	78A068
22.3.11	**Bis(dimethylglyoximato)methylcobalt(III) difluoroborate**							
	$Ru(bpy)_3^+ + CH_3Co((dmg)BF_2)_2 \rightarrow Ru(bpy)_3^{2+} + CH_3Co((dmg)BF_2)_2^-$	3.2×10^9	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.12 mol L^{-1} ascorbate (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (0.14-0.97) × 10^{-4} mol L^{-1} $CH_3Co((dmg)BF_2)_2$.	86A161
22.3.12	**Chromium(III) ion**							
	$Ru(bpy)_3^+ + Cr^{3+} \rightarrow Ru(bpy)_3^{2+} + Cr^{2+}$	4.6×10^6	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (2.8-45) × 10^{-4} mol L^{-1} $CrCl_3$.	86A161
22.3.13	**Pentaaqua(trifluoromethyl)chromium(III) ion**							
	$Ru(bpy)_3^+ + (H_2O)_5CrCF_3^{2+} \rightarrow$	$<5 \times 10^5$	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (2.2-11.3) × 10^{-4} mol L^{-1} $(H_2O)_5CrCF_3^{2+}$.	86A161
22.3.14	**Pentaaqua(methoxymethyl)chromium(III) ion**							
	$Ru(bpy)_3^+ + (H_2O)_5CrCH_2OCH_3^{2+} \rightarrow Ru(bpy)_3^{2+} + (H_2O)_5CrCH_2OCH_3^+$	2.2×10^6	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (1.56-7.80) × 10^{-4} mol L^{-1} $(H_2O)_5CrCH_2OCH_3^{2+}$.	86A161
22.3.15	**Pentaaqua(dichloromethyl)chromium(III) ion**							
	$Ru(bpy)_3^+ + (H_2O)_5CrCHCl_2^{2+} \rightarrow Ru(bpy)_3^{2+} + (H_2O)_5CrCHCl_2^+$	2.1×10^7	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (0.90-3.89) × 10^{-4} mol L^{-1} $(H_2O)_5CrCHCl_2^{2+}$.	86A161
22.3.16	**Pentaaqua(benzyl)chromium(III) ion**							
	$Ru(bpy)_3^+ + (H_2O)_5CrCH_2C_6H_5^{2+} \rightarrow Ru(bpy)_3^{2+} + (H_2O)_5CrCH_2C_6H_5^+$	3.2×10^7	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (0.18-2.14) × 10^{-4} mol L^{-1} $(H_2O)_5CrCH_2C_6H_5^{2+}$.	86A161
22.3.17	**Pentaaqua(4-pyridiniomethyl)chromium(III) ion**							
	$Ru(bpy)_3^+ + 4\text{-}[(H_2O)_5CrCH_2]C_5H_4NH^{3+} \rightarrow Ru(bpy)_3^{2+} + 4\text{-}[(H_2O)_5CrCH_2]C_5H_4NH^{2+}$	1.4×10^9	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (7.6-39.8) × 10^{-4} mol L^{-1} $4\text{-}[(H_2O)_5CrCH_2]C_5H_4NH^{3+}$.	86A161

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.3	**Tris(2,2′-bipyridine)ruthenium(II) ion, electron adduct** — Continued							
22.3.18	**Pentaaqua(4-methylpyridine)chromium(III) ion**							
	$Ru(bpy)_3^+ + (H_2O)_5CrNC_5H_4\text{-}4\text{-}CH_3^{3+} \rightarrow Ru(bpy)_3^{2+} + (H_2O)_5CrNC_5H_4\text{-}4\text{-}CH_3^{2+}$	4.2×10^8	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (0.97-3.69) × 10^{-4} mol L^{-1} $(H_2O)_5CrNC_5H_4\text{-}4\text{-}CH_3^{3+}$.	86A161
22.3.19	**Pentaaqua(pyridine)chromium(III) ion**							
	$Ru(bpy)_3^+ + (H_2O)_5Cr(NC_5H_5)^{3+} \rightarrow Ru(bpy)_3^{2+} + (H_2O)_5Cr(NC_5H_5)^{2+}$	5.5×10^8	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (1.22-6.12) × 10^{-4} mol L^{-1} $(H_2O)_5CrNC_5H_5^{3+}$.	86A161
22.3.20	**Pentaaqua(3-chloropyridine)chromium(III) ion**							
	$Ru(bpy)_3^+ + (H_2O)_5Cr(NC_5H_4\text{-}3\text{-}Cl)^{3+} \rightarrow Ru(bpy)_3^{2+} + (H_2O)_5Cr(NC_5H_4\text{-}3\text{-}Cl)^{2+}$	1.3×10^9	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (1.02-4.5) × 10^{-4} mol L^{-1} $(H_2O)_5CrNC_5H_4\text{-}3\text{-}Cl^{3+}$.	86A161
22.3.21	**Pentaaqua(3-cyanopyridine)chromium(III) ion**							
	$Ru(bpy)_3^+ + (H_2O)_5Cr(NC_5H_4\text{-}3\text{-}CN)^{3+} \rightarrow Ru(bpy)_3^{2+} + (H_2O)_5Cr(NC_5H_4\text{-}3\text{-}CN)^{2+}$	2.6×10^9	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (0.73-2.70) × 10^{-4} mol L^{-1} $(H_2O)_5CrNC_5H_4\text{-}3\text{-}CN^{3+}$.	86A161
22.3.22	**Tetraaquabis(pyridine)chromium(III) ion**							
	$Ru(bpy)_3^+ + cis\text{-}(H_2O)_4Cr(py)_2^{3+} \rightarrow Ru(bpy)_3^{2+} + cis\text{-}(H_2O)_4Cr(py)_2^{2+}$	1.5×10^9	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (0.40-4.48) × 10^{-4} mol L^{-1} $cis\text{-}(H_2O)_4Cr(py)_2^{3+}$.	86A161
22.3.23	**Tetraaqua(2,2′-bipyridine)chromium(III) ion**							
	$Ru(bpy)_3^+ + (H_2O)_4Cr(bpy)^{3+} \rightarrow Ru(bpy)_3^{2+} + (H_2O)_4Cr(bpy)^{2+}$	1.8×10^9	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (1.12-4.49) × 10^{-4} mol L^{-1} $(H_2O)_4Cr(bpy)^{3+}$.	86A161
22.3.24	**Copper(II) ion**							
	$Ru(bpy)_3^+ + Cu^{2+} \rightarrow Ru(bpy)_3^{2+} + Cu^+$	3.9×10^8 5.2×10^8	6.6 6.6	0.04 0.5	25	p.r.	D.k. at 510 nm in soln. contg. $Ru(bpy)_3^{2+}$, 0.5 mol L^{-1} *tert*-BuOH and cacodylate buffer.	78A090
		3.4×10^8	6-7	<0.0002	24	f.p./pi	D.k. at 510 nm in soln. contg. 2 × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and (2.6-39) × 10^{-6} mol L^{-1} Cu^{2+}.	771093
22.3.25	**Europium(III) ion**							
	$Ru(bpy)_3^+ + Eu^{3+} \rightarrow Ru(bpy)_3^{2+} + Eu^{2+}$	2.7×10^7	1.3	0.5	25	f.p./rq	D.k. at 490-510 nm in soln. contg. (0.3-3.0) × 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$. ~0.1 mol L^{-1} Eu^{2+} (RQ) and 0.05 mol L^{-1} H^+.	78A087 767412
22.3.26	**4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]tricosaneeuropium(III) ion**							
	$Ru(bpy)_3^+ + [Eu\ 2.2.1]^{3+} \rightarrow Ru(bpy)_3^{2+} + [Eu\ 2.2.1]^{2+}$	7.0×10^8		1	22	f.p./rq	D.k. at 500 nm and p.b.k. at 454 nm in deaerated soln. contg. $Ru(bpy)_3^{2+}$, excess $[Eu\ 2.2.1]^{2+}$ (RQ) and 1 mol L^{-1} KCl.	86E195

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.3	**Tris(2,2′-bipyridine)ruthenium(II) ion, electron adduct** — Continued							
22.3.27	**Nitrite ion**							
	$Ru(bpy)_3^+ + NO_2^- \rightarrow$	2.5×10^7	~7			p.r.	D.k. at 510 nm in soln. contg. $Ru(bpy)_3^{2+}$ and 0.5 mol L^{-1} *tert*-BuOH.	720381
22.3.28	**1,4,8,11-Tetramethyl-1,4,8,11-tetraazacyclotetradecanenickel(II) ion**							
	$Ru(bpy)_3^+ + Ni(Me_4[14]aneN_4)^{2+} \rightarrow Ru(bpy)_3^{2+} + Ni(Me_4[14]aneN_4)^+$	5.1×10^8	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.12 mol L^{-1} ascorbate (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl, and (1.05-4.04) × 10^{-4} mol L^{-1} $Ni(Me_4[14]aneN_4)^{2+}$.	86A161
22.3.29	**Tetracyanonickelate(II) ion**							
	$Ru(bpy)_3^+ + Ni(CN)_4^{2-} \rightarrow Ru(bpy)_3^{2+} + Ni(CN)_4^{3-}$	4.1×10^7	11			p.r.	D.k. in soln. contg. $Ru(bpy)_3^{2+}$ and 0.1 mol L^{-1} CH_3OH.	78A068
22.3.30	**Oxygen**							
	$Ru(bpy)_3^+ + O_2 \rightarrow Ru(bpy)_3^{2+} + O_2^{\cdot -}$	5.5×10^9	6.9	0.04		f.p./rq	D.k. in soln. contg. 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$, hydroquinone (RQ) and 2.4 × 10^{-4} mol L^{-1} O_2.	81A042
		4×10^9		0.5	25	f.p./rq	D.k. at 500 nm in soln. contg. $Ru(bpy)_3^{2+}$ and $Fe(CN)_6^{4-}$ (RQ).	78A087
		7.4×10^9	11			p.r.	D.k. in soln. contg. $Ru(bpy)_3^{2+}$ and 0.1 mol L^{-1} CH_3OH.	78A068
		7.2×10^9	6-7		24	f.p./pi	D.k. at 510 nm in soln. contg. 2 × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.5-2.5) × 10^{-6} mol L^{-1} O_2.	771093
22.3.31	**Pentaammine(chloro)osmium(III) ion**							
	$Ru(bpy)_3^+ + Os(NH_3)_5Cl^{2+} \rightarrow Ru(bpy)_3^{2+} + Os(NH_3)_5Cl^+$	1.0×10^9	1.3	0.5	25	f.p./rq	D.k. at 490 nm in soln. contg. 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$, (0.5-2.0) × 10^{-3} mol L^{-1} $Os(NH_3)_5Cl^{2+}$, 0.03 mol L^{-1} Eu^{2+} (RQ), 0.45 mol L^{-1} NaCl and 0.05 mol L^{-1} HCl.	82A145
22.3.32	**Ethylenediaminetetraacetatoosmate(III) ion**							
	$Ru(bpy)_3^+ + OsEDTA^- \rightarrow Ru(bpy)_3^{2+} + OsEDTA^{2-}$	1.1×10^9	4-5	0.5	25	f.p./rq	D.k. at 490 nm in soln. contg. $Ru(bpy)_3^{2+}$, 1.0 mol L^{-1} ascorbate ion (RQ) and $OsEDTA^-$.	82A145
22.3.33	**Chlorotris[3-(diphenylphosphino)benzenesulfonato]rhodate(I) ion**							
	$Ru(bpy)_3^+ + RhCl(dpm)_3^{3-} \rightarrow Ru(bpy)_3^{2+} + RhCl(dpm)_3^{4-}$	1.9×10^8	5.0			f.p./rq	D.k. at 500 nm in soln. contg. $Ru(bpy)_3^{2+}$, 0.1 mol L^{-1} ascorbate ion (RQ) and $RhCl(dpm)_3^{3-}$	87F040
22.3.34	**Tris(4,4′-dimethyl-2,2′-bipyridinerhodium(III) ion**							
	$Ru(bpy)_3^+ + Rh(4,4'\text{-}Me_2bpy)_3^{3+} \rightarrow Ru(bpy)_3^{2+} + Rh(4,4'\text{-}Me_2bpy)_3^{2+}$	3.7×10^9	4-5	0.5	25	f.p./rq	D.k. at 490 nm in soln. contg. $Ru(bpy)_3^{2+}$, 1.0 mol L^{-1} ascorbate ion (RQ) and $Rh(4,4'\text{-}Me_2bpy)_3^{3+}$.	82A145
22.3.35	**Hexaammineruthenium(III) ion**							
	$Ru(bpy)_3^+ + Ru(NH_3)_6^{3+} \rightarrow Ru(bpy)_3^{2+} + Ru(NH_3)_6^{2+}$	4.7×10^9		0.5	25	f.p./rq	D.k. at 500 nm in soln. contg. $Ru(bpy)_3^{2+}$ and $Ru(NH_3)_6^{2+}$ (RQ).	78A087
22.3.36	**Tris(2,2′-bipyridine)ruthenium(III) ion**							
	$Ru(bpy)_3^+ + Ru(bpy)_3^{3+} \rightarrow 2\ Ru(bpy)_3^{2+}$	3.4×10^9	4.6		24	p.r.	D.k. at 510 in Ar-satd. soln. contg. 0.5 mol L^{-1} *tert*-BuOH, 2 × 10^{-3} mol L^{-1} $Ru(bpy)_3^{2+}$ and 10^{-4} mol L^{-1} $Ru(bpy)_3^{3+}$.	78A070
22.3.37	**Sulfite radical ion**							
	$Ru(bpy)_3^+ + SO_3^{\cdot -} \rightarrow$	$\leq 10^6$			25	f.p./rq	P.b.k. in soln. contg. 5 × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and 0.1-1.0 mol L^{-1} Na_2SO_3 (RQ).	79F045

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.3	**Tris(2,2′-bipyridine)ruthenium(II) ion, electron adduct** — Continued							
22.3.38	**Samarium(III) ion**							
	$Ru(bpy)_3^+ + Sm^{3+} \rightarrow Ru(bpy)_3^{2+} + Sm^{2+}$	$<2 \times 10^4$	0.6	1.0-1.58	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (0.07-0.14) × 10^{-4} mol L^{-1} Sm(III) perchlorate.	86A161
22.3.39	**Ytterbium(III) ions**							
	$Ru(bpy)_3^+ + Yb^{3+} \rightarrow Ru(bpy)_3^{2+} + Yb^{2+}$	1.2×10^5	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.25 mol L^{-1} HCl and (0.01-0.05) × 10^{-4} mol L^{-1} $Yb(ClO_4)_3$.	86A161
22.3.40	**Ascorbate radical anion**							
	$Ru(bpy)_3^+ + A^{\bullet -} + H^+ \rightarrow Ru(bpy)_3^{2+} + AH^-$	1×10^9	4			f.p./rq	D.k. at 500 nm in soln. contg. 0.5 mol L^{-1} ascorbic acid, 0.5 mol L^{-1} ascorbate ion (RQ) and 5 × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$.	79F045
22.3.41	**1,4-Benzoquinone**							
	$Ru(bpy)_3^+ + Q \rightarrow Ru(bpy)_3^{2+} + Q^{\bullet -}$	$>2 \times 10^9$	6.9	0.04		f.p./rq	D.k. in soln. contg. 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$, hydroquinone (RQ) a. 10^{-4} mol L^{-1} benzoquinone.	81A042
22.3.42	**2,2′-Bipyridine, conjugate acid**							
	$Ru(bpy)_3^+ + bpyH^+ \rightarrow Ru(bpy)_3^{2+} + bpyH^{\bullet}$	2×10^9			25	f.p./rq	Soln. contg. $Ru(bpy)_3^{2+}$, 0.1 mol L^{-1} ascorbate ion (RQ), 0.01 mol L^{-1} phosphate and bipyridine.	82A278
22.3.43	**1,1′-Bis(4-sulfonatobenzyl)-4,4′-bipyridinium zwitterion**							
	$Ru(bpy)_3^+ + BSV \rightarrow Ru(bpy)_3^{2+} + BSV^{\bullet -}$	5.7×10^9	10		24	p.r.	P.b.k. at 590 nm in soln. contg. 0.01 mol L^{-1} *tert*-BuOH, 2 × 10^{-5} mol L^{-1} BSV and 6.6 × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$.	85A064
22.3.44	**4-Bromophenoxyl**							
	$Ru(bpy)_3^+ + 4\text{-}BrC_6H_4O^{\bullet} \rightarrow Ru(bpy)_3^{2+} + 4\text{-}BrC_6H_4O^-$	1.0×10^{10}	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.1-40) × 10^{-3} mol L^{-1} 4-bromophenoxide ion (RQ).	82A365
22.3.45	**Carbon dioxide radical anion**							
	$Ru(bpy)_3^+ + CO_2^{\bullet -} \rightarrow Ru(bpy)_2(bpyCO_2)$	1.9×10^9	~7-12			p.r.	P.b.k. at 390 nm in Ar-satd. soln. contg. (5-10) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and 0.5 mol L^{-1} formate ion; value obtained from computer fit. Product undergoes protonation by H_2O and $H_2PO_4^{2-}$, $k = 290$ s^{-1} and 3.2 × 10^5 L mol^{-1} s^{-1}, respectively.	91A218
22.3.46	**4-Carboxyphenoxyl, conjugate base**							
	$Ru(bpy)_3^+ + 4\text{-}^-O_2CC_6H_4O^{\bullet} \rightarrow {}^{2+} + 4\text{-}^-O_2CC_6H_4O^-$	9.8×10^9	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.1-40) × 10^{-3} mol L^{-1} 4-hydroxybenzoate dianion (RQ).	82A365
22.3.47	**4-Chlorophenoxyl**							
	$Ru(bpy)_3^+ + 4\text{-}ClC_6H_4O^{\bullet} \rightarrow Ru(bpy)_3^{2+} + 4\text{-}ClC_6H_4O^-$	1.0×10^{10}	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.1-40) × 10^{-3} mol L^{-1} 4-chlorophenoxide ion (RQ).	82A365

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.3	**Tris(2,2′-bipyridine)ruthenium(II) ion, electron adduct** — Continued							
22.3.48	**1,1′-Dimethyl-4,4′-bipyridinium**							
	$Ru(bpy)_3^+ + MV^{2+} \rightarrow Ru(bpy)_3^{2+} + MV^{\cdot+}$	3.5×10^9	13	0.1		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.13 mol L^{-1} 2-PrOH, $Ru(bpy)_3^{2+}$ and MV^{2+}; $k_r = 2.1 \times 10^{-4}$ L mol^{-1} s^{-1} calculated from K_{eq} and k_f.	91A081 91A198
		1.6×10^9	4-5	0.5	25	f.p./rq	D.k. at 490 nm in soln. contg. $Ru(bpy)_3^{2+}$, 1.0 mol L^{-1} ascorbate ion (RQ) and MV^{2+}.	82A145
22.3.49	**Duroquinone**							
	$Ru(bpy)_3^+ + DQ \rightarrow Ru(bpy)_3^{2+} + [DQ]^{\cdot-}$	4.0×10^9	6-7		24	f.p./pi	D.k. at 510 nm in soln. contg. 2×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.61-3.0) $\times 10^{-6}$ mol L^{-1} DQ.	771093
22.3.50	**4-Ethoxyphenoxyl**							
	$Ru(bpy)_3^+ + 4\text{-}EtOC_6H_4O^{\cdot} \rightarrow Ru(bpy)_3^{2+} + 4\text{-}EtOC_6H_4O^-$	1.2×10^{10}	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) $\times 10^{-4}$ mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.1-40) $\times 10^{-3}$ mol L^{-1} 4-ethoxyphenoxide n (RQ).	82A365
22.3.51	**4-Ethylphenoxyl**							
	$Ru(bpy)_3^+ + 4\text{-}EtC_6H_4O^{\cdot} \rightarrow Ru(bpy)_3^{2+} + 4\text{-}EtC_6H_4O^-$	7.2×10^9	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) $\times 10^{-4}$ mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.1-40) $\times 10^{-3}$ mol L^{-1} 4-ethylphenoxide ion (RQ).	82A365
22.3.52	**2-Hydroxy-2,2-dimethylethy**							
	$Ru(bpy)_3^+ + {}^{\cdot}CH_2C(CH_3)_2OH \rightarrow Ru(bpy)_2[bpyCH_2C(CH_3)_2OH]^+$	1.9×10^9	~7-12			p.r.	P.b.k. at 390 nm in Ar-satd. soln. contg. (5-10) $\times 10^{-5}$ mol L^{-1} $Ru(bpy)_3^{2+}$ and 0.5 mol L^{-1} *tert*-BuOH; value obtained from computer fit. Product undergoes protonation by H_2O and $H_2PO_4^{2-}$, k = 530 s^{-1} and 1.3×10^5 L mol^{-1} s^{-1}, respectively.	91A218
22.3.53	**1-Hydroxyethyl**							
	$Ru(bpy)_3^+ + CH_3\dot{C}HOH \rightarrow Ru(bpy)_2(bpyCHOHCH_3)^+$	1.9×10^9				p.r.	P.b.k. at 390 nm in Ar-satd. soln. contg. (5-10) $\times 10^{-5}$ mol L^{-1} $Ru(bpy)_3^{2+}$ and 0.5 mol L^{-1} EtOH; value obtained from computer fit. Product undergoes protonation by H_2O and $H_2PO_4^{2-}$, k = 140 s^{-1} and 1.1×10^5 L mol^{-1} s^{-1}, respectively.	91A218
22.3.54	**Hydroxymethyl**							
	$Ru(bpy)_3^+ + {}^{\cdot}CH_2OH \rightarrow Ru(bpy)_2(bpyCH_2OH)^{\cdot}$	1.9×10^9				p.r.	P.b.k. at 390 nm in Ar-satd. soln. contg. (5-10) $\times 10^{-5}$ mol L^{-1} $Ru(bpy)_3^{2+}$ and 0.5 mol L^{-1} MeOH; value obtained from computer fit. Product undergoes protonation by H_2O and $H_2PO_4^{2-}$, k = 410 s^{-1} and 1.3×10^5 L mol^{-1} s^{-1}, respectively.	91A218
22.3.55	**1-Hydroxy-1-methylethy**							
	$Ru(bpy)_3^+ + (CH_3)_2\dot{C}OH \rightarrow Ru(bpy)_2[bpyCOH(CH_3)_2]^+$	1.9×10^9				p.r.	P.b.k. at 390 nm in Ar-satd. soln. contg. (5-10) $\times 10^{-5}$ mol L^{-1} $Ru(bpy)_3^{2+}$ and 0.5 mol L^{-1} 2-PrOH; value obtained from computer fit. Product undergoes protonation by H_2O and $H_2PO_4^{2-}$, k = 85 s^{-1} and 3.4 $\times 10^4$ L mol^{-1} s^{-1}, respectively.	91A218

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.3	**Tris(2,2′-bipyridine)ruthenium(II) ion, electron adduct** — Continued							
22.3.56	**4-Iodophenoxyl**							
	$Ru(bpy)_3^+ + 4\text{-}IC_6H_4O^\bullet \rightarrow Ru(bpy)_3^{2+} + 4\text{-}IC_6H_4O^-$	1.1×10^{10}	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.1-40) × 10^{-3} mol L^{-1} 4-iodophenoxide ion (RQ).	82A365
22.3.57	**4-Isopropylphenoxyl**							
	$Ru(bpy)_3^+ + 4\text{-}(CH_3)_2CC_6H_4O^\bullet \rightarrow Ru(bpy)_3^{2+} + 4\text{-}(CH_3)_2CC_6H_4O^-$	1.2×10^{10}	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.1-40) × 10^{-3} mol L^{-1} 4-isopropylphenoxide ion (RQ).	82A365
22.3.58	**4-Methoxy-*N,N*-dimethylaniline radical cation**							
	$Ru(bpy)_3^+ + [4\text{-}CH_3OC_6H_4N(CH_3)_2]^{\bullet+} \rightarrow Ru(bpy)_3^{2+} + 4\text{-}CH_3OC_6H_4N(CH_3)_2$	9.6×10^9	7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.1-40) × 10^{-3} mol L^{-1} 4-methoxy-*N,N*-dimethylaniline (RQ).	82A365
22.3.59	**3-Methoxyphenoxyl**							
	$Ru(bpy)_3^+ + 3\text{-}CH_3OC_6H_4O^\bullet \rightarrow Ru(bpy)_3^{2+} + 3\text{-}CH_3OC_6H_4O^-$	7.2×10^9	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.1-40) × 10^{-3} mol L^{-1} 3-methoxyphenoxide ion (RQ).	82A365
22.3.60	**4-Methoxyphenoxyl**							
	$Ru(bpy)_3^+ + 4\text{-}CH_3OC_6H_4O^\bullet \rightarrow Ru(bpy)_3^{2+} + 4\text{-}CH_3OC_6H_4O^-$	1.2×10^{10}	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.1-40) × 10^{-3} mol L^{-1} 4-methoxyphenoxide ion (RQ).	82A365
22.3.61	**3-Methylphenoxyl**							
	$Ru(bpy)_3^+ + 3\text{-}CH_3C_6H_4O^\bullet \rightarrow Ru(bpy)_3^{2+} + 3\text{-}CH_3C_6H_4O^-$	8.1×10^9	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.1-40) × 10^{-3} mol L^{-1} 3-methylphenoxide ion (RQ).	82A365
22.3.62	**4-Methylphenoxyl**							
	$Ru(bpy)_3^+ + 4\text{-}CH_3C_6H_4O^\bullet \rightarrow Ru(bpy)_3^{2+} + 4\text{-}CH_3C_6H_4O^-$	1.1×10^{10}	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.1-40) × 10^{-3} mol L^{-1} 4-methylphenoxide ion (RQ).	82A365
22.3.63	**Phenoxyl**							
	$Ru(bpy)_3^+ + C_6H_5O^\bullet \rightarrow Ru(bpy)_3^{2+} + C_6H_5O^-$	5.3×10^9	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.1-40) × 10^{-3} mol L^{-1} phenoxide ion (RQ).	82A365
22.3.64	**4-Phenylphenoxyl**							
	$Ru(bpy)_3^+ + 4\text{-}PhC_6H_4O^\bullet \rightarrow Ru(bpy)_3^{2+} + 4\text{-}PhC_6H_4O^-$	7.6×10^9	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.1-40) × 10^{-3} mol L^{-1} 4-phenylphenoxide ion (RQ).	82A365
22.3.65	**2,4,6-Trimethylphenoxyl**							
	$Ru(bpy)_3^+ + 2,4,6\text{-}Me_3C_6H_2O^\bullet \rightarrow Ru(bpy)_3^{2+} + 2,4,6\text{-}Me_3C_6H_2O^-$	1.2×10^{10}	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$ and (0.1-40) × 10^{-3} mol L^{-1} 2,4,6-trimethylphenoxide ion (RQ).	82A365

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.4	**Bis(2,2′-bipyridine)(4-carboxy-4′-methyl-2,2′-bipyridine)ruthenium(II) ion, electron adduct**							
22.4.1	**Pentaammine(1-L-prolyl-L-prolinato)cobalt(III) ion**							
	$[Ru(bpy)_2(4\text{-}CO_2\text{-}4'\text{-}CH_3bpy)]^{\bullet} + Co(NH_3)_5(Pro)_2^{2+} \rightarrow [Ru(bpy)_2(4\text{-}CO_2\text{-}4'\text{-}CH_3bpy)]^{+} + Co(NH_3)_5(Pro)_2^{+}$	7.2×10^8	6.3		25	p.r.	D.k. at 350 and 500 nm in soln. contg. 6.6×10^{-5} mol L^{-1} $[Ru(bpy)_2(4\text{-}CO_2\text{-}4'\text{-}CH_3bpy)]^{+}$, $(1.3\text{-}7.7) \times 10^{-5}$ mol L^{-1} $Co(NH_3)_5(Pro)_2^{2+}$, 0.13 mol L^{-1} *tert*-BuOH and 0.005 mol L^{-1} sodium acetate buffer; studied between 5 and 50 °C., $\Delta H\ddagger = 15$ kJ mol^{-1}, $\Delta S\ddagger = -24.2$ J mol^{-1} K^{-1}.	93A434
22.5	**Bis(2,2′-bipyridine)ruthenium(II)(4-carboxy-4′-methyl-2,2′-bipyridine)(prolylprolinato)pentaamminecobalt(III), electron adduct**							
22.5.1	**Bis(2,2′-bipyridine)(4-carboxy-4′-methyl-2,2′-bipyridine)ruthenium(II) ion**							
	$[Ru(bpy)_2(4\text{-}CO\text{-}4'\text{-}CH_3bpy)(Pro)_2\text{-}Co(NH_3)_5]^{\bullet 3+} + [Ru(bpy)_2(4\text{-}CO_2\text{-}4'\text{-}CH_3bpy)]^{+} \rightarrow [Ru(bpy)_2(4\text{-}CO\text{-}4'\text{-}CH_3bpy)(Pro)_2\text{-}Co(NH_3)_5]^{4+} + [Ru(bpy)_2(4\text{-}CO_2\text{-}4'\text{-}CH_3bpy)]^{\bullet}$	6.6×10^8	6.3			p.r.	P.b.k. in soln. contg. $[Ru(bpy)_2(4\text{-}CO_2\text{-}4'\text{-}CH_3bpy)(Pro)_2\text{-}Co(NH_3)_5]^{4+}$, 0.13 mol L^{-1} *tert*-BuOH and 0.005 mol L^{-1} sodium acetate buffer.	93A434
22.6	**Bis(2,2′-bipyridine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct**							
22.6.1	**1,1′-Dimethyl-4,4′-bipyridinium**							
	$Ru(bpy)_2(bpm)^{+} + MV^{2+} \rightarrow Ru(bpy)_2(bpm)^{2+} + MV^{\bullet +}$	1.5×10^9	10-13	0.15		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, $Ru(bpy)_2(bpm)^{2+}$ and MV^{2+}; $k_r = 3.7 \times 10^2$ L mol^{-1} s^{-1} calculated from K_{eq} and k_f.	91A081 91A198
22.7	**Bis(2,2′-bipyridine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated**							
22.7.1	**1,1′-Dimethyl-4,4′-bipyridinium**							
	$Ru(bpy)_2(bpmH)^{2+} + MV^{2+} \rightarrow Ru(bpy)_2(bpm)^{2+} + MV^{\bullet +} + H^{+}$	1.8×10^6	3.0	0.14		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, $Ru(bpy)_2(bpm)^{2+}$ and MV^{2+}; $k_r = 4.5 \times 10^4$ L mol^{-1} s^{-1}.	91A081 91A198
22.8	**(2,2′-Bipyrazine)bis(2,2′-bipyridine)ruthenium(II) ion, electron adduct**							
22.8.1	**1,1′-Dimethyl-4,4′-bipyridinium**							
	$Ru(bpy)_2(bpz)^{+} + MV^{2+} \rightarrow Ru(bpy)_2(bpz)^{2+} + MV^{\bullet +}$	1.2×10^9	10-13	0.15		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, $Ru(bpy)_2(bpz)^{2+}$ and MV^{2+}; $k_r = 3.1 \times 10^3$ L mol^{-1} s^{-1} calculated from K_{eq} and k_f.	91A081 91A198
22.9	**(2,2′-Bipyrazine)bis(2,2′-bipyridine)ruthenium(II) ion, electron adduct, protonated**							
22.9.1	**1,1′-Dimethyl-4,4′-bipyridinium**							
	$Ru(bpy)_2(bpzH)^{2+} + MV^{2+} \rightarrow Ru(bpy)_2(bpz)^{2+} + MV^{\bullet +} + H^{+}$	1.9×10^5	3.0	0.14		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, $Ru(bpy)_2(bpz)^{2+}$ and MV^{2+}; $k_r = 9.3 \times 10^5$ L mol^{-1} s^{-1}.	91A081 91A198
22.10	**(2,2′-Bipyrazine)(2,2′-bipyridine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct**							
22.10.1	**1,1′-Dimethyl-4,4′-bipyridinium**							
	$Ru(bpy)(bpm)(bpz)^{+} + MV^{2+} \rightarrow Ru(bpy)(bpm)(bpz)^{2+} + MV^{\bullet +}$	1.0×10^9	10-13	0.15		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, $Ru(bpy)(bpm)(bpz)^{2+}$ and MV^{2+}; $k_r = 1.3 \times 10^5$ L mol^{-1} s^{-1} calculated from K_{eq} and k_f.	91A081 91A198

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.11	**(2,2′-Bipyrazine)(2,2′-bipyridine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated**							
22.11.1	**1,1′-Dimethyl-4,4′-bipyridinium**							
	$Ru(bpy)(bpm)(bpzH)^{2+} + MV^{2+} \rightarrow Ru(bpy)(bpm)(bpz)^{2+} + MV^{\cdot+} + H^+$	1.1×10^4	3.0	0.14		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, $Ru(bpy)(bpm)(bpz)^{2+}$ and MV^{2+}; $k_r = 7.8 \times 10^5$ L mol^{-1} s^{-1}.	91A081 91A198
22.12	**Tris(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct**							
22.12.1	**Tris(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct**							
	$Ru(bpm)_3^+ + Ru(bpm)_3^+ \rightarrow$	2.8×10^7	7.0			p.r.	D.k. at 350 and 450 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion and $Ru(bpm)_3^{2+}$. Reaction suggested to involve the protonated electron adduct; $k \sim 1.5 \times 10^7$ and $\sim 5 \times 10^7$ L mol^{-1} s^{-1}, at pH 5 and pH 6-7, respectively, and $k = 18$ s^{-1} at pH 13.0.	89A280
22	**1,1′-Dimethyl-4,4′-bipyridinium**							
	$Ru(bpm)_3^+ + MV^{2+} \rightarrow Ru(bpm)_3^{2+} + MV^{\cdot+}$	1.0×10^9	13.0			p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, (1.3) $\times 10^{-5}$ mol L^{-1} MV^{2+} and 1.0×10^{-4} mol L^{-1} $Ru(bpm)_3^{2+}$; $k_r = 1.2 \times 10^4$ L mol^{-1} s^{-1} calculated from K_{eq} and k_f [91A081].	89A280
22.12.3	**Ascorbate radical anion**							
	$Ru(bpm)_3^+ + A^{\cdot-} + H^+ \rightarrow Ru(bpm)_3^{2+} + AH^-$	2.1×10^9	10	1.0		f.p./rq	D.k. at 490 nm in soln. contg. $Ru(bpm)_3^{2+}$ and ascorbate ion (RQ).	89A280
22.13	**Tris(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated**							
22.13.1	**1,1′-Dimethyl-4,4′-bipyridinium**							
	$Ru(bpm)_2(bpmH)^{2+} + MV^{2+} \rightarrow Ru(bpm)_3^{2+} + MV^{\cdot+} + H^+$	1.0×10^6	3.0			p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, (1.5-4.5) $\times 10^{-5}$ mol L^{-1} MV^{2+} and 1.0×10^{-4} mol L^{-1} $Ru(bpm)_3^{2+}$; $pK_a = 6.3$; $k_r = 6.3 \times 10^4$ L mol^{-1} s^{-1}.	89A280
22.14	**(2,2′-Bipyridine)bis(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct**							
22.14.1	**1,1′-Dimethyl-4,4′-bipyridinium**							
	$Ru(bpm)_2(bpy)^+ + MV^{2+} \rightarrow Ru(bpm)_2(bpy)^{2+} + MV^{\cdot+}$	1.3×10^9	10-13	0.15		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, $Ru(bpm)_2(bpy)^{2+}$ and MV^{2+}; $k_r = 3.3 \times 10^3$ L mol^{-1} s^{-1} calculated from K_{eq} and k_f.	91A081 91A198
22.15	**(2,2′-Bipyridine)bis(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated**							
22.15.1	**1,1′-Dimethyl-4,4′-bipyridinium**							
	$Ru(bpm)(bpmH)(bpy)^{2+} + MV^{2+} \rightarrow Ru(bpm)_2(bpy)^{2+} + MV^{\cdot+} + H^+$	4.7×10^5	3.0	0.14		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, $Ru(bpm)_2(bpy)^{2+}$ and MV^{2+}; $k_r = 7.2 \times 10^4$ L mol^{-1} s^{-1}.	91A081 91A198

TABLE 22. Rate constants for ruthenium transients — Continued

Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.16 (2,2′-Bipyrazine)bis(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct							
22.16.1 1,1′-Dimethyl-4,4′-bipyridinium							
$Ru(bpm)_2(bpz)^+ + MV^{2+} \rightarrow Ru(bpm)_2(bpz)^{2+} + MV^{\cdot+}$	6.0×10^8	10-13	0.15		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, $Ru(bpm)_2(bpz)^{2+}$ and MV^{2+}; $k_r = 7.9 \times 10^5$ L mol^{-1} s^{-1} calculated from K_{eq} and k_f.	91A081 91A198
22.17 (2,2′-Bipyrazine)bis(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated							
22.17.1 1,1′-Dimethyl-4,4′-bipyridinium							
$Ru(bpm)_2(bpzH)^{2+} + MV^{2+} \rightarrow Ru(bpm)_2(bpz)^{2+} + MV^{\cdot+} + H^+$	8.7×10^3	3.0	0.14		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, $Ru(bpm)_2(bpz)^{2+}$ and MV^{2+}; $k_r = 1.7 \times 10^6$ L mol^{-1} s^{-1}.	91A081 91A198
22.18 Tris(2,2′-bipyrazine)ruthenium(II) ion, electron adduct							
22.18.1 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(III) ion							
$Ru(bpz)_3^+ + Co(sep)^{3+} \rightarrow Ru(bpz)_3^{2+} + Co(sep)^{2+}$	3.3×10^5	10.3			p.r.	D.k. at 490 nm in N_2O-satd. soln. contg. 0.13 mol L^{-1} 2-PrOH, 1×10^{-4} mol L^{-1} $Ru(bpz)_3^{2+}$ and $<3 \times 10^{-5}$ mol L^{-1} $Co(sep)^{3+}$.	88A091
22.18.2 Oxygen							
$Ru(bpz)_3^+ + O_2 \rightarrow Ru(bpz)_3^{2+} + O_2^{\cdot-}$	5.8×10^8	11.0			f.p./rq	Soln. contg. $Ru(bpz)_3^{2+}$, EDTA (RQ) and 1.3×10^{-3} mol L^{-1} O_2.	86A120
22.18.3 Ascorbate radical anion							
$Ru(bpz)_3^+ + A^{\cdot-} + H^+ \rightarrow Ru(bpz)_3^{2+} + AH^-$	1.5×10^9	4.5-9.5	1	22	f.p./rq	D.k. in soln. contg. 5×10^{-5} mol L^{-1} $Ru(bpz)_3^{2+}$ and 3×10^{-3} mol L^{-1} ascorbate ion (RQ).	89E105
22.18.4 1,1′-Dimethyl-4,4′-bipyridinium							
$Ru(bpz)_3^+ + MV^{2+} \rightarrow Ru(bpz)_3^{2+} + MV^{\cdot+}$	1.3×10^8	10-13	0.15		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, $Ru(bpz)_3^{2+}$ and MV^{2+}; $k_r = 1.7 \times 10^7$ L mol^{-1} s^{-1}.	91A081 91A198
	3.8×10^8	12	1.0	22	f.p./rq	D.k. at 490 nm and p.b.k. at 440 and 605 nm in soln. contg. $Ru(bpz)_3^{2+}$, 0.05 mol L^{-1} triethanolamine (RQ) and 2 and 5×10^{-4} mol L^{-1} MV^{2+}; $k = 5 \times 10^8$ L mol^{-1} s^{-1} was obtained using 2×10^{-4} mol L^{-1} MV^{2+} and $(CH_3)_2NCH_2CH_2S^-$ as RQ.	89E105
22.19 Tris(2,2′-bipyrazine)ruthenium(II) ion, electron adduct, protonated							
22.19.1 1,1′-Dimethyl-4,4′-bipyridinium							
$Ru(bpz)_2(bpzH)^{2+} + MV^{2+} \rightarrow Ru(bpz)_3^{2+} + MV^{\cdot+} + H^+$	4.4×10^4	3.0	0.14		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, $Ru(bpz)_3^{2+}$ and MV^{2+}; $k_r = 3.3 \times 10^7$ L mol^{-1} s^{-1}.	91A081 91A198
22.19.2 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(III) ion							
$Ru(bpz)_2(bpzH)^{2+} + Co(sep)^{3+} \rightarrow Ru(bpz)_3^{2+} + Co(sep)^{2+} + H^+$	$<10^3$	4.0			p.r.	No reaction obs. in the presence of 0.1 mol L^{-1} $Co(sep)^{3+}$ in N_2O-satd. soln. contg. 0.13 mol L^{-1} 2-PrOH and 1×10^{-4} mol L^{-1} $Ru(bpz)_3^{2+}$; pK_a of protonated electron adduct = 7.1.	88A091

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1}·s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.20	**Bis(2,2′-bipyrazine)(2,2′-bipyridine)ruthenium(II) ion, electron adduct**							
22.20.1	**1,1′-Dimethyl-4,4′-bipyridinium**							
	$Ru(bpz)_2(bpy)^+ + MV^{2+} \rightarrow Ru(bpz)_2(bpy)^{2+} + MV^{\cdot+}$	8.0×10^8	10-13	0.15		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, $Ru(bpz)_2(bpy)^{2+}$ and MV^{2+}; $k_r = 4.8 \times 10^5$ L mol^{-1} s^{-1} calculated from K_{eq} and k_f.	91A081 91A198
22.21	**Bis(2,2′-bipyrazine)(2,2′-bipyridine)ruthenium(II) ion, electron adduct, protonated**							
22.21.1	**1,1′-Dimethyl-4,4′-bipyridinium**							
	$Ru(bpz)(bpzH)(bpy)^{2+} + MV^{2+} \rightarrow Ru(bpz)_2(bpy)^{2+} + MV^{\cdot+} + H^+$	9.0×10^4	3.0	0.14		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, $Ru(bpz)_2(bpy)^{2+}$ and MV^{2+}; $k_r = 4.5 \times 10^6$ L mol^{-1} s^{-1}.	91A081 91A198
22.22	**Bis(2,2′-bipyrazine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct**							
22.22.1	**1,1′-Dimethyl-4,4′-bipyridinium**							
	$Ru(bpz)_2(bpm)^+ + MV^{2+} \rightarrow Ru(bpz)_2(bpm)^{2+} + MV^{\cdot+}$	5.3×10^8	10-13	0.15		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, $Ru(bpz)_2(bpm)^{2+}$ and MV^{2+}; $k_r = 7.2 \times 10^6$ L mol^{-1} s^{-1} calculated from K_{eq} and k_f.	91A081 91A198
22.23	**Bis(2,2′-bipyrazine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated**							
22.23.1	**1,1′-Dimethyl-4,4′-bipyridinium**							
	$Ru(bpz)(bpzH)(bpm)^{2+} + MV^{2+} \rightarrow Ru(bpz)_2(bpm)^{2+} + MV^{\cdot+} + H^+$	3.0×10^4	3.0	0.14		p.r.	P.b.k. at 602 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} formate ion, $Ru(bpz)_2(bpm)^{2+}$ and MV^{2+}; $k_r = 8.1 \times 10^6$ L mol^{-1} s^{-1}.	91A081 91A198
22.24	**Tris(2,2′-bipyridine)ruthenium(II) ion, OH-adduct**							
22.24.1	**Tris(2,2′-bipyridine)ruthenium(II) ion, OH-adduct**							
	$Ru(bpy)_3\text{-}OH^{2+} + Ru(bpy)_3\text{-}OH^{2+} \rightarrow$	6×10^6	~7		21	p.r.	D.k. at 750 nm in N_2O-satd. soln. contg. $Ru(bpy)_3^{2+}$; mixt. of adducts; unclear whether k or $2k$.	86A034
		$(5\text{-}10) \times 10^6$	5-11	1.0	25	p.r.	D.k. at 750 nm in N_2O-satd. soln. contg. $Ru(bpy)_3^{2+}$.	757415
22.24.2	**Ferricyanide ion**							
	$Ru(bpy)_3\text{-}OH^{2+} + Fe(CN)_6^{3-} \rightarrow$	4.1×10^5	9.7			p.r.	D.k. at 800 nm and p.b.k. at 479 nm in N_2O-satd. soln. contg. $(1\text{-}6) \times 10^{-4}$ mol L^{-1} $Ru(bpy)_3^{2+}$ and $(1.32\text{-}5.97) \times 10^{-4}$ mol L^{-1} $Fe(CN)_6^{3-}$; $k = 3.4 \times 10^5$ L mol^{-1} s^{-1} by condy. measurement.	90A015
22.25	**Tris(2,2′-bipyrazine)ruthenium(II) ion, OH-adduct**							
22.25.1	**Tris(2,2′-bipyrazine)ruthenium(II) ion, OH-adduct**							
	$Ru(bpz)_3\text{-}OH^{2+} + Ru(bpz)_3\text{-}OH^{2+} \rightarrow$	$\sim 4 \times 10^8$	4.0			p.r.	D.k. at 450 nm in N_2O-satd. soln. contg. $Ru(bpz)_3^{2+}$; unclear whether k or $2k$.	88A091
22.26	**Bis(2,2′-bipyridine)(dipyrido[3,2-*a*:2′,3′-*c*]phenazine)ruthenium(II) ion, electron adduct, diprotonated**							
22.26.1	**Bis(2,2′-bipyridine)(dipyrido[3,2-*a*:2′,3′-*c*]phenazine)ruthenium(II) ion, electron adduct, diprotonated**							
	$Ru(bpy)_2(dppzH_2)^{3+} + Ru(bpy)_2(dppzH_2)^{3+} \rightarrow Ru(bpy)_2(dppz)^{2+} + Ru(bpy)_2(dppzH_2)^{2+} + 2\,H^+$	1.2×10^8	3			p.r.	D.k. at 390 nm in N_2O-satd. soln. contg. $Ru(bpy)_2(dppz)^{2+}$ and 0.1 mol L^{-1} formate ion; pK_a of reduced species = 4 and 10.	89A312

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.27	**Bis(2,2′-bipyridine)(dipyrido[3,2-*a*:2′,3′-*c*]phenazine)ruthenium(II) ion, electron adduct, protonated**							
22.27.1	**Bis(2,2′-bipyridine)(dipyrido[3,2-*a*:2′,3′-*c*]phenazine)ruthenium(II) ion, electron adduct, protonated**							
	$Ru(bpy)_2(dppzH)^{2+}$ + $Ru(bpy)_2(dppzH)^{2+}$ → $Ru(bpy)_2(dppz)^{2+}$ + $Ru(bpy)_2(dppzH_2)^{2+}$	4.7×10^8	7			p.r.	D.k. at 390 nm in N_2O-satd. soln. contg. $Ru(bpy)_2(dppz)^{2+}$ and 0.1 mol L^{-1} formate ion; pK_a of reduced species = 4 and 10.	89A312
22.28	**Bis(2,2′-bipyridine)(dipyrido[3,2-*a*:2′,3′-*c*]phenazine)ruthenium(II) ion, electron adduct**							
22.28.1	**Bis(2,2′-bipyridine)(dipyrido[3,2-*a*:2′,3′-*c*]phenazine)ruthenium(II) ion, electron adduct**							
	2 $Ru(bpy)_2(dppz)^+$ + 2 H_2O → $Ru(bpy)_2(dppz)^{2+}$ + $Ru(bpy)_2(dppzH_2)^{2+}$ + 2 OH^-	4.3×10^8	12-13			p.r.	D.k. at 390 nm in N_2O-satd. soln. contg. $Ru(bpy)_2(dppz)^{2+}$ and 0.1 mol L^{-1} formate ion; pK_a of reduced species = 4 and 10.	89A312
22.28.2	**1,1′-Dimethyl-4,4′-bipyridinium**							
	$Ru(bpy)_2(dppz)^+$ + MV^{2+} → $Ru(bpy)_2(dppz)^{2+}$ + $MV^{\bullet+}$	1.6×10^9	13			p.r.	P.b.k. in N_2O-satd. soln. contg. $Ru(bpy)_2(dppz)^{2+}$ and 0.1 mol L^{-1} formate ion; at pH 3 and 7 the reduction of $Ru(bpy)_2(dppz)^{2+}$ by $MV^{\bullet+}$ was observed; pK_a of the reduced species = 4 and 10.	89A312
22.29	**Bis(2,2′-bipyridine)(6,7-dihydro-5,8-dimethyldibenzo[*b*,*j*][1,10]phenanthroline)ruthenium(II) ion, electron adduct**							
22.29.1	**4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]tricosaneeuropium(III) ion**							
	$Ru(bpy)_2(DMCH)^+$ + $[Eu\ 2.2.1]^{3+}$ → $Ru(bpy)_2(DMCH)^{2+}$ + $[Eu\ 2.2.1]^{2+}$	5.9×10^7		1	22	f.p./rq	D.k. at 500 nm in soln. contg. $Ru(bpy)_2(DMCH)^{2+}$, excess $[Eu\ 2.2.1]^{2+}$ (RQ) and 1 mol L^{-1} KCl.	86E195
22.30	**Tris(4,4′-dimethyl-2,2′-bipyridine)ruthenium(II) ion, electron adduct**							
22.30.1	**Copper(II) ion**							
	$Ru(4,4'\text{-}Me_2bpy)_3^+$ + Cu^{2+} → $Ru(4,4'\text{-}Me_2bpy)_3^{2+}$ + Cu^+	3.7×10^8	6.6	0.04	25	p.r.	D.k. at 510 nm in soln. contg. $Ru(4,4'\text{-}Me_2bpy)_3^{2+}$, 0.5 mol L^{-1} *tert*-BuOH and cacodylate buffer.	78A090
22.30.2	**Europium(III) ion**							
	$Ru(4,4'\text{-}Me_2bpy)_3^+$ + Eu^{3+} → $Ru(4,4'\text{-}Me_2bpy)_3^{2+}$ + Eu^{2+}	4.5×10^7		0.5	25	f.p./rq	D.k. at 490-510 nm in soln. contg. $(0.3\text{-}3.0) \times 10^{-4}$ mol L^{-1} $Ru(4,4'\text{-}Me_2bpy)_3^{2+}$ and ~0.1 mol L^{-1} Eu^{2+} (RQ).	78A087
22.31	**Tris(1,10-phenanthroline)ruthenium(II) ion, electron adduct**							
22.31.1	**Copper(II) ion**							
	$Ru(phen)_3^+$ + Cu^{2+} → $Ru(phen)_3^{2+}$ + Cu^+	4.7×10^8	6.6	0.04	25	p.r.	D.k. at 510 nm in soln. contg. $Ru(phen)_3^{2+}$, 0.5 mol L^{-1} *tert*-BuOH and cacodylate buffer.	78A090
22.31.2	**Europium(III) ion**							
	$Ru(phen)_3^+$ + Eu^{3+} → $Ru(phen)_3^{2+}$ + Eu^{2+}	5.2×10^7		0.5	25	f.p./rq	D.k. at 490-510 nm in soln. contg. $(0.3\text{-}3.0) \times 10^{-4}$ mol L^{-1} $Ru(phen)_3^{2+}$ and ~0.1 mol L^{-1} Eu^{2+} (RQ).	78A087
22.32	**Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(II) ion, electron adduct**							
22.32.1	**Europium(III) ion**							
	$Ru(4,7\text{-}Me_2phen)_3^+$ + Eu^{3+} → $Ru(4,7\text{-}Me_2phen)_3^{2+}$ + Eu^{2+}	5.7×10^7		0.5	25	f.p./rq	D.k. at 490-510 nm in soln. contg. $(0.3\text{-}3.0) \times 10^{-4}$ mol L^{-1} $Ru(4,7\text{-}Me_2phen)_3^{2+}$ and ~0.1 mol L^{-1} Eu^{2+} (RQ).	78A087

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.33	**Tris(5-chloro-1,10-phenanthroline)ruthenium(II) ion, electron adduct**							
22.33.1	**Copper(II) ion**							
	$Ru(5\text{-}Clphen)_3^{+} + Cu^{2+} \rightarrow Ru(5\text{-}Clphen)_3^{2+} + Cu^{+}$	2.6×10^8	6.6	0.04	25	p.r.	D.k. at 510 nm in soln. contg. $Ru(5\text{-}Clphen)_3^{2+}$, 0.5 mol L^{-1} *tert*-BuOH and cacodylate buffer.	78A090
22.33.2	**Europium(III) ion**							
	$Ru(5\text{-}Clphen)_3^{+} + Eu^{3+} \rightarrow Ru(5\text{-}Clphen)_3^{2+} + Eu^{2+}$	1.6×10^7		0.5	25	f.p./rq	D.k. at 490-510 nm in soln. contg. $(0.3\text{-}3.0) \times 10^{-4}$ mol L^{-1} $Ru(5\text{-}Clphen)_3^{2+}$ and ~0.1 mol L^{-1} Eu^{2+} (RQ).	78A087
22.34	**Tris(1,4,5,8-tetraazaphenanthrene)ruthenium(II) ion, electron adduct, protonated**							
22.34.1	**Tris(1,4,5,8-tetraazaphenanthrene)ruthenium(II) ion, electron adduct, protonated**							
	$Ru(TAP)_2(TAPH)^{2+} + Ru(TAP)_2(TAPH)^{2+} \rightarrow$	1.0×10^9	5			f.p./rq	D.k. at 470 nm in Ar- or O_2-satd. soln. contg. 6×10^{-5} mol L^{-1} $Ru(TAP)_3^{2+}$ and 10^{-2} mol L^{-1} guanosine 5′-monophosphate (RQ); $pK_a = 7.6$; unclear whether k or $2k$.	92R075
22.35	**Tris(1,4,5,8-tetraazaphenanthrene)ruthenium(II) ion, electron adduct**							
22.35.1	**Oxygen**							
	$Ru(TAP)_3^{+} + O_2 \rightarrow Ru(TAP)_3^{2+} + O_2^{\cdot -}$	1.9×10^7 4.4×10^7 8.4×10^7 2.2×10^8	7.5 8.0 8.4 8.9			f.p./rq	D.k. at 470 nm in O_2-satd. soln. contg. 6×10^{-5} mol L^{-1} $Ru(TAP)_3^{2+}$ and 10^{-2} mol L^{-1} guanosine 5′-monophosphate (RQ).	92R075
22.35.2	**1,4-Benzosemiquinone, radical ion**							
	$Ru(TAP)_3^{+} + Q^{\cdot -} + 2\,H^{+} \rightarrow Ru(TAP)_3^{2+} + QH_2$	$\sim 5 \times 10^9$				f.p./rq	D.k. at 480 nm in soln. contg. 1.1×10^{-4} mol L^{-1} $Ru(TAP)_3^{2+}$ and 10^{-2} mol L^{-1} hydroquinone (RQ).	87A267
22.35.3	**1,4-Benzoquinone**							
	$Ru(TAP)_3^{+} + Q \rightarrow Ru(TAP)_3^{2+} + Q^{\cdot -}$	4.3×10^8 5.6×10^8	6.5 8.4			f.p./rq	D.k. at 470 nm in Ar-satd. soln. contg. 10^{-4} mol L^{-1} $Ru(TAP)_3^{2+}$, 10^{-2} mol L^{-1} guanosine 5′-monophosphate (RQ) and 8×10^{-5} mol L^{-1} benzoquinone. Change in k with pH attributed to protonation of $Ru(TAP)_3^{+}$; pK_a $Ru(TAP)_2(TAPH)^{2+} = 7.6$.	92R075
22.35.4	**Guanosine 5'-monophosphate radical**							
	$Ru(TAP)_3^{+} + [GMP(\text{-}H)]^{\cdot} + H^{+} \rightarrow Ru(TAP)_3^{2+} + GMP$	1.0×10^9 1.5×10^9	6 9			f.p./rq	D.k. at 470 nm in Ar-satd. soln. contg. 10^{-4} mol L^{-1} $Ru(TAP)_3^{2+}$ and 10^{-2} mol L^{-1} GMP (RQ); pK_a $(GMP^{\cdot +}) = 4$, pK_a $Ru(TAP)_2(TAPH)^{2+} = 7.6$.	92R075
22.36	***trans*-Tetraammine(aqua)nitrosylruthenium(II) ion**							
22.36.1	**Pentaammine(nitroso)ruthenium(III) ion**							
	trans-$Ru(NH_3)_4NO(H_2O)^{2+} + Ru(NH_3)_5NO^{3+} \rightarrow$ *trans*-$Ru(NH_3)_4NO(H_2O)^{3+} + Ru(NH_3)_5NO^{2+}$	8	7.5	0.4	26.0	γ-r.	Kinetic anal. of zero-order k_{obs} in N_2O-satd. soln. contg. 2.0×10^{-3} mol^{-1} L^{-1} $Ru(NH_3)_5NO^{3+}$ and 0.4 mol L^{-1} HCO_2^{-}.	78A110

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.37	**Pentaamminenitrosylruthenium(II) ion**							
22.37.1	**Water**							
	$Ru(NH_3)_5NO^{2+} + H_2O \rightarrow$ *trans*-$Ru(NH_3)_4NO(H_2O)^{2+} + NH_3$	1.8×10^{-2} s^{-1}	7.1	0.4	25.0	γ-r.	Kinetic anal. of abs. increase at 315 nm in N_2O-satd. soln. contg. 1.7×10^{-3} mol^{-1} L^{-1} $Ru(NH_3)_5NO^{3+}$ and 0.4 mol L^{-1} HCO_2^- (or 2-PrOH); $\Delta H\ddagger$ = 99.2 kJ mol^{-1}, $\Delta S\ddagger$ = 45.2 J K^{-1} mol^{-1}.	78A110
22.37.2	**2-Hydroxy-2,2-dimethylethyl**							
	$Ru(NH_3)_5NO^{2+} + {}^{\bullet}CH_2C(CH_3)_2OH \rightarrow Ru(NH_3)_5N(O)CH_2C(CH_3)_2OH^{2+}$	3.7×10^9	6.0-7.5			p.r.	D.k. at 280 nm and p.b.k. in Ar-satd. soln. contg. $Ru(NH_3)_5NO^{3+}$ and 0.3 mol L^{-1} *tert*-BuOH.	79A134
		3.7×10^9	1.0-10.3		23	p.r.	D.k. at 280 nm and p.b.k. in deoxygenated soln. contg. (5-50) × 10^{-4} mol L^{-1} $Ru(NH_3)_5NO^{3+}$ and 0.1-2 mol L^{-1} *tert*-BuOH.	751077
22.37.3	**2-Amino-2-carboxy-2-methylethyl**							
	$Ru(NH_3)_5NO^{2+} + {}^{\bullet}CH_2C(CH_3)(NH_3^+)CO_2^- \rightarrow Ru(NH_3)_5N(O)CH_2C(CH_3)(NH_3)CO_2^{2+}$	3.1×10^9	6.0-7.5			p.r.	D.k. at 280 nm and p.b.k. in Ar-satd. soln. contg. $Ru(NH_3)_5NO^{3+}$ and 0.3 mol L^{-1} α-aminoisobutyrate ion.	79A134
22.37.4	**(*N*-Acetyl-*N*-methylamino)methyl**							
	$Ru(NH_3)_5NO^{2+} + {}^{\bullet}CH_2N(CH_3)C(O)CH_3 \rightarrow Ru(NH_3)_5N(O)CH_2N(CH_3)C(O)CH_3^{2+}$	2.9×10^9	6.0-7.5			p.r.	D.k. at 280 nm and p.b.k. in Ar-satd. soln. contg. $Ru(NH_3)_5NO^{3+}$ and 0.3 mol L^{-1} *N,N*-dimethylacetamide.	79A134
22.37.5	**2-Amino-2-methylpropyl, conjugate acid**							
	$Ru(NH_3)_5NO^{2+} + {}^{\bullet}CH_2C(CH_3)_2NH_3^+ \rightarrow Ru(NH_3)_5N(O)CH_2C(CH_3)_2NH_3^{3+}$	2.0×10^9	7.0			p.r.	D.k. at 280 nm and p.b.k. in Ar-satd. soln. contg. 5×10^{-4} mol L^{-1} $Ru(NH_3)_5NO^{3+}$ and 0.3 mol L^{-1} *tert*-butylamine.	79A134
22.37.6	**2-Carboxy-2-hydroxy-2-methylethyl, anion**							
	$Ru(NH_3)_5NO^{2+} + {}^{\bullet}CH_2C(CH_3)(OH)CO_2^- \rightarrow Ru(NH_3)_5N(O)CH_2C(CH_3)(OH)CO_2^+$	3.0×10^9	7.0			p.r.	D.k. at 280 nm and p.b.k. in Ar-satd. soln. contg. 5×10^{-4} mol L^{-1} $Ru(NH_3)_5NO^{3+}$ and 0.3 mol L^{-1} α-hydroxyisobutyrate ion.	79A134
22.37.7	**2-Carboxy-2,2-dimethylethyl anion**							
	$Ru(NH_3)_5NO^{2+} + {}^{\bullet}CH_2C(CH_3)_2CO_2^- \rightarrow Ru(NH_3)_5N(O)CH_2C(CH_3)_2CO_2^+$	2.9×10^9	6.3			p.r.	P.b.k. at 343 nm and d.k. at 280 nm in Ar-satd. soln. contg. 5×10^{-4} mol L^{-1} $Ru(NH_3)_5NO^{3+}$ and 0.3 mol L^{-1} pivalate ion.	79A134
22.37.8	**Oxygen**							
	$Ru(NH_3)_5NO^{2+} + O_2 \rightarrow$	7.6×10^6				p.r.	D.k. at 280 nm in air-satd. soln. contg. $Ru(NH_3)_5NO^{3+}$.	751049
22.37.9	**2-Hydroxy-2,2-dimethylethylperoxyl**							
	$Ru(NH_3)_5NO^{2+} + (CH_3)_2C(OH)CH_2OO^{\bullet} \rightarrow$	3×10^9				p.r.	D.k. in air-satd. soln. contg. 1×10^{-3} mol L^{-1} $Ru(NH_3)_5NO^{3+}$ and 1 mol L^{-1} *tert*-BuOH. Authors suggested that oxidation to $Ru(NH_3)_5NO^{3+}$ could occur.	751077
22.38	**Decaammine(dinitrogen)diruthenium(I-II) ion**							
22.38.1	**Water**							
	$[(NH_3)_5RuN_2Ru(NH_3)_5]^{3+} + H_2O \rightarrow Ru(NH_3)_5N_2^{2+}$ + other products	8.0×10^4 s^{-1}	7.2		23.5	p.r.	D.k. at 500 nm in N_2-satd. soln. contg. 1×10^{-4} mol L^{-1} $[(NH_3)_5RuN_2Ru(NH_3)_5]^{4+}$ and 0.1 mol L^{-1} *tert*-BuOH; other products include Ru(I)-Ru(0) species.	82A135

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.39	**Decaammine(dinitrogen)diruthenium(II) ion, OH-adduct**							
22.39.1	**First-order reaction**							
	$[(NH_3)_5RuN_2Ru(NH_3)_5]\text{-}OH^{4+} \rightarrow [(NH_3)_5RuN_2Ru(NH_3)_5]^{5+} + OH^-$	1.4×10^4 s^{-1}	6.8		23.5	p.r.	D.k. at 435 nm in N_2O-satd. soln. contg. 1×10^{-4} mol L^{-1} $[(NH_3)_5RuN_2Ru(NH_3)_5]^{4+}$.	82A135
22.40	**Decaammine(dinitrogen)diruthenium(II-III) ion**							
22.40.1	**Water**							
	$[(NH_3)_5RuN_2Ru(NH_3)_5]^{5+} + H_2O \rightarrow Ru(NH_3)_5N_2^{2+} + Ru(NH_3)_5OH^{2+} + H^+$	0.16 s^{-1}	6.8		23.5	p.r.	D.k. at 235 nm in N_2O-satd. soln. contg. $(2\text{-}5) \times 10^{-4}$ mol L^{-1} $[(NH_3)_5RuN_2Ru(NH_3)_5]^{4+}$.	82A135
22.41	**Tris(acetylacetonato)ruthenate(II) ion**							
22.41.1	**Hydrogen ion**							
	$Ru(acac)_3^- + H^+ \rightarrow Ru(acac)_2 + acacH$	$\leq 1 \times 10^2$	3.5-7.0		25	p.r.	Estd. from condy. change in He-satd. soln. contg. 5×10^{-4} mol L^{-1} $Ru(acac)_3$ and 0.1 mol L^{-1} *tert*-BuOH; pK_a of $Ru(acac)_3H$ <3.5.	79A297
22.41.2	**First-order reaction**							
	$Ru(acac)_3^- \rightarrow Ru(acac)_2 + acac^-$	$\leq 3 \times 10^{-2}$ s^{-1}	3.5-7.0		25	p.r.	Estd. from condy. change in He-satd. soln. contg. 5×10^{-4} mol L^{-1} $Ru(acac)_3$ and 0.1 mol L^{-1} *tert*-BuOH.	79A297
22.42	**Pentaammine(chloro)ruthenium(II) ion**							
22.42.1	**Water**							
	$Ru(NH_3)_5Cl^+ + H_2O \rightarrow Ru(NH_3)_5(H_2O)^{2+} + Cl^-$	4.7 s^{-1}			20	p.r.	D.k. at 280 nm in soln. contg. 0.1 mol L^{-1} MeOH and ~1.5×10^{-4} mol L^{-1} $Ru(NH_3)_5Cl^{2+}$.	700178
22.43	**Pentaammine(aquo)ruthenium(II) ion**							
22.43.1	**Pentaammine(chloro)ruthenium(III) ion**							
	$Ru(NH_3)_5(H_2O)^{2+} + Ru(NH_3)_5Cl^{2+} \rightarrow Ru(NH_3)_5(H_2O)^{3+} + Ru(NH_3)_5Cl^+$	1.0×10^3		0.0003	20	p.r.	D.k. at 330 nm in soln. contg. 0.1 mol L^{-1} MeOH and ~1.5×10^{-4} mol L^{-1} $Ru(NH_3)_5Cl^{2+}$.	700178
22.44	**Tris(2,2′-bipyridine)ruthenium(II) ion, H-adduct**							
22.44.1	**Tris(2,2′-bipyridine)ruthenium(II) ion, H-adduct**							
	$Ru(bpy)_3\text{-}H^{2+} + Ru(bpy)_3\text{-}H^{2+} \rightarrow Ru(bpy)_3^{2+} + Ru(bpy)_2(bpyH_2)^{2+}$	6.6×10^8	~1			p.r.	D.k. in soln. contg. $Ru(bpy)_3^{2+}$, 0.05 mol L^{-1} $HClO_4$ and 0.5 mol L^{-1} *tert*-BuOH; unclear whether k or $2k$.	720381
22.45	**Pentaammine(dinitrogen)ruthenium(III) ion**							
22.45.1	**Water**							
	$Ru(NH_3)_5N_2^{3+} + H_2O \rightarrow Ru(NH_3)_5OH^{2+} + H^+ + N_2$	260 s^{-1}			20	p.r.	P.b.k. at 310 nm and d.k. at 430 nm in N_2O-satd. soln. contg. (5.5 or 11) × 10^{-4} mol L^{-1} $Ru(NH_3)_5N_2^{2+}$; average of two values.	710234
22.46	**Hexacyanoruthenate(III) ion**							
22.46.1	**Ferrocyanide ion**							
	$Ru(CN)_6^{3-} + Fe(CN)_6^{4-} \rightarrow Ru(CN)_6^{4-} + Fe(CN)_6^{3-}$	2.8×10^6 2.4×10^7 9.6×10^7 1.7×10^8		0.03 0.075 0.24 0.44	25	f.p./pi	P.b.k. at 420 nm and d.k. at 455 nm in soln. contg 4×10^{-3} mol L^{-1} $Ru(CN)_6^{4-}$, $Fe(CN)_6^{4-}$ and KCl.	90A168

TABLE 22. Rate constants for ruthenium transients — Continued

No. Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.46 Hexacyanoruthenate(III) ion — Continued							
22.46.2 Hexacyanoosmate(II) ion							
$Ru(CN)_6^{3-} + Os(CN)_6^{4-} \rightarrow Ru(CN)_6^{4-} + Os(CN)_6^{3-}$	2.1×10^5		0.03	25	f.p./pi	D.k. at 455 nm in soln. contg $Ru(CN)_6^{4-}$ and $Os(CN)_6^{4-}$ and KCl.	90A168
	2.1×10^6		0.075				
	6.6×10^6		0.24				
	1.2×10^7		0.44				
22.47 Bis(2,2′-bipyridine)bis(cyano)ruthenium(III) ion							
22.47.1 Iron(II) sulfate							
$Ru(bpy)_2(CN)_2^+ + FeSO_4 \rightarrow Ru(bpy)_2(CN)_2 + FeSO_4^+$	2.0×10^5	0.3		20	f.p./oq	Calcd. from current-time curve; soln. contg. 0.5 mol L^{-1} H_2SO_4, 3×10^{-4} mol L^{-1} $Ru(bpy)_2(CN)_2$ and $[Fe^{2+}] = [Fe^{3+}]$ (OQ).	80E224
22.47.2 1,1′-Dimethyl-4,4′-bipyridinium radical cation							
$Ru(bpy)_2(CN)_2^+ + MV^{\cdot+} \rightarrow Ru(bpy)_2(CN)_2 + MV^{2+}$	9.4×10^9	5-7			f.p./oq	D.k. at 600 nm in soln. contg. 5.5×10^{-5} mol L^{-1} $Ru(bpy)_2(CN)_2$ and 3×10^{-3} mol L^{-1} MV^{2+} (OQ).	85B030
	1.8×10^{10}				f.p./pi	D.k. at 395 nm in N_2-satd. soln. contg. 10^{-2} mol L^{-1} MV^{2+} and 10^{-4} mol L^{-1} $Ru(bpy)_2(CN)_2$.	84A177
22.48 2-(Aminomethyl)pyridinebis(2,2′-bipyridine)ruthenium(III) ion							
22.48.1 2-(Aminomethyl)pyridinebis(2,2′-bipyridine)ruthenium(III) ion, deprotonated							
$Ru(bpy)_2(pyCH_2NH_2)^{3+} + Ru(bpy)_2(pyCH_2NH)^{2+} \rightarrow Ru(bpy)_2(pyCH_2NH_2)^{2+} + Ru(bpy)_2(pyCH_2NH)^{3+}$	1×10^9	0-2	1.0	24	f.p./oq	D.k. at 436 nm in deaerated soln. contg. 1.01×10^{-5} mol L^{-1} $Ru(bpy)_2(pyCH_2NH_2)^{2+}$, 2×10^{-3} mol L^{-1} Fe^{3+} (OQ) and 0.01-1.00 mol L^{-1} $HClO_4$; $k = 9 \times 10^8$ L mol^{-1} s^{-1} in 1.0 mol L^{-1} H_2SO_4; $k_r = 5 \times 10^6$ L mol^{-1} s^{-1}.	81A225
22.49 2-(Aminomethyl)pyridinebis(2,2′-bipyridine)ruthenium(III) ion, deprotonated							
22.49.1 Hydrogen ion							
$Ru(bpy)_2(pyCH_2NH)^{2+} + H^+ \rightarrow Ru(bpy)_2(pyCH_2NH_2)^{3+}$	1×10^9	0-2	1.0	24	f.p./oq	D.k. at 436 nm in deaerated soln. contg. 1.01×10^{-5} mol L^{-1} $Ru(bpy)_2(pyCH_2NH_2)^{2+}$, 2×10^{-3} mol L^{-1} Fe^{3+} (OQ) and 0.01-1.00 mol L^{-1} $HClO_4$; $k = 2 \times 10^9$ L mol^{-1} s^{-1} in 1.0 mol L^{-1} H_2SO_4; $k_r = 5 \times 10^6$ L mol^{-1} s^{-1}.	81A225
22.50 Tris(2,2′-bipyridine)ruthenium(III) ion							
22.50.1 Silver(I) ion, complex with Ag(0)							
$Ru(bpy)_3^{3+} + Ag_2^+ \rightarrow Ru(bpy)_3^{2+} + 2\ Ag^+$	1.2×10^{10}				f.p./oq	P.b.k. in soln. contg. $Ru(bpy)_3^{2+}$ and Ag^+ (OQ).	80C004
22.50.2 Ethylenediaminetetraacetatocobaltate(II) ion							
$Ru(bpy)_3^{3+} + CoEDTA^{2-} \rightarrow Ru(bpy)_3^{2+} + CoEDTA^-$	9×10^3	4.75		25		In 0.05 mol L^{-1} acetate buffer.	85F089
22.50.3 8-Methyl-1,3,13,16-tetraaza-6,10,19-trithiabicyclo[6.6.6]eicosanecobalt(II) ion							
$Ru(bpy)_3^{3+} + Co(AZAcapten)^{2+} \rightarrow Ru(bpy)_3^{2+} + Co(AZAcapten)^{3+}$	$\sim 5 \times 10^8$				f.p./oq	P.b.k. at 470 nm in soln. contg. $Ru(bpy)_3^{2+}$ and $Co(AZAcapten)^{3+}$ (OQ).	85F222
22.50.4 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(II) ion							
$Ru(bpy)_3^{3+} + Co(sep)^{2+} \rightarrow Ru(bpy)_3^{2+} + Co(sep)^{3+}$	5.5×10^8		0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) $\times 10^{-5}$ mol L^{-1} $Ru(bpy)_3^{2+}$ and (1-7) $\times 10^{-3}$ mol L^{-1} $Co(sep)^{3+}$ (OQ).	84A238

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.50	**Tris(2,2′-bipyridine)ruthenium(III) ion** — Continued							
22.50.5	**1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion**							
	$Ru(bpy)_3^{3+} + Co(cyclam)^{2+} \rightarrow Ru(bpy)_3^{2+} + Co(cyclam)^{3+}$	3.2×10^7		0.1	25	f.p./oq	P.b.k. at 443 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5py^{3+}$ (OQ) and $Co(cyclam)^{2+}$.	90A221
22.50.6	**2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradecanecobalt(II) ion**							
	$Ru(bpy)_3^{3+} + Co(Me_4[14]aneN_4)^{2+} \rightarrow Ru(bpy)_3^{2+} + Co(Me_4[14]aneN_4)^{3+}$	5.9×10^5		0.1	25	f.p./oq	P.b.k. at 443 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5Br^{3+}$ (OQ), $Co(NH_3)_5Cl^{3+}$ (OQ) or $S_2O_8^{2-}$ (OQ) and $Co(Me_4[14]aneN_4)^{2+}$; average of three values.	90A221
22.50.7	**5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecobalt(II) ion**							
	$Ru(bpy)_3^{3+} + Co(Me_6[14]aneN_4)^{2+} \rightarrow Ru(bpy)_3^{2+} + Co(Me_6[14]aneN_4)^{3+}$	7.7×10^6		0.1	25	f.p./oq	P.b.k. at 443 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5Br^{2+}$ (OQ) or $Co(NH_3)_5Cl^{2+}$ (OQ) and $Co(Me_6[14]aneN_4)^{2+}$; average of two values.	90A221
22.50.8	**2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion**							
	$Ru(bpy)_3^{3+} + Co(Me_4tetraeneN_4)^{2+} \rightarrow Ru(bpy)_3^{2+} + Co(Me_4tetraeneN_4)^{3+}$	2.1×10^7		0.1	25	f.p./oq	P.b.k. at 443 nm in soln. contg. $Ru(bpy)_3^{2+}$ and $Co(Me_4tetraeneN_4)^{3+}$ (OQ).	90A221
22.50.9	**1,4,8,12-Tetraazacyclopentadecanecobalt(II) ion**							
	$Ru(bpy)_3^{3+} + Co([15]aneN_4)^{2+} \rightarrow Ru(bpy)_3^{2+} + Co([15]aneN_4)^{3+}$	1.8×10^7		0.1	25	f.p./oq	P.b.k. at 443 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5Br^{2+}$ (OQ) or $Co(NH_3)_5Cl^{2+}$ (OQ) and $Co([15]aneN_4)^{2+}$; average of two values.	90A221
22.50.10	**Tris(2,2′-bipyridine)cobalt(II) ion**							
	$Ru(bpy)_3^{3+} + Co(bpy)_3^{2+} \rightarrow Ru(bpy)_3^{2+} + Co(bpy)_3^{3+}$	1.3×10^8		1.0		f.p./oq	Soln. contg. $Ru(bpy)_3^{2+}$ and $Co(bpy)_3^{3+}$ (OQ).	82F048
		2.4×10^8		1.0	25	f.p./oq	D.k. at 675 nm in soln. contg. 7.5×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and 0.5 or 1.0×10^{-3} mol L^{-1} $Co(bpy)_3^{3+}$ (OQ); studied at 5-25 °C, $E_a = -11.8$ kJ mol^{-1}.	80A003
22.50.11	**Tris(1,10-phenanthroline)cobalt(II) ion**							
	$Ru(bpy)_3^{3+} + Co(phen)_3^{2+} \rightarrow Ru(bpy)_3^{2+} + Co(phen)_3^{3+}$	1.4×10^8		1.0	25	f.p./oq	D.k. at 675 nm in soln. contg. 7.5×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and 0.25-2.0×10^{-3} mol L^{-1} $Co(phen)_3^{3+}$ (OQ); the same value was obtained under pseudo-first order conditions with addn. of 1.0×10^{-4} mol L^{-1} $Co(phen)_3^{2+}$. Studied at 5-25 °C, $E_a = -4.6 \pm 3.7$ kJ mol^{-1}.	80A003
22.50.12	**3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) ion**							
	$Ru(bpy)_3^{3+} + Co(tspc)^{4-} \rightarrow Ru(bpy)_3^{2+} + Co(tspc)^{3-}$	4.5×10^7				f.p./oq	D.k. at 580 nm; mixed dimer contg. $(5\text{-}10) \times 10^{-3}$ $Ru(bpy)_3^{2+}$ and $(1\text{-}5) \times 10^{-6}$ mol L^{-1} $Co(tspc)^{3-}$ (OQ).	79A090
22.50.13	**3,10,17,24-Tetrasulfophthalocyaninecobaltate(I) ion**							
	$Ru(bpy)_3^{3+} + Co(tspc)^{5-} \rightarrow Ru(bpy)_3^{2+} + Co(tspc)^{4-}$	2.9×10^8	1-3			f.p./oq	D.k. at 520 nm in deaerated soln. contg. 0.001-0.1 mol L^{-1} HCl, 0.001-0.01 mol L^{-1} $Ru(bpy)_3^{2+}$ and $Co(tspc)^{4-}$ (OQ).	79A090
22.50.14	**Decaammine-μ-peroxidodicobalt(III) ion**							
	$Ru(bpy)_3^{3+} + [Co(NH_3)_5]_2(O_2)^{4+} \rightarrow Ru(bpy)_3^{2+} + [Co(NH_3)_5]_2(O_2)^{5+}$	1.3×10^7	0			f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $[Co(NH_3)_5]_2(O_2)^{5+}$ (OQ) and 1 mol L^{-1} HCl.	81A065

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref
22.50	**Tris(2,2′-bipyridine)ruthenium(III) ion** — Continued							
22.50.15	**μ-Amido-μ-peroxidooctakisamminedicobalt(III) ion**							
	$Ru(bpy)_3^{3+} + NH_2[Co(NH_3)_4]_2(O_2)^{3+} \rightarrow Ru(bpy)_3^{2+} + NH_2[Co(NH_3)_4]_2(O_2)^{4+}$	3.4×10^5	0			f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $NH_2[Co(NH_3)_4]_2(O_2)^{4+}$ (OQ) and 1 mol L^{-1} HCl.	81A065
22.50.16	**μ-Amido-μ-peroxidotetrakis(ethylenediamine)dicobalt(III) ion**							
	$Ru(bpy)_3^{3+} + NH_2[Co(en)_2]_2(O_2)^{3+} \rightarrow Ru(bpy)_3^{2+} + NH_2[Co(en)_2]_2(O_2)^{4+}$	2.5×10^6	0			f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $NH_2[Co(en)_2]_2(O_2)^{4+}$ (OQ) and 1 mol L^{-1} HCl; $k = 7.6 \times 10^5$ L mol^{-1} s^{-1} detd. by s.f.	81A065
22.50.17	**μ-Amido-μ-peroxidotetrakis(2,2′-bipyridine)dicobalt(III) ion**							
	$Ru(bpy)_3^{3+} + NH_2[Co(bpy)_2]_2(O_2)^{3+} \rightarrow Ru(bpy)_3^{2+} + NH_2[Co(bpy)_2]_2(O_2)^{4+}$	3.0×10^8	0			f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $NH_2[Co(bpy)_2]_2(O_2)^{4+}$ (OQ) and 1 mol L^{-1} HCl.	81A065
22.50.18	**μ-Amido-μ-peroxidotetrakis(1,10-phenanthroline)dicobalt(III) ion**							
	$Ru(bpy)_3^{3+} + NH_2[Co(phen)_2]_2(O_2)^{3+} \rightarrow Ru(bpy)_3^{2+} + NH_2[Co(phen)_2]_2(O_2)^{4+}$	3.6×10^8	0			f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$ and $NH_2[Co(phen)_2]_2(O_2)^{4+}$ (OQ) and 1 mol L^{-1} HCl.	81A065
22.50.19	**Chromium(II) ion**							
	$Ru(bpy)_3^{3+} + Cr^{2+} \rightarrow Ru(bpy)_3^{2+} + Cr^{3+}$	7.6×10^7						86A536
22.50.20	**Pentaaquamethylchromium(III) ion**							
	$Ru(bpy)_3^{3+} + (H_2O)_5CrCH_3^{2+} \rightarrow Ru(bpy)_3^{2+} + (H_2O)_5CrCH_3^{3+}$	$<10^3$	1-1.2	0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (1.2-2.6) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, (2-10) × 10^{-3} mol L^{-1} $Co(NH_3)_5Br^{2+}$ (OQ) and (2-210) × 10^{-5} mol L^{-1} $(H_2O)_5CrCH_3^{2+}$; [H$^+$] = 0.07-0.095 mol L^{-1}.	86A536
22.50.21	**Pentaaqua(ethyl)chromium(III) ion**							
	$Ru(bpy)_3^{3+} + (H_2O)_5CrCH_2CH_3^{2+} \rightarrow Ru(bpy)_3^{2+} + (H_2O)_5CrCH_2CH_3^{3+}$	2.0×10^5	1-1.2	0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (1.2-2.6) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, (2-10) × 10^{-3} mol L^{-1} $Co(NH_3)_5Br^{2+}$ (OQ) and (2-210) × 10^{-5} mol L^{-1} $(H_2O)_5CrCH_2CH_3^{2+}$; [H$^+$] = 0.07-0.095 mol L^{-1}.	86A536
22.50.22	**Pentaaqua(isopropyl)chromium(III) ion**							
	$Ru(bpy)_3^{3+} + (H_2O)_5CrCH(CH_3)_2^{2+} \rightarrow Ru(bpy)_3^{2+} + (H_2O)_5CrCH(CH_3)_2^{3+}$	4.3×10^7	1-1.2	0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (1.2-2.6) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, (2-10) × 10^{-3} mol L^{-1} $Co(NH_3)_5Br^{2+}$ (OQ) and (2-210) × 10^{-5} mol L^{-1} $(H_2O)_5CrCH(CH_3)_2^{2+}$; [H$^+$] = 0.07-0.095 mol L^{-1}.	86A536
22.50.23	**Pentaaqua(methoxymethyl)chromium(III) ion**							
	$Ru(bpy)_3^{3+} + (H_2O)_5CrCH_2OCH_3^{2+} \rightarrow Ru(bpy)_3^{2+} + (H_2O)_5CrCH_2OCH_3^{3+}$	1.0×10^7	1-1.2	0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (1.2-2.6) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, (2-10) × 10^{-3} mol L^{-1} $Co(NH_3)_5Br^{2+}$ (OQ) and (2-210) × 10^{-5} mol L^{-1} $(H_2O)_5CrCH_2OCH_3^{2+}$; [H$^+$] = 0.07-0.095 mol L^{-1}.	86A536
22.50.24	**Pentaaqua(4-cyanobenzyl)chromium(III) ion**							
	$Ru(bpy)_3^{3+} + (H_2O)_5Cr(4\text{-}CH_2C_6H_4CN^{2+} \rightarrow Ru(bpy)_3^{2+} + (H_2O)_5Cr(4\text{-}CH_2C_6H_4CN)^{3+}$	9.5×10^6	1-1.2	0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (1.2-2.6) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, (2-10) × 10^{-3} mol L^{-1} $Co(NH_3)_5Br^{2+}$ (OQ) and (2-210) × 10^{-5} mol L^{-1} $(H_2O)_5Cr(4\text{-}CH_2C_6H_4CN)^{2+}$; [H$^+$] = 0.07-0.095 mol L^{-1}.	86A536

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.50	**Tris(2,2′-bipyridine)ruthenium(III) ion** — Continued							
22.50.25	**Pentaaqua[4-(trifluoromethyl)benzyl]chromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + $(H_2O)_5CrCH_2C_6H_4$-4-CF_3^{2+} → $Ru(bpy)_3^{2+}$ + $(H_2O)_5CrCH_2C_6H_4$-4-CF_3^{3+}	1.7×10^7	1-1.2	0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (1.2-2.6) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, (2-10) × 10^{-3} mol L^{-1} $Co(NH_3)_5Br^{2+}$ (OQ) and (2-210) × 10^{-5} mol L^{-1} $(H_2O)_5Cr(4\text{-}CH_2C_6H_4CF_3)^{2+}$; [H$^+$] = 0.07-0.095 mol L^{-1}.	86A536
22.50.26	**Pentaaqua(benzyl)chromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + $(H_2O)_5CrCH_2C_6H_5^{2+}$ → $Ru(bpy)_3^{2+}$ + $(H_2O)_5CrCH_2C_6H_5^{3+}$	5.3×10^8	1-1.2	0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (1.2-2.6) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, (2-10) × 10^{-3} mol L^{-1} $Co(NH_3)_5Br^{2+}$ (OQ) and (2-210) × 10^{-5} mol L^{-1} $(H_2O)_5CrCH_2C_6H_5^{2+}$; [H$^+$] = 0.07-0.095 mol L^{-1}.	86A536
22.50.27	**Pentaaqua(4-methylbenzyl)chromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + $(H_2O)_5CrCH_2C_6H_4$-4-CH_3^{2+} → $Ru(bpy)_3^{2+}$ + $(H_2O)_5CrCH_2C_6H_4$-4-CH_3^{3+}	2.9×10^8	1-1.2	0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (1.2-2.6) × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, (2-10) × 10^{-3} mol L^{-1} $Co(NH_3)_5Br^{2+}$ (OQ) and (2-210) × 10^{-5} mol L^{-1} $(H_2O)_5Cr(4\text{-}CH_2C_6H_4CH_3)^{2+}$; [H$^+$] = 0.07-0.095 mol L^{-1}.	86A536
22.50.28	**(Methyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + $CH_3Cr([15]aneN_4)^{2+}$ → $Ru(bpy)_3^{2+}$ + $CH_3Cr([15]aneN_4)^{3+}$	14	2	0.21	25	therm.	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, 0.01 mol L^{-1} H$^+$, 0.2 mol L^{-1} $NaClO_4$ and $CH_3Cr([15]aneN_4)^{2+}$.	91A511
22.50.29	**(Ethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + $CH_3CH_2Cr([15]aneN_4)^{2+}$ → $Ru(bpy)_3^{2+}$ + $CH_3CH_2Cr([15]aneN_4)^{3+}$	2.1×10^4	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5Br^{2+}$, or $Co(NH_3)_5py^{3+}$ or $Co(NH_3)_5(H_2O)^{3+}$ (OQ), 0.01 mol L^{-1} H$^+$, 0.2 mol L^{-1} $NaClO_4$ and $CH_3CH_2Cr([15]aneN_4)^{2+}$.	91A511
22.50.30	**(Propyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + $CH_3CH_2CH_2Cr([15]aneN_4)^{2+}$ → $Ru(bpy)_3^{2+}$ + $CH_3CH_2CH_2Cr([15]aneN_4)^{3+}$	3.5×10^3	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5Br^{2+}$ (OQ), 0.01 mol L^{-1} H$^+$, 0.2 mol L^{-1} $NaClO_4$ and $CH_3CH_2CH_2Cr([15]aneN_4)^{2+}$.	91A511
22.50.31	**(1-Methylethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + $(CH_3)_2CHCr([15]aneN_4)^{2+}$ → $Ru(bpy)_3^{2+}$ + $(CH_3)_2CHCr([15]aneN_4)^{3+}$	4.7×10^6	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5Br^{2+}$ (OQ), 0.01 mol L^{-1} H$^+$, 0.2 mol L^{-1} $NaClO_4$ and $(CH_3)_2CHCr([15]aneN_4)^{2+}$.	91A511
22.50.32	**(Butyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + $CH_3(CH_2)_3Cr([15]aneN_4)^{2+}$ → $Ru(bpy)_3^{2+}$ + $CH_3(CH_2)_3Cr([15]aneN_4)^{3+}$	3.8×10^3	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5Br^{2+}$ (OQ), 0.010 mol L^{-1} H$^+$, 0.20 mol L^{-1} $NaClO_4$ and $CH_3(CH_2)_3Cr([15]aneN_4)^{2+}$.	91A511
22.50.33	**(2-Butyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + $CH_3CH_2CH(CH_3)Cr([15]aneN_4)^{2+}$ → $Ru(bpy)_3^{2+}$ + $CH_3CH_2CH(CH_3)Cr([15]aneN_4)^{3+}$	1.4×10^6	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5Br^{2+}$ (OQ), 0.01 mol L^{-1} H$^+$, 0.2 mol L^{-1} $NaClO_4$ and $CH_3CH_2CH(CH_3)Cr([15]aneN_4)^{2+}$.	91A511

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.50	**Tris(2,2′-bipyridine)ruthenium(III) ion** — Continued							
22.50.34	**(Cyclohexyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + c-$C_6H_{11}Cr([15]aneN_4)^{2+}$ → $Ru(bpy)_3^{2+}$ + c-$C_6H_{11}Cr([15]aneN_4)^{3+}$	1.2×10^7	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5Br^{2+}$ (OQ), 0.01 mol L^{-1} H^+, 0.2 mol L^{-1} $NaClO_4$ and c-$C_6H_{11}Cr([15]aneN_4)^{2+}$.	91A511
22.50.35	**(Phenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + $C_6H_5CH_2Cr([15]aneN_4)^{2+}$ → $Ru(bpy)_3^{2+}$ + $C_6H_5CH_2Cr([15]aneN_4)^{3+}$	5.5×10^8	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5Br^{2+}$ (OQ), 0.01 mol L^{-1} H^+, 0.2 mol L^{-1} $NaClO_4$ and $C_6H_5CH_2Cr([15]aneN_4)^{2+}$.	91A511
22.50.36	**(4-Bromobenzyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + 4-$BrC_6H_4CH_2Cr([15]aneN_4)^{2+}$ → $Ru(bpy)_3^{2+}$ + 4-$BrC_6H_4CH_2Cr([15]aneN_4)^{3+}$	4.3×10^8	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5Br^{2+}$ (OQ), 0.01 mol L^{-1} H^+, 0.2 mol L^{-1} $NaClO_4$ and 4-$BrC_6H_4CH_2Cr([15]aneN_4)^{2+}$.	91A511
22.50.37	**(4-Chlorophenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + 4-$ClC_6H_4CH_2Cr([15]aneN_4)^{2+}$ → $Ru(bpy)_3^{2+}$ + 4-$ClC_6H_4CH_2Cr([15]aneN_4)^{3+}$	3.8×10^8	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5Br^{2+}$ (OQ), 0.01 mol L^{-1} H^+, 0.2 mol L^{-1} $NaClO_4$ and 4-$ClC_6H_4CH_2Cr([15]aneN_4)^{2+}$.	91A511
22.50.38	**(4-Fluorophenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + 4-$FC_6H_4CH_2Cr([15]aneN_4)^{2+}$ → $Ru(bpy)_3^{2+}$ + 4-$FC_6H_4CH_2Cr([15]aneN_4)^{3+}$	3.0×10^8	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5Br^{2+}$ (OQ), 0.01 mol L^{-1} H^+, 0.2 mol L^{-1} $NaClO_4$ and 4-$FC_6H_4CH_2Cr([15]aneN_4)^{2+}$.	91A511
22.50.39	**(4-Methylbenzyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + 4-$CH_3C_6H_4CH_2Cr([15]aneN_4)^{2+}$ → $Ru(bpy)_3^{2+}$ + 4-$CH_3C_6H_4CH_2Cr([15]aneN_4)^{3+}$	1.1×10^9	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5Br^{2+}$ (OQ), 0.01 mol L^{-1} H^+, 0.2 mol L^{-1} $NaClO_4$ and 4-$CH_3C_6H_4CH_2Cr([15]aneN_4)^{2+}$.	91A511
22.50.40	**(4-Trifluoromethyl)phenylmethyl-1,4,8,12-tetraazacyclopentadecanechromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + 4-$CF_3C_6H_4CH_2Cr([15]aneN_4)^{2+}$ → $Ru(bpy)_3^{2+}$ + 4-$CF_3C_6H_4CH_2Cr([15]aneN_4)^{3+}$	2.7×10^7	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5Br^{2+}$ (OQ), 0.01 mol L^{-1} H^+, 0.2 mol L^{-1} $NaClO_4$ and 4-$CF_3C_6H_4CH_2Cr([15]aneN_4)^{2+}$.	91A511
22.50.41	**(4-Methoxyphenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion**							
	$Ru(bpy)_3^{3+}$ + 4-$CH_3OC_6H_4CH_2Cr([15]aneN_4)^{2+}$ → $Ru(bpy)_3^{2+}$ + 4-$CH_3OC_6H_4CH_2Cr([15]aneN_4)^{3+}$	1.2×10^9	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Co(NH_3)_5Br^{2+}$ (OQ), 0.01 mol L^{-1} H^+, 0.2 mol L^{-1} $NaClO_4$ and 4-$CH_3OC_6H_4CH_2Cr([15]aneN_4)^{2+}$.	91A511
22.50.42	**Copper(I) ion**							
	$Ru(bpy)_3^{3+}$ + Cu^+ → $Ru(bpy)_3^{2+}$ + Cu^{2+}	4.3×10^8 3×10^8	0.3 <0		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and in 0.5 and 2.4 mol L^{-1} $HClO_4$, respectively.	78A090
		9.7×10^8	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
		3.4×10^8		1.0	21	f.p./oq	P.b.k. in deoxygenated soln. contg. $Ru(bpy)_3^{2+}$ and Cu^{2+} (OQ).	78F683
		1×10^8	0	1.9	24	f.p./oq	D.k. at 480 nm in soln. contg. $Ru(bpy)_3^{2+}$, Cu^{2+} (OQ) and 1 mol L^{-1} $HClO_4$.	771093

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.50	**Tris(2,2′-bipyridine)ruthenium(III) ion** — Continued							
22.50.43	**Copper(I) chloride**							
	$Ru(bpy)_3^{3+} + CuCl \rightarrow Ru(bpy)_3^{2+} + CuCl^+$	3.5×10^9	1	1.0	21	f.p./oq	P.b.k. in deoxygenated soln. contg. $Ru(bpy)_3^{2+}$, 0.10 mol L^{-1} $HClO_4$, 0.5 mol L^{-1} NaCl and Cu(II) ions (OQ); 75% $CuCl^+$.	78F683
22.50.44	**Tetraformatocuprate(I) ion**							
	$Ru(bpy)_3^{3+} + Cu(HCO_2)_4^{3-} \rightarrow Ru(bpy)_3^{2+} + Cu(HCO_2)_4^{2-}$	2.1×10^9	1	1.0	21	f.p./oq	P.b.k. in deoxygenated soln. contg. $Ru(bpy)_3^{2+}$, 0.10 mol L^{-1} $HClO_4$, 0.5 mol L^{-1} formate ion and Cu(II) ions (OQ); 80% $Cu(HCO_2)_4^{2-}$.	78F683
22.50.45	**Tetraacetatocuprate(I) ion**							
	$Ru(bpy)_3^{3+} + Cu(OAc)_4^{3-} \rightarrow Ru(bpy)_3^{2+} + Cu(OAc)_4^{2-}$	2.3×10^9	1	1.0	21	f.p./oq	P.b.k. in deoxygenated soln. contg. $Ru(bpy)_3^{2+}$, 0.10 mol L^{-1} $HClO_4$, 0.5 mol L^{-1} acetate ion and Cu(II) ions (OQ); 90% $Cu(OAc)_4^{2-}$.	78F683
22.50.46	**4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]tricosaneeuropium(II) ion**							
	$Ru(bpy)_3^{3+} + [Eu\ 2.2.1]^{2+} \rightarrow Ru(bpy)_3^{2+} + [Eu\ 2.2.1]^{3+}$	1.3×10^9		1	22	f.p./oq	P.b.k. at 454 nm in soln. contg. $Ru(bpy)_3^{2+}$, excess $[Eu\ 2.2.1]^{3+}$ (OQ) and 1 mol L^{-1} KCl.	86E195
22.50.47	**Iron(II) ion**							
	$Ru(bpy)_3^{3+} + Fe^{2+} \rightarrow Ru(bpy)_3^{2+} + Fe^{3+}$	1.2×10^6	0.3		22-23	phot.	Step-excitation method, λ_{exc} = 488.8 nm; soln. contg. 7.6×10^{-6} mol L^{-1} $Ru(bpy)_3^{2+}$, 1.02×10^{-3} mol L^{-1} Fe^{3+} (OQ), 2.8×10^{-6} mol L^{-1} Fe^{2+} and 0.5 mol L^{-1} $HClO_4$; at λ_{exc} = 496.5 and 514.5 nm, $k = 9.3 \times 10^5$ and 1.5×10^6 L mol^{-1} s^{-1}, respectively.	79F488
		2.6×10^6 7.2×10^5 6.4×10^5 4.3×10^5 1.5×10^5	≤1	0.1 0.5 1.0 2.5 5.0	18	f.p./oq	P.b.k. at 452 nm in soln. contg. $Ru(bpy)_3^{2+}$, Fe^{3+} (OQ) and 0.1, 0.5, 1.0, 2.5 and 5.0 mol L^{-1} $HClO_4$, respectively.	79A218
		1.6×10^6 1.2×10^6 9.8×10^5	≤1	0.1 0.5 1.0	18	f.p./oq	P.b.k. at 452 nm in soln. contg. $Ru(bpy)_3^{2+}$, Fe^{3+} (OQ) and 0.1, 0.5 and 1.0 mol L^{-1} CF_3SO_3H, respectively.	79A218
		1.2×10^6 1.4×10^6	0 ~1	1.0 0.1	25 25	f.p./oq	P.b.k. in soln. contg. 3.0×10^{-6} mol L^{-1} $Ru(bpy)_3^{2+}$, 3.0×10^{-6} mol L^{-1} $Ru(phen)_3^{2+}$, 1.0 or 0.076 mol L^{-1} $HClO_4$, 4.0×10^{-5} mol L^{-1} Fe^{3+} (OQ) and 3.0×10^{-5} mol L^{-1} Fe^{2+}; independent of temperature 5-50 °C.	777164
		8.5×10^5	0	1.9	24	f.p./oq	D.k. at 480 nm in soln. contg. $Ru(bpy)_3^{2+}$, Fe^{3+} (OQ) and 1 mol L^{-1} $HClO_4$.	771093
		1.0×10^6	0			f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, Fe^{3+} (OQ) and 1.0 mol L^{-1} $HClO_4$.	747159
22.50.48	**Iron(II) acetate**							
	$Ru(bpy)_3^{3+} + Fe(OAc)_n^{2-n+} \rightarrow Ru(bpy)_3^{2+} + Fe(OAc)_n^{3-n+}$	3.4×10^8	5.0			f.p./oq	P.b.k. at 452 nm in deaerated soln. contg. 5×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 4×10^{-4} mol L^{-1} Fe^{3+} (OQ) and 0.1 mol L^{-1} acetate ion.	81N178

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1}.s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.50	**Tris(2,2′-bipyridine)ruthenium(III) ion** — Continued							
22.50.49	**Tetrachloroferrate(II) ion**							
	$Ru(bpy)_3^{3+} + FeCl_4^{2-} \rightarrow Ru(bpy)_3^{2+} + FeCl_4^-$	4.1×10^6 4.7×10^6 5.3×10^6	1 0.3 0	0.1 0.5 1.0	18	f.p./oq	P.b.k. at 452 nm in soln. contg. $Ru(bpy)_3^{2+}$, Fe^{3+} (OQ) (primarily $FeCl_4^-$) and 0.1, 0.5 and 1.0 mol L^{-1} HCl, respectively.	79A218
22.50.50	**Triphosphatoferrate(II) ion**							
	$Ru(bpy)_3^{3+} + Fe(PO_4)_3^{7-} \rightarrow Ru(bpy)_3^{2+} + Fe(PO_4)_3^{6-}$	1.9×10^7 1.5×10^7	<1.2		18	f.p./oq	P.b.k. at 452 nm in soln. contg. $Ru(bpy)_3^{2+}$, Fe^{3+} (OQ) (various species including $Fe(PO_4)_3^{6-}$) and 0.5 and 5.0 mol L^{-1} H_3PO_4, respectively.	79A218
22.50.51	**Iron(II) sulfate**							
	$Ru(bpy)_3^{3+} + FeSO_4 \rightarrow Ru(bpy)_3^{2+} + FeSO_4^+$	1.3×10^7 8×10^6	~2 ~0.8			f.p./oq	P.b.k. at 455 nm in soln. contg. 2×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, Fe(III) (OQ), (0-7) $\times 10^{-4}$ mol L^{-1} Fe(II) and 7×10^{-3} or 0.16 mol L^{-1} H_2SO_4, respectively.	89E329
		4.0×10^6	0.3	1.0		f.p./oq	Soln. contg. $Ru(bpy)_3^{2+}$, Fe(III) (OQ) and 0.5 mol L^{-1} H_2SO_4.	82F048
		4.8×10^6	0.3		20	f.p./oq	Calcd. from current-time curve; soln. contg. 0.5 mol L^{-1} H_2SO_4, 3×10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$ and $[Fe^{2+}] = [Fe^{3+}]$ (OQ).	80E224
		5.1×10^6 5.2×10^6 4.0×10^6	~0.8 0.3 <0		18	f.p./oq	P.b.k. at 452 nm in soln. contg. $Ru(bpy)_3^{2+}$, Fe^{3+} (OQ) ($FeSO_4^+$ and $Fe(SO_4)_2^-$) and 0.17, 0.5 or 2.5 mol L^{-1} H_2SO_4, respectively.	79A218
		5.2×10^6	0.3		25	f.p./oq	P.b.k. in soln. contg. $Ru(bpy)_3^{2+}$, Fe(III) (OQ) and 0.5 mol L^{-1} H_2SO_4; $k = 4.9 \times 10^6$ L mol^{-1} s^{-1} detd. by s.f.	766404
22.50.52	**Tris(1,10-phenanthroline)iron(II) ion**							
	$Ru(bpy)_3^{3+} + Fe(phen)_3^{2+} \rightarrow Ru(bpy)_3^{2+} + Fe(phen)_3^{3+}$	1.8×10^9 1.3×10^9	0 ~1	1.0 0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 3.0×10^{-6} mol L^{-1} $Ru(bpy)_3^{2+}$, 2.5×10^{-6} mol L^{-1} $Fe(phen)_3^{2+}$, 1.0 or 0.076 mol L^{-1} $HClO_4$, 4.0×10^{-3} mol L^{-1} Fe^{3+} (OQ) and 3.0×10^{-5} mol L^{-1} Fe^{2+}.	777164
22.50.53	**Ferrocyanide ion**							
	$Ru(bpy)_3^{3+} + Fe(CN)_6^{4-} \rightarrow Ru(bpy)_3^{2+} + Fe(CN)_6^{3-}$	9.8×10^9	6.8	0.1	23	f.p./oq	P.b.k. at 450 nm in soln. contg. 4.2×10^{-1} $Ru(bpy)_3^{2+}$, 0.01 mol L^{-1} MV^{2+} (OQ) and 2.0×10^{-4} mol L^{-1} $Fe(CN)_6^{3-}$.	82A130
22.50.54	**Mercury(I) ion**							
	$Ru(bpy)_3^{3+} + Hg^+ \rightarrow Ru(bpy)_3^{2+} + Hg^{2+}$	2.9×10^9	~1	1.0	21	f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. 3.6×10^{-6} mol L^{-1} $Ru(bpy)_3^{2+}$, 1×10^{-2} mol L^{-1} $Hg(NO_3)_2$ (OQ), 0.11 mol L^{-1} HNO_3 and 0.09 mol L^{-1} $NaNO_3$; assumed $k(Hg^+ + Hg^+) = 8 \times 10^9$ L mol^{-1} s^{-1}.	84A148
22.50.55	**Mercury(I) dimer ion**							
	$Ru(bpy)_3^{3+} + Hg_2^{2+} \rightarrow Ru(bpy)_3^{2+} + Hg^{2+} + Hg^+$	4.5	~1	1.0	21	f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. 3.6×10^{-6} mol L^{-1} $Ru(bpy)_3^{2+}$, 1×10^{-2} mol L^{-1} $Hg(NO_3)_2$ (OQ), 0.11 mol L^{-1} HNO_3 and 0.09 mol L^{-1} $NaNO_3$.	84A148

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L·mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.50	**Tris(2,2′-bipyridine)ruthenium(III) ion** — Continued							
22.50.56	**Dichloromercurate(I) ion**							
	$Ru(bpy)_3^{3+} + HgCl_2^- \rightarrow Ru(bpy)_3^{2+} + HgCl_2$	$>2 \times 10^{10}$		1.0		f.p./oq	Soln. contg. $Ru(bpy)_3^{2+}$ and $HgCl_2$ (OQ).	84A077
22.50.57	**Superoxide radical anion**							
	$Ru(bpy)_3^{3+} + O_2^{\cdot -} \rightarrow Ru(bpy)_3^{2+} + O_2$	* 8.0×10^9		0.2	23	f.p./oq	P.b.k. at 450 nm in O_2 satd. soln. contg. 5.5×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and (5-50) $\times 10^{-3}$ mol L^{-1} MV^{2+} (OQ) in D_2O.	88A105
		* 1.4×10^{10}	>7	0.1	23	f.p./oq	P.b.k. at 452 nm in soln. contg. 5×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, ~0.01 mol L^{-1} MV^{2+} (OQ) and (0.7-10) $\times 10^{-4}$ mol L^{-1} O_2. Calcd. from pH study; unreactive with HO_2.	85F449
		* 3.5×10^{10}			24	f.p./oq	P.b.k. at 450 in air-satd. soln. contg. $Ru(bpy)_3^{2+}$ and BSV (OQ). * Unexplained discrepancy in these data.	85A064
22.50.58	**Tris(2,2′-bipyridine)rhodium(II) ion**							
	$Ru(bpy)_3^{3+} + Rh(bpy)_3^{2+} \rightarrow Ru(bpy)_3^{2+} + Rh(bpy)_3^{3+}$	1.3×10^9	5	0.056	20	f.p./oq	D.k. at 670 nm and p.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$ and $Rh(bpy)_3^{3+}$ (OQ) in 0.04 mol L^{-1} acetate buffer.	87A460
		3×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 5×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 4.0×10^{-3} mol L^{-1} $Rh(bpy)_3^{3+}$ (OQ) and 0.5 mol L^{-1} H_2SO_4.	81N003 79A317
22.50.59	**Hexaammineruthenium(II) ion**							
	$Ru(bpy)_3^{3+} + Ru(NH_3)_6^{2+} \rightarrow Ru(bpy)_3^{2+} + Ru(NH_3)_6^{3+}$	3.7×10^9	0.3			f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $Ru(NH_3)_6^{3+}$ (OQ) and 1.0 mol L^{-1} CF_3CO_2H.	747159
22.50.60	**Ammine(2,2′-bipyridine)(2,2′:6′,2″-terpyridine)ruthenium(II) ion**							
	$Ru(bpy)_3^{3+} + Ru(terpy)(bpy)(NH_3)^{2+} \rightarrow Ru(bpy)_3^{2+} + Ru(terpy)(bpy)(NH_3)^{3+}$	2.7×10^9	0			f.p./oq	P.b.k. at 450 nm and d.k. at 480 nm in soln. contg. 5.64×10^{-6} mol L^{-1} $Ru(bpy)_3^{2+}$, 3.48×10^{-6} mol L^{-1} $Ru(terpy)(bpy)NH_3^{2+}$, 4.2×10^{-3} mol L^{-1} Fe^{3+} (OQ), 5.25×10^{-5} mol L^{-1} Fe^{2+} and 1.0 mol L^{-1} $HClO_4$; average of two values.	84A302
22.50.61	**Thiocyanate ion**							
	$Ru(bpy)_3^{3+} + 2\ SCN^- \rightarrow Ru(bpy)_3^{2+} + (SCN)_2^{\cdot -}$	2×10^5	7.0		25	p.r.	D.k. at 500 nm in N_2O-satd. soln. contg. 0.01 mol L^{-1} KSCN, 4.5×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and 5×10^{-3} mol L^{-1} phosphate ion; $k_r = 7 \times 10^{10}$ L mol^{-1} s^{-1}.	90C005
22.50.62	**Sulfite ion**							
	$Ru(bpy)_3^{3+} + SO_3^{2-} \rightarrow$	2×10^9				f.p./oq	Soln. contg. $Ru(bpy)_3^{2+}$ and $Co(NH_3)_5X^{2+}$ (X = Br, Cl, I) (OQ).	79Z056
22.50.63	**Thallium(II) ion**							
	$Ru(bpy)_3^{3+} + Tl^{2+} \rightarrow Ru(bpy)_3^{2+} + Tl^{3+}$	2.9×10^{10}	<0	3.0		f.p./oq	P.b.k. at 452 nm in soln. contg. $Ru(bpy)_3^{2+}$, 3.0 mol L^{-1} HCl and $Tl(NO_3)_3$ (OQ); Cl^- complexes of Tl are present.	82A111

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.50	**Tris(2,2′-bipyridine)ruthenium(III) ion** — Continued							
22.50.64	**1,4-Benzenediol**							
	$Ru(bpy)_3^{3+} + QH_2 \rightarrow Ru(bpy)_3^{2+} + Q^{\cdot-} + 2\,H^+$	2.1×10^9	6.9	0.04		f.p./oq	P.b.k. at 470 nm in soln. contg. 2×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 10^{-2} mol L^{-1} MV^{2+} (OQ) and (2.5-20) $\times 10^{-4}$ mol L^{-1} QH_2.	81A042
22.50.65	**1,1′-Bis(carboxymethyl)-4,4′-bipyridinium radical cation**							
	$Ru(bpy)_3^{3+} + [CMV]^{\cdot+} \rightarrow Ru(bpy)_3^{2+} + CMV^{2+}$	6.5×10^9		~0.0003		f.p./oq	Soln. contg. $Ru(bpy)_3^{2+}$ and CMV^{2+} (OQ).	82N022
22.50.66	**1,1′-Bis(2-hydroxyethyl)-4,4′-bipyridinium radical cation**							
	$Ru(bpy)_3^{3+} + [BP]^{\cdot+} \rightarrow Ru(bpy)_3^{2+} + BP^{2+}$	1.2×10^9	5			f.p./oq	Soln. contg. $Ru(bpy)_3^{2+}$ and *N,N′*-bis(2-hydroxyethyl)-4,4′-bipyridinium (OQ).	82C019
22.50.67	**1,1′-Bis(4-sulfonatobenzyl)-4,4′-bipyridinium zwitterion, radical anion**							
	$Ru(bpy)_3^{3+} + [BSV]^{\cdot-} \rightarrow Ru(bpy)_3^{2+} + BSV$	2.1×10^{10}				f.p./oq	P.b.k. at 450 nm and d.k. at 590 nm in soln. contg. $Ru(bpy)_3^{2+}$ and BSV (OQ).	82N118
22.50.68	**1,1′-Bis(2-sulfonatoethyl)-4,4′-bipyridinium radical anion**							
	$Ru(bpy)_3^{3+} + [SEV]^{\cdot-} \rightarrow Ru(bpy)_3^{2+} + SEV$	5.8×10^9	6.5	0.066	20	f.p./oq	D.k. at 600 nm. in soln. contg. $Ru(bpy)_3^{2+}$ and SEV (OQ).	86N260
22.50.69	**1,1′-Bis(3-sulfonatopropyl)-4,4′-bipyridinium radical anion**							
	$Ru(bpy)_3^{3+} + [SPV]^{\cdot-} \rightarrow Ru(bpy)_3^{2+} + SPV$	* 1.4×10^{10} * 4.0×10^9	6.2 8.2			f.p./oq	D.k. at 602 nm in soln. contg. $Ru(bpy)_3^{2+}$ and SPV (OQ). * The large pH effect is not explained.	91A143
		3.5×10^9	7	0.4		p./oq	Soln. contg. $Ru(bpy)_3^{2+}$ and SPV (OQ).	85F435
		5.0×10^9				f.p./oq	D.k. at 603 nm in soln. contg. 2.0×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and 5×10^{-4} mol L^{-1} SPV (OQ).	85F007
		7.8×10^9		~0.0003		f.p./oq	Soln. contg. $Ru(bpy)_3^{2+}$ and SPV (OQ).	82N022
		7.9×10^9				f.p./oq	Soln. contg. $Ru(bpy)_3^{2+}$ and SPV (OQ).	81N054
22.50.70	**1,1′-Bis(3-sulfonatopropyl)-3,3′-dimethyl-4,4′-bipyridinium radical anion**							
	$Ru(bpy)_3^{3+} + [3\text{-}MSPV]^{\cdot-} \rightarrow Ru(bpy)_3^{2+} + 3\text{-}MSPV$	3.8×10^9				f.p./oq	Soln. contg. $Ru(bpy)_3^{2+}$ and 3-MPVS (OQ).	90N140
22.50.71	**1,1′-Bis[3-(trimethylammonio)propyl]-4,4′-bipyridinium radical cation**							
	$Ru(bpy)_3^{3+} + [APV]^{\cdot 3+} \rightarrow Ru(bpy)_3^{2+} + APV^{4+}$	1.2×10^9	6.5	0.066	20	f.p./oq	D.k. at 600 nm in soln. contg. $Ru(bpy)_3^{2+}$ and APV^{4+} (OQ).	86N260
22.50.72	**Cysteine**							
	$Ru(bpy)_3^{3+} + CysSH \rightarrow Ru(bpy)_3^{2+} + CysS^{\cdot} + H^+$	3.7×10^6				f.p./oq	P.b.k. at 452 nm in soln. contg. 4×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, cysteine and 0.01 mol L^{-1} MV^{2+} (OQ).	78A351
22.50.73	**1,1′-Dibenzyl-4,4′-bipyridinium radical cation**							
	$Ru(bpy)_3^{3+} + BV^{\cdot+} \rightarrow Ru(bpy)_3^{2+} + BV^{2+}$	2.4×10^9	5		22	f.p.	D.k. at ~600 nm in soln. contg. $Ru(bpy)_3^{2+}$ and BV^{2+} (OQ).	82S257
		2.3×10^9	5			f.p./oq	Soln. contg. $Ru(bpy)_3^{2+}$ and BV^{2+} (OQ).	82C019

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.50	**Tris(2,2′-bipyridine)ruthenium(III) ion** — Continued							
22.50.74	**1,1′-Dimethyl-4,4′-bipyridinium radical cation**							
	$Ru(bpy)_3^{3+} + MV^{\bullet+} \rightarrow Ru(bpy)_3^{2+} + MV^{2+}$	2.5×10^9		→0			Deduced from the analysis of data reported in [91A143], [91N125], [90A389], [89E329], [88A025], [85F435], [81A042], [81N003], [78A351]; k depends on I, see Appendix, Table A1 and Fig. 1.	
22.50.75	**Ethylenediaminetetraacetate ions**							
	$Ru(bpy)_3^{3+} + EDTA \rightarrow Ru(bpy)_3^{2+} + [EDTA_{ox}]^{\bullet}$	1.2×10^6 4.6×10^7 5.0×10^7	4.7 8.7 11.0	1.0 0.6 1.0		f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$ and MV^{2+} (OQ). Studied at various concentrations and ionic strength; extrapolation to $I = 0$ at pH 4.7 indicates $k > 4 \times 10^8$ L mol^{-1} s^{-1}.	89A065
22.50.76	**1,1′,2,2′,6,6′-Hexamethyl-4,4′-bipyridinium radical cation**							
	$Ru(bpy)_3^{3+} + [HMV]^{\bullet+} \rightarrow Ru(bpy)_3^{2+} + HMV^{2+}$	2.9×10^9	5		22	f.p./oq	Soln. contg. 6.0×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and 1.6×10^{-3} mol L^{-1} HMV^{2+} (OQ).	82F316 82S257
22.50.77	**1-Methyl-4,4′-bipyridinyl**							
	$Ru(bpy)_3^{3+} + [1\text{-Me-}4,4'\text{-bpy}]^{\bullet} \rightarrow Ru(bpy)_3^{2+} + 1\text{-Me-}4,4'\text{-bpy}^+$	$\sim 10^9$	5.6		25	f.p./oq	D.k. at 600 nm in soln. contg. $Ru(bpy)_3^{2+}$ and 1-methyl-4,4′-bipyridinium (OQ).	78E293
22.50.78	**1-Methyl-1′-tetradecyl-4,4′-bipyridinium radical cation**							
	$Ru(bpy)_3^{3+} + [C_{14}MV]^{\bullet+} \rightarrow Ru(bpy)_3^{2+} + C_{14}MV^{2+}$	4×10^9		0.0014		f.p/oq	D.k. at 602 nm in soln. contg. $Ru(bpy)_3^{2+}$ and 5×10^{-4} mol L^{-1} $C_{14}MV^{2+}$ (OQ); addn. of 10^{-2} mol L^{-1} NaCl increases k by 30%.	80N025 81N002
22.50.79	**Oxalate ion**							
	$Ru(bpy)_3^{3+} + {}^-O_2CCO_2^- \rightarrow Ru(bpy)_3^{2+} + {}^-O_2CCO_2^{\bullet}$	1.0×10^5 3×10^4		0.30-1.0 2.1-3.0	23	f.p./oq	P.b.k. at 450 nm in soln. contg. $Ru(bpy)_3^{2+}$, $(1.0\text{-}10) \times 10^{-3}$ mol L^{-1} MV^{2+} (OQ) and 0.10 mol L^{-1} oxalate ion.	90A389
22.50.80	**1,1′-Tetramethylene-2,2′-bipyridinium radical cation**							
	$Ru(bpy)_3^{3+} + [BP]^{\bullet+} \rightarrow Ru(bpy)_3^{2+} + BP^{2+}$	1.5×10^9	5			f.p./oq	Soln. contg. $Ru(bpy)_3^{2+}$ and BP^{2+} (OQ).	82C019
22.50.81	**1,1′,2,2′-Tetramethyl-4,4′-bipyridinium radical cation**							
	$Ru(bpy)_3^{3+} + [TMV]^{\bullet+} \rightarrow Ru(bpy)_3^{2+} + TMV^{2+}$	2.6×10^9	5		22	f.p./oq	D.k. at 605 nm in soln. contg. 6.0×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and 1.6×10^{-3} mol L^{-1} TMV^{2+} (OQ).	82F316 82S257
22.50.82	**1,1′-Trimethylene-2,2′-bipyridinium radical cation**							
	$Ru(bpy)_3^{3+} + [TQ]^{\bullet+} \rightarrow Ru(bpy)_3^{2+} + TQ^{2+}$	2.8×10^9	5			f.p./oq	Soln. contg. $Ru(bpy)_3^{2+}$ and TQ^{2+} (OQ).	82C019
22.50.83	**Triethanolamine**							
	$Ru(bpy)_3^{3+} + TEOA \rightarrow Ru(bpy)_3^{2+} + [TEOA]^{\bullet+}$	2×10^7	8.1	0.5	25	f.p./oq	P.b.k. in soln. contg. 5×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 4.0×10^{-3} mol L^{-1} $Rh(bpy)_3^{3+}$ (OQ) and 0.01 mol L^{-1} TEOA/$TEOAH^+$ ($pK_a = 8.1$).	79A317
		4.7×10^7	9			f.p./oq	P.b.k. at 452 nm in soln. contg. 4×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.05-0.125 mol L^{-1} TEOA and 0.01 mol L^{-1} MV^{2+} (OQ); at pH 5 and 7, $k_{obs} = 2.4 \times 10^5$ and 6.5×10^6 L mol^{-1} s^{-1}, respectively, indicating that only the unprotonated amine is reactive.	78A351

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.50	**Tris(2,2′-bipyridine)ruthenium(III) ion** — Continued							
22.50.84	**Trimethylhydroquinone**							
	$Ru(bpy)_3^{3+} + 2,3,5\text{-}(CH_3)_3QH_2 \rightarrow Ru(bpy)_3^{2+} + 2\,H^+ + [2,3,5\text{-}(CH_3)_3Q]^{\cdot-}$	3.3×10^9	6.9	0.04		f.p./oq	P.b.k. at 470 nm ($Ru(bpy)_3^{2+}$) in soln. contg. 2×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 10^{-2} mol L^{-1} MV^{2+} (OQ) and (2.5-20) 10^{-4} mol L^{-1} trimethylhydroquinone.	81A042
22.51	**Tris(4,4′-dimethyl-2,2′-bipyridine)ruthenium(III) ion**							
22.51.1	**Copper(I) ion**							
	$Ru(4,4'\text{-}Me_2bpy)_3^{3+} + Cu^+ \rightarrow Ru(4,4'\text{-}Me_2bpy)_3^{2+} + Cu^{2+}$	8.7×10^7	0.3		25	f.p./oq	P.b.k. at ~450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(4,4'\text{-}Me_2bpy)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
22.51.2	**Iron(II) sulfate**							
	$Ru(4,4'\text{-}Me_2bpy)_3^{3+} + FeSO_4 \rightarrow Ru(4,4'\text{-}Me_2bpy)_3^{2+} + FeSO_4^+$	1.0×10^5	0.3		20	f.p./oq	Calcd. from current-time curve; soln. contg. 0.5 mol L^{-1} H_2SO_4, 3×10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$ and $[Fe^{2+}] = [Fe^{3+}]$ (OQ).	80E224
22.51.3	**Dichloromercurate(I) ion**							
	$Ru(4,4'\text{-}Me_2bpy)_3^{3+} + HgCl_2^- \rightarrow Ru(4,4'\text{-}Me_2bpy)_3^{2+} + HgCl_2$	$>2 \times 10^{10}$		1.0		f.p./oq	Soln. contg. $Ru(bpy)_3^{2+}$ and $HgCl_2$ (OQ).	84A077
22.52	**Tris(5,5'-dimethyl-2,2′-bipyridine)ruthenium(III) ion**							
22.52.1	**Iron(II) sulfate**							
	$Ru(5,5'\text{-}Me_2bpy)_3^{3+} + FeSO_4 \rightarrow Ru(5,5'\text{-}Me_2bpy)_3^{2+} + FeSO_4^+$	6.0×10^5	0.3		20	f.p./oq	Calcd. from current-time curve; soln. contg. 0.5 mol L^{-1} H_2SO_4, 3×10^{-4} mol L^{-1} $Ru(bpy)_3^{2+}$ and $[Fe^{2+}] = [Fe^{3+}]$ (OQ).	80E224
22.53	**Ammine(2,2′-bipyridine)(2,2′:6′,2″-terpyridine)ruthenium(III) ion**							
22.53.1	**Iron(II) ion**							
	$Ru(terpy)(bpy)(NH_3)^{3+} + Fe^{2+} \rightarrow Ru(terpy)(bpy)(NH_3)^{2+} + Fe^{3+}$	3.1×10^4	0			f.p./oq	P.b.k. at 450 and 480 nm in soln. contg. 5.64×10^{-6} mol L^{-1} $Ru(bpy)_3^{2+}$, 3.48×10^{-6} mol L^{-1} $Ru(terpy)(bpy)NH_3^{2+}$, 4.2×10^{-3} mol L^{-1} Fe^{3+} (OQ), 5.25×10^{-5} mol L^{-1} Fe^{2+} and 1.0 mol L^{-1} $HClO_4$; same value obtained by s.f.	84A302
22.54	**Tris(4-triethylphosphonio-2,2′-bipyridine)ruthenium(III) ion**							
22.54.1	**Tris(2,2′-bipyridine)cobalt(II) ion**							
	$Ru[4\text{-}(Et_3P)bpy]_3^{6+} + Co(bpy)_3^{2+} \rightarrow Ru[4\text{-}(Et_3P)bpy]_3^{5+} + Co(bpy)_3^{3+}$	2.2×10^8		1.0		f.p.	Soln. contg. $Ru([4\text{-}(Et_3P)bpy]_3^{5+}$ and $Co(bpy)_3^{3+}$ (OQ).	82F048
22.54.2	**Iron(II) sulfate**							
	$Ru[4\text{-}(Et_3P)bpy]_3^{6+} + FeSO_4 \rightarrow Ru[4\text{-}(Et_3P)bpy]_3^{5+} + FeSO_4^+$	1.9×10^8	0.3			f.p./oq	Soln. contg. $Ru([4\text{-}(Et_3P)bpy]_3^{5+}$ and $FeSO_4^+$ (OQ) in 0.5 mol L^{-1} H_2SO_4.	82F048

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.55	**Tris(1,10-phenanthroline)ruthenium(III) ion**							
22.55.1	**Tris(2,2′-bipyridine)cobalt(II) ion**							
	$Ru(phen)_3^{3+} + Co(bpy)_3^{2+} \rightarrow Ru(phen)_3^{2+} + Co(bpy)_3^{3+}$	1.9×10^8		0.25		f.p./oq	P.b.k. at 420-450 nm in soln. contg. 1×10^{-4} mol L^{-1} $Ru(phen)_3^{2+}$, 0.25 mol L^{-1} LiCl and (2-6) $\times 10^{-4}$ mol L^{-1} $Co(bpy)_3^{3+}$ (OQ); $k = 2.5 \times 10^8$ in presence of 0.166 mol L^{-1} Na_2SO_4 and 4.8×10^7 L mol^{-1} s^{-1} in 50% aqueous acetonitrile contg. 0.25 mol L^{-1} LiCl.	85S022
22.55.2	**2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradecanecobalt(II) ion**							
	$Ru(phen)_3^{3+} + Co(Me_4[14]aneN_4)^{2+} \rightarrow Ru(phen)_3^{2+} + Co(Me_4[14]aneN_4)^{3+}$	9.7×10^5		0.1	25	f.p./oq	P.b.k. in soln. contg. $Ru(phen)_3^{2+}$ and $Co(NH_3)_5Br^{2+}$ (OQ).	90A221
22.55.3	**1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(II) ion**							
	$Ru(phen)_3^{3+} + Co(sep)^{2+} \rightarrow Ru(phen)_3^{2+} + Co(sep)^{3+}$	6.4×10^8		0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) $\times 10^{-5}$ mol L^{-1} $Ru(phen)_3^{2+}$ and (1-7) $\times 10^{-3}$ mol L^{-1} $Co(sep)^{3+}$ (OQ).	84A238
22.55.4	**1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosanecobalt(II) ion, conjugate diacid**							
	$Ru(phen)_3^{3+} + Co(diamsarH_2)^{4+} \rightarrow Ru(phen)_3^{2+} + Co(diamsarH_2)^{5+}$	7.9×10^6	1	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) $\times 10^{-5}$ mol L^{-1} $Ru(phen)_3^{2+}$, (1-7) $\times 10^{-3}$ mol L^{-1} $Co(diamsar)^{3+}$ (OQ) and 0.1 mol L^{-1} HCl.	84A238
22.55.5	**1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosanecobalt(II) ion**							
	$Ru(phen)_3^{3+} + Co(diamsar)^{2+} \rightarrow Ru(phen)_3^{2+} + Co(diamsar)^{3+}$	9.6×10^7	8.3	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) $\times 10^{-5}$ mol L^{-1} $Ru(phen)_3^{2+}$, (1-7) $\times 10^{-3}$ mol L^{-1} $Co(diamsar)^{3+}$ (OQ), 0.1 mol L^{-1} LiCl and 0.05 mol L^{-1} *N*-ethylmorpholine.	84A238
22.55.6	**Copper(I) ion**							
	$Ru(phen)_3^{3+} + Cu^+ \rightarrow Ru(phen)_3^{2+} + Cu^{2+}$	1.2×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(phen)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
22.55.7	**Iron(II) ion**							
	$Ru(phen)_3^{3+} + Fe^{2+} \rightarrow Ru(phen)_3^{2+} + Fe^{3+}$	1.2×10^6 1.4×10^6	0 1.1	1.0 0.1	25 25	f.p./oq	P.b.k. in soln. contg. 3.0×10^{-6} mol L^{-1} $Ru(bpy)_3^{2+}$, 3.0×10^{-6} mol L^{-1} $Ru(phen)_3^{2+}$, 1.0 or 0.076 mol L^{-1} $HClO_4$, respectively, 4.0×10^{-5} mol L^{-1} Fe^{3+} (OQ) and 3.0×10^{-5} mol L^{-1} Fe^{2+}; for $I = 0.1$, k is independent of temperature in the range 5-50 °C.	777164
22.55.8	**Mercury(I) ion**							
	$Ru(phen)_3^{3+} + Hg^+ \rightarrow Ru(phen)_3^{2+} + Hg^{2+}$	2.5×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $Ru(phen)_3^{2+}$, excess $Hg(NO_3)_2$ (OQ), HNO_3 and $NaNO_3$; assumed $k(Hg^+ + Hg^+) = 8 \times 10^9$ L mol^{-1} s^{-1}.	84A148
22.55.9	**Mercury(I) dimer ion**							
	$Ru(phen)_3^{3+} + Hg_2^{2+} \rightarrow Ru(phen)_3^{2+} + Hg^{2+} + Hg^+$	10	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $Ru(phen)_3^{2+}$, excess $Hg(NO_3)_2$ (OQ), HNO_3 and $NaNO_3$.	84A148

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.55	**Tris(1,10-phenanthroline)ruthenium(III) ion** — Continued							
22.55.10	**Tris(2,2′-bipyridine)ruthenium(II) ion**							
	$Ru(phen)_3^{3+} + Ru(bpy)_3^{2+} \rightarrow$ $Ru(phen)_3^{2+} + Ru(bpy)_3^{3+}$	1.2×10^9 4.2×10^8	0 1.1	1.0 0.1	25 25	f.p./oq	P.b.k. in soln. contg. 3.0×10^{-6} mol L^{-1} $Ru(bpy)_3^{2+}$, 3.0×10^{-6} mol L^{-1} $Ru(phen)_3^{2+}$, 1.0 or 0.076 mol L^{-1} $HClO_4$, respectively, 4.0×10^{-5} mol L^{-1} Fe^{3+} (OQ) and 3.0×10^{-5} mol L^{-1} Fe^{2+}; $\Delta H\ddagger = 32$ kJ mol^{-1}, $\Delta S\ddagger = -28$ J K^{-1} mol^{-1}, $\Delta G\ddagger = 24$ kJ mol^{-1} for $I = 1$; measured over 5-50 °C,	777164
22.55.11	**1,1′-Bis(3-sulfonatopropyl)-3,3′-dimethyl-4,4′-bipyridinium radical anion**							
	$Ru(phen)_3^{3+} + [3\text{-MSPV}]^{\bullet -} \rightarrow$ $Ru(phen)_3^{2+} + 3\text{-MSPV}$	2.1×10^9				f.p./oq	Soln. contg. $Ru(phen)_3^{2+}$ and 3-MPVS (OQ).	90N140
22.56	**Tris(5-bromo-1,10-phenanthroline)ruthenium(III) ion**							
22.56.1	**Copper(I) ion**							
	$Ru(5\text{-Brphen})_3^{3+} + Cu^+ \rightarrow$ $Ru(5\text{-Brphen})_3^{2+} + Cu^{2+}$	2.3×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(5\text{-Brphen})_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
22.56.2	**Dichloromercurate(I) ion**							
	$Ru(5\text{-Brphen})_3^{3+} + HgCl_2^- \rightarrow$ $Ru(5\text{-Brphen})_3^{2+} + HgCl_2$	$>2 \times 10^{10}$		1.0		f.p./oq	Soln. contg. $Ru(5\text{-Brphen})_3^{2+}$ and $HgCl_2$ (OQ).	84A077
22.57	**Tris(5-chloro-1,10-phenanthroline)ruthenium(III) ion**							
22.57.1	**1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(II) ion**							
	$Ru(5\text{-Clphen})_3^{3+} + Co(sep)^{2+} \rightarrow$ $Ru(5\text{-Clphen})_3^{2+} + Co(sep)^{3+}$	8.2×10^8		0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) $\times 10^{-5}$ mol L^{-1} $Ru(5\text{-Clphen})_3^{2+}$ and (1-7) $\times 10^{-3}$ mol L^{-1} $Co(sep)^{3+}$ (OQ).	84A238
22.57.2	**1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosanecobalt(II) ion**							
	$Ru(5\text{-Clphen})_3^{3+} + Co(diamsar)^{2+} \rightarrow$ $Ru(5\text{-Clphen})_3^{2+} + Co(diamsar)^{3+}$	1.7×10^8	8.1	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 0.2 mol L^{-1} LiCl. 0.05 mol L^{-1} *N*-ethylmorpholine, (2-5) $\times 10^{-5}$ mol L^{-1} $Ru(5\text{-Clphen})_3^{2+}$ and (1-7) $\times 10^{-3}$ mol L^{-1} $Co(diamsar)^{3+}$ (OQ).	84A238
22.57.3	**Copper(I) ion**							
	$Ru(5\text{-Clphen})_3^{3+} + Cu^+ \rightarrow$ $Ru(5\text{-Clphen})_3^{2+} + Cu^{2+}$	2.7×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(5\text{-Clphen})_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
22.57.4	**Iron(II) sulfate**							
	$Ru(5\text{-Clphen})_3^{3+} + FeSO_4 \rightarrow$ $Ru(5\text{-Clphen})_3^{2+} + FeSO_4^+$	2.2×10^7		0.3	25	f.p./oq	P.b.k. in soln. contg. $Ru(5\text{-Clphen})_3^{2+}$, Fe(III) (OQ) and 0.5 mol L^{-1} H_2SO_4; $k = 1.8 \times 10^7$ L mol^{-1} s^{-1} detd. by s.f.	766404
22.57.5	**Mercury(I) ion**							
	$Ru(5\text{-Clphen})_3^{3+} + Hg^+ \rightarrow$ $Ru(5\text{-Clphen})_3^{2+} + Hg^{2+}$	3.5×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $Ru(5\text{-Clphen})_3^{2+}$, excess $Hg(NO_3)_2$ (OQ), HNO_3 and $NaNO_3$; assumed $k(Hg^+ + Hg^+) = 8 \times 10^9$ L mol^{-1} s^{-1}	84A148
22.57.6	**Mercury(I) dimer ion**							
	$Ru(5\text{-Clphen})_3^{3+} + Hg_2^{2+} \rightarrow$ $Ru(5\text{-Clphen})_3^{2+} + Hg^{2+} + Hg^+$	79	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $Ru(5\text{-Clphen})_3^{2+}$, excess $Hg(NO_3)_2$ (OQ), HNO_3 and $NaNO_3$.	84A148

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.58	**Tris(5,6-dimethyl-1,10-phenanthroline)ruthenium(III) ion**							
22.58.1	**Copper(I) ion**							
	$Ru(5,6\text{-}Me_2phen)_3^{3+} + Cu^+ \rightarrow Ru(5,6\text{-}Me_2phen)_3^{2+} + Cu^{2+}$	5.4×10^8	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(5,6\text{-}Me_2phen)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
22.58.2	**Mercury(I) ion**							
	$Ru(5,6\text{-}Me_2phen)_3^{3+} + Hg^+ \rightarrow Ru(5,6\text{-}Me_2phen)_3^{2+} + Hg^{2+}$	3.2×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $Ru(5,6\text{-}Me_2phen)_3^{2+}$, excess $Hg(NO_3)_2$ (OQ), HNO_3 and $NaNO_3$; assumed $k(Hg^+ + Hg^+) = 8 \times 10^9$ L mol^{-1} s^{-1}.	84A148
22.58.3	**Mercury(I) dimer ion**							
	$Ru(5,6\text{-}Me_2phen)_3^{3+} + Hg_2^{2+} \rightarrow Ru(5,6\text{-}Me_2phen)_3^{2+} + Hg^{2+} + Hg^+$	3.0	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $Ru(5,6\text{-}Me_2phen)_3^{2+}$, excess $Hg(NO_3)_2$ (OQ), HNO_3 and $NaNO_3$.	84A148
22.59	**Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion**							
22.59.1	**Tris(2,2′-bipyridine)cobalt(II) ion**							
	$Ru(4,7\text{-}Me_2phen)_3^{3+} + Co(bpy)_3^{2+} \rightarrow Ru(4,7\text{-}Me_2phen)_3^{2+} + Co(bpy)_3^{3+}$	3.1×10^8		0.25		f.p./oq	P.b.k. at 420-450 nm in soln. contg. 1 $\times 10^{-4}$ mol L^{-1} $Ru(4,7\text{-}Me_2phen)_3^{2+}$, 0.25 mol L^{-1} LiCl and 2-6 $\times 10^{-4}$ mol L^{-1} $Co(bpy)_3^{3+}$ (OQ); $k = 5.1 \times 10^8$ in presence of 0.166 mol L^{-1} Na_2SO_4 and 2.2×10^7 L mol^{-1} s^{-1} in 50% aqueous acetonitrile contg. 0.25 mol L^{-1} LiCl.	85S022
22.59.2	**2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradecanecobalt(II) ion**							
	$Ru(4,7\text{-}Me_2phen)_3^{3+} + Co(Me_4[14]aneN_4)^{2+} \rightarrow Ru(4,7\text{-}Me_2phen)_3^{2+} + Co(Me_4[14]aneN_4)^{3+}$	9.7×10^5		0.10	25	f.p./oq	P.b.k. in soln. contg. $Ru(4,7\text{-}Me_2phen)_3^{2+}$ and $Co(NH_3)_5Br^{2+}$ (OQ).	90A221
22.59.3	**1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(II) ion**							
	$Ru(4,7\text{-}Me_2phen)_3^{3+} + Co(sep)^{2+} \rightarrow Ru(4,7\text{-}Me_2phen)_3^{2+} + Co(sep)^{3+}$	5.4×10^8		0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) $\times 10^{-5}$ mol L^{-1} $Ru(5\text{-}Clphen)_3^{2+}$ and (1-7) $\times 10^{-3}$ mol L^{-1} $Co(sep)^{3+}$ (OQ).	84A238
22.59.4	**1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosanecobalt(II) ion**							
	$Ru(4,7\text{-}Me_2phen)_3^{3+} + Co(diamsar)^{2+} \rightarrow Ru(4,7\text{-}Me_2phen)_3^{2+} + Co(diamsar)^{3+}$	3.1×10^7	8.3	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 0.2 mol L^{-1} LiCl, 0.05 mol L^{-1} *N*-ethylmorpholine, (2-5) $\times 10^{-5}$ mol L^{-1} $Ru(5\text{-}Clphen)_3^{2+}$ and (1-7) $\times 10^{-3}$ mol L^{-1} $Co(diamsar)^{3+}$ (OQ).	84A238
22.59.5	**Copper(I) ion**							
	$Ru(4,7\text{-}Me_2phen)_3^{3+} + Cu^+ \rightarrow Ru(4,7\text{-}Me_2phen)_3^{2+} + Cu^{2+}$	1.4×10^8	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(4,7\text{-}Me_2phen)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
22.59.6	**Europium(II) ion**							
	$Ru(4,7\text{-}Me_2phen)_3^{3+} + Eu^{2+} \rightarrow Ru(4,7\text{-}Me_2phen)_3^{2+} + Eu^{3+}$	4×10^8			25	f.p./oq	Soln. contg. $Ru(4,7\text{-}Me_2phen)_3^{2+}$ and Eu^{3+} (OQ).	766404
22.59.7	**Mercury(I) ion**							
	$Ru(4,7\text{-}Me_2phen)_3^{3+} + Hg^+ \rightarrow Ru(4,7\text{-}Me_2phen)_3^{2+} + Hg^{2+}$	3.0×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $Ru(4,7\text{-}Me_2phen)_3^{2+}$, excess $Hg(NO_3)_2$ (OQ), HNO_3 and $NaNO_3$; assumed $k(Hg^+ + Hg^+) = 8 \times 10^9$ L mol^{-1} s^{-1}.	84A148

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.59	**Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion** — Continued							
22.59.8	**Mercury(I) dimer ion**							
	$Ru(4,7\text{-}Me_2phen)_3^{3+} + Hg_2^{2+} \rightarrow Ru(4,7\text{-}Me_2phen)_3^{2+} + Hg^{2+} + Hg^{+}$	0.20	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $Ru(4,7\text{-}Me_2phen)_3^{2+}$, excess $Hg(NO_3)_2$ (OQ), HNO_3 and $NaNO_3$.	84A148
22.59.9	**Triethanolamine**							
	$Ru(4,7\text{-}Me_2phen)_3^{3+} + TEOA \rightarrow Ru(4,7\text{-}Me_2phen)_3^{2+} + [TEOA]^{\cdot+}$	5.2×10^6		0.25	25	f.p./oq	P.b.k. at 420-450 nm in 50% aqueous acetonitrile soln. contg. 1×10^{-4} mol L^{-1} $Ru(4,7\text{-}Me_2phen)_3^{2+}$, 0.25 mol L^{-1} LiCl, 2-6 $\times 10^{-4}$ mol L^{-1} TEOA and 1×10^{-4} mol L^{-1} $Co(bpy)_3^{3+}$ (OQ).	85S022
22.60	**Tris(5-methyl-1,10-phenanthroline)ruthenium(III) ion**							
22.60.1	**Copper(I) ion**							
	$Ru(5\text{-}Mephen)_3^{3+} + Cu^{+} \rightarrow Ru(5\text{-}Mephen)_3^{2+} + Cu^{2+}$	1.0×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(5\text{-}Mephen)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
22.60.2	**Mercury(I) ion**							
	$Ru(5\text{-}Mephen)_3^{3+} + Hg^{+} \rightarrow Ru(5\text{-}Mephen)_3^{2+} + Hg^{2+}$	3.1×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $Ru(5\text{-}Mephen)_3^{2+}$, excess $Hg(NO_3)_2$ (OQ), HNO_3 and $NaNO_3$ assumed $k(Hg^{+} + Hg^{+}) = 8 \times 10^9$ L mol^{-1} s^{-1}.	84A148
22.60.3	**Mercury(I) dimer ion**							
	$Ru(5\text{-}Mephen)_3^{3+} + Hg_2^{2+} \rightarrow Ru(5\text{-}Mephen)_3^{2+} + Hg^{2+} + Hg^{+}$	5.7	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $Ru(5\text{-}Mephen)_3^{2+}$, excess $Hg(NO_3)_2$ (OQ), HNO_3 and $NaNO_3$.	84A148
22.61	**Tris(5-phenyl-1,10-phenanthroline)ruthenium(III) ion**							
22.61.1	**Copper(I) ion**							
	$Ru(5\text{-}Phphen)_3^{3+} + Cu^{+} \rightarrow Ru(5\text{-}Phphen)_3^{2+} + Cu^{2+}$	1.1×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(5\text{-}Phphen)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
22.62	**Tris(3,4,7,8-tetramethyl-1,10-phenanthroline)ruthenium(III) ion**							
22.62.1	**Tris(2,2′-bipyridine)cobalt(II) ion**							
	$Ru(3,4,7,8\text{-}Me_4phen)_3^{3+} + Co(bpy)_3^{2+} \rightarrow Ru(3,4,7,8\text{-}Me_4phen)_3^{2+} + Co(bpy)_3^{3+}$	2.0×10^7		0.25		f.p./oq	P.b.k. at 420-450 nm in 50% aqueous acetonitrile soln. contg. 1×10^{-4} mol L^{-1} $Ru(3,4,7,8\text{-}Me_4phen)_3^{2+}$, 0.25 mol L^{-1} LiCl and 2-6 $\times 10^{-4}$ mol L^{-1} $Co(bpy)_3^{3+}$ (OQ).	85S022
22.62.2	**Copper(I) ion**							
	$Ru(3,4,7,8\text{-}Me_4phen)_3^{3+} + Cu^{+} \rightarrow Ru(3,4,7,8\text{-}Me_4phen)_3^{2+} + Cu^{2+}$	6.0×10^7	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $Ru(3,4,7,8\text{-}Me_4phen)_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
22.62.3	**Dichloromercurate(I) ion**							
	$Ru(3,4,7,8\text{-}Me_4phen)_3^{3+} + HgCl_2^{-} \rightarrow Ru(3,4,7,8\text{-}Me_4phen)_3^{2+} + HgCl_2$	$>2 \times 10^{10}$		1.0		f.p./oq	Soln. contg. $Ru(3,4,7,8\text{-}Me_4phen)_3^{2+}$ and $HgCl_2$ (OQ).	84A077
22.63	**Bis(2,2′-bipyridine)[2-(2-thiazolyl]pyridine]ruthenium(III) ion**							
22.63.1	**Ethylenediaminetetraacetate ions**							
	$Ru(bpy)_2(pyth)^{3+} + EDTA \rightarrow Ru(bpy)_2(pyth)^{2+} + [EDTA_{ox}]^{\cdot}$	2×10^6				f.p./oq	Soln. contg. $Ru(bpy)_2(pyth)^{2+}$ and MV^{2+} (OQ).	83N214

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
22.63	**Bis(2,2′-bipyridine)[2-(2-thiazolyl]pyridine]ruthenium(III) ion — Continued**							
22.63.2	**1,1′-Dimethyl-4,4′-bipyridinium radical cation**							
	$Ru(bpy)_2(pyth)^{3+} + MV^{\cdot+} \rightarrow Ru(bpy)_2(pyth)^{2+} + MV^{2+}$	2.7×10^9				f.p./oq	Soln. contg. $Ru(bpy)_2(pyth)^{2+}$ and MV^{2+} (OQ).	83N214
22.64	**2,2′-Bipyridinebis[2-(2-thiazolyl)pyridine]ruthenium(III) ion**							
22.64.1	**1,1′-Dimethyl-4,4′-bipyridinium radical cation**							
	$Ru(bpy)(pyth)_2^{3+} + MV^{\cdot+} \rightarrow Ru(bpy)(pyth)_2^{2+} + MV^{2+}$	2.7×10^9				f.p./oq	Soln. contg. $Ru(bpy)(pyth)_2^{2+}$ and MV^{2+} (OQ).	83N214
22.65	**Tris[2-(2-thiazolyl)pyridine]ruthenium(III) ion**							
22.65.1	**1,1′-Dimethyl-4,4′-bipyridinium radical cation**							
	$Ru(pyth)_3^{3+} + MV^{\cdot+} \rightarrow Ru(pyth)_3^{2+} + MV^{2+}$	* 1.6×10^{10}	5.0			f.p./oq	D.k. at 602 nm in Ar-satd. buffered soln. contg. 2.0×10^{-5} mol L^{-1} $Ru(pyth)_3^{2+}$ and 5.0×10^{-2} mol L^{-1} MV^{2+} (OQ).	87E949
		* 2.7×10^9				f.p./oq	Soln. contg. $Ru(pyth)_3^{2+}$ and MV^{2+} (OQ). * Unexplained discrepancy in these data.	83N214
22.65.2	**Ethylenediaminetetraacetate ions**							
	$Ru(pyth)_3^{3+} + EDTA \rightarrow Ru(pyth)_3^{2+} + [EDTA_{ox}]^{\cdot}$	4.0×10^8	5.0			f.p./oq	P.b.k. in Ar-satd. buffered soln. contg. 2.0×10^{-5} mol L^{-1} $Ru(pyth)_3^{2+}$, 5.0×10^{-2} mol L^{-1} MV^{2+} (OQ) and 5.0×10^{-2} mol L^{-1} EDTA.	87E949
22.66	**Tris(2,2′-bithiazole)ruthenium(III) ion**							
22.66.1	**Ethylenediaminetetraacetate ions**							
	$Ru(bth)_3^{3+} + EDTA \rightarrow Ru(bth)_3^{2+} + [EDTA_{ox}]^{\cdot}$	8.2×10^8	5.0			f.p./oq	P.b.k. in Ar-satd. buffered soln. contg. 2.0×10^{-5} mol L^{-1} $Ru(bth)_3^{2+}$, 5.0×10^{-2} mol L^{-1} MV^{2+} (OQ) and 5.0×10^{-2} mol L^{-1} EDTA.	87E949
22.67	**Tris[2-(1,2,4-thiadiazol-5-yl)pyridine]ruthenium(III) ion**							
22.67.1	**Ethylenediaminetetraacetate ions**							
	$Ru(pytda)_3^{3+} + EDTA \rightarrow Ru(pytda)_3^{2+} + [EDTA_{ox}]^{\cdot}$	3.9×10^8	5.0			f.p./oq	P.b.k. in Ar-satd. buffered soln. contg. 2.0×10^{-5} mol L^{-1} $Ru(pytda)_3^{2+}$, 5.0×10^{-2} mol L^{-1} MV^{2+} (OQ) and 5.0×10^{-2} mol L^{-1} EDTA.	87E949
22.68	**Hexaammineruthenium(III) ion, OH reaction product**							
22.68.1	**Hexaammineruthenium(III) ion, OH reaction product**							
	$[Ru(NH_3)_6^{3+}/OH] + [Ru(NH_3)_6^{3+}/OH] \rightarrow$	4.5×10^9		$\sim 3 \times 10^{-3}$	20	p.r.	D.k. at 400 nm in N_2O-satd. soln. contg. 5×10^{-4} mol L^{-1} $Ru(NH_3)_6^{3+}$; unclear whether k or $2k$.	700178
22.69	**Pentaammine(chloro)ruthenium(III) ion, OH reaction product**							
22.69.1	**First-order reaction**							
	$[Ru(NH_3)_5Cl^{2+}/OH] \rightarrow$	2.5×10^5 s^{-1}		$\sim 3 \times 10^{-3}$	20	p.r.	P.b.k. at 360 nm in N_2O-satd. soln. contg. 5×10^{-4} mol L^{-1} $Ru(NH_3)_5Cl^{2+}$.	700178

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})*	pH	I	t(°C)	Method	Comment	Ref.
22.70	**Pentaammine(acetylenedicarboxylato)ruthenium(III), OH-adduct**							
22.70.1	**Pentaammine(acetylenedicarboxylato)ruthenium(III), OH-adduct**							
	$(NH_3)_5Ru(C_4O_4\text{-}OH) + (NH_3)_5Ru(C_4O_4\text{-}OH) \rightarrow$	$\sim 2 \times 10^7$	3.5			p.r.	D.k. in N_2O-satd. soln. contg. $(NH_3)_5RuC_4O_4$; unclear whether k or $2k$.	88A030

TABLE 23. Rate constants for antimony transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
23.1	**3,8,13,18-Tetrakis(carboxymethyl)porphine-2,7,12,17-tetrapropanoato(chloro)oxoantimony(V) radical anion**							
23.1.1	**1,1'-Dimethyl-4,4'-bipyridinium**							
	$[SbO(Cl)(uroporphyrin\ I)]^{\cdot+} + MV^{2+} \rightarrow SbO(Cl)(uroporphyrin\ I)^{2+} + MV^{\cdot+}$	4.6×10^8	9.0			f.p./rq	P.b.k. at 578 nm in deaerated soln. contg. 10^{-5} mol L^{-1} SbO(Cl)(uroporphyrin I)$^{2+}$, 0.02 mol L^{-1} EDTA (RQ) and <10^{-3} mol L^{-1} MV^{2+}.	88N184

TABLE 24. Rate constants for tin transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
24.1	**Tin(III)**							
24.1.1	**Tin(III)**							
	Sn(III) + Sn(III) → Sn(II) + Sn(IV)	1.9×10^{9}	0			f.p.	D.k. at 280 nm in soln. contg. 1 mol L^{-1} HCl and Sn(II) and Sn(IV). In soln. contg. only Sn(II) or Sn(IV), $k = 2.5 \times 10^{9}$ and 1.2×10^{9} L mol^{-1} s^{-1}, respectively.	86A208
24.1.2	**Oxygen**							
	Sn(III) + O_2 + H^+ → Sn(IV) + $HO_2^{\bullet}$	1.7×10^{8}	0			f.p.	D.k. at 280 nm in soln. contg. 1 mol L^{-1} HCl, 5.0×10^{-4} mol L^{-1} Sn(IV) and 8.83×10^{-5}, 1.6×10^{-4}, 2.84×10^{-4} or 1.38×10^{-3} mol L^{-1} oxygen.	86A208 89B054
24.2	**Dichloro[5,10,15,20-tetrakis(4-sulfonatophenyl)porphinatostannate(IV) radical anion**							
24.2.1	**First-order reaction**							
	$[SnTPPSCl_2]^{\bullet 5-}$ →	6.2×10^{4} s^{-1}	7			f.p./rq	D.k. in N_2-satd. soln. contg. $SnTPPSCl_2^{4-}$ and 4-$HOC_6H_4NH_2$ (RQ). Reaction suggested to represent protonation followed by disproportionation to form a Sn(IV) chlorin.	90A022
24.2.2	**Oxygen**							
	$[SnTPPSCl_2]^{\bullet 5-}$ + O_2 → $SnTPPSCl_2^{4-}$ + $O_2^{\bullet -}$	2.6×10^{8}	7			f.p./rq	D.k. in N_2-satd. soln. contg. $SnTPPSCl_2^{4-}$ and 4-$HOC_6H_4NH_2$ (RQ) and varied [O_2].	90A022
24.3	**5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatotin(IV) radical anion**							
24.3.1	**5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatotin(IV) radical anion**							
	$[SnTMpyP]^{\bullet 5+}$ + $[SnTMpyP]^{\bullet 5+}$ + H^+ → $SnTMpyP^{6+}$ + $SnTMpyPH^{5+}$	1.5×10^{5}	2.9			p.r.	D.k.	84A121

TABLE 25. Rate constants for thallium transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
25.1	**Thallium(0)**							
25.1.1	**Silver(I) ion**							
	$Tl^0 + Ag^+ \rightarrow AgTl^+$	1.7×10^9				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and 8×10^{-5} mol L^{-1} Tl^+.	80A123
25.1.2	**Carbon dioxide**							
	$Tl^0 + CO_2 \rightarrow Tl^+ + CO_2^{\bullet-}$	3×10^7	3.7		25	p.r.	Calcd. from rate of approach to equilibrium in soln. contg. 0.01-0.04 mol L^{-1} Tl^+; $k_r = 3 \times 10^6$ L mol^{-1} s^{-1}.	89C001
25.1.3	**Cadmium(II) ion**							
	$Tl^0 + Cd^{2+} \rightarrow$	3.6×10^8				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and 8×10^{-5} mol L^{-1} Tl^+.	80A123
25.1.4	**Chromium(III) ion**							
	$Tl^0 + Cr^{3+} \rightarrow$	6.0×10^8				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and 8×10^{-5} mol L^{-1} Tl^+.	80A123
25.1.5	**Copper(II) ion**							
	$Tl^0 + Cu^{2+} \rightarrow$	3.5×10^9				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and 8×10^{-5} mol L^{-1} Tl^+.	80A123
25.1.6	**Ferricyanide ion**							
	$Tl^0 + Fe(CN)_6^{3-} \rightarrow$	3.7×10^9				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and 8×10^{-5} mol L^{-1} Tl^+.	80A123
25.1.7	**Nitrous oxide**							
	$Tl^0 + N_2O \rightarrow$	5×10^6			25	p.r.	D.k. in N_2O-satd. soln.; reaction suggested to produce $^{\bullet}OH$.	84C015
25.1.8	**Nickel(II) ion**							
	$Tl^0 + Ni^{2+} \rightarrow$	$<1 \times 10^7$				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and 8×10^{-5} mol L^{-1} Tl^+.	80A123
25.1.9	**Hydrogen peroxide**							
	$Tl^0 + H_2O_2 \rightarrow Tl^+ + {}^{\bullet}OH + OH^-$	3.7×10^9				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and 8×10^{-5} mol L^{-1} Tl^+.	80A123
25.1.10	**Oxygen**							
	$Tl^0 + O_2 \rightarrow Tl^+ + O_2^{\bullet-}$	3.5×10^9				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and 8×10^{-5} mol L^{-1} Tl^+.	80A123
25.1.11	**Lead(II) ions**							
	$Tl^0 + Pb^{2+} \rightarrow$	2.3×10^9				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and 8×10^{-5} mol L^{-1} Tl^+.	80A123
25.1.12	**Tris(2,2'-bipyridine)ruthenium(II) ion**							
	$Tl^0 + Ru(bpy)_3^{2+} \rightarrow Tl^+ + Ru(bpy)_3^+$	1.0×10^{10}	7		25	p.r.	P.b.k. at 505 nm in Ar-satd. soln. contg. 0.5 mol L^{-1} 2-PrOH, 5×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and varied [Tl^+].	89C001
25.1.13	**Samarium(II) ion**							
	$Tl^0 + Sm^{2+} \rightarrow$	$<2 \times 10^7$				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and 8×10^{-5} mol L^{-1} Tl^+.	80A123
25.1.14	**Thallium(I) ion**							
	$Tl^0 + Tl^+ \rightarrow Tl_2^+$	1.4×10^9	7		25	p.r.	Calcd. from $k_{obs} = 1.7 \times 10^7$ s^{-1} for increase in absorption at 420 nm in soln. contg. 0.5 mol L^{-1} 2-PrOH and 10^{-4}-10^{-2} mol L^{-1} $TlClO_4$; $k_r = 1 \times 10^7$ s^{-1}.	89C001
25.1.15	**Acetaldehyde**							
	$Tl^0 + CH_3CHO \rightarrow Tl^+ + CH_3\dot{C}HO^-$	1.0×10^9			25	p.r.	Calcd. from rate of approach to equilibrium in soln. contg. acetaldehyde and Tl^+; $k_r = 4.7 \times 10^8$ L mol^{-1} s^{-1}.	89C001

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
25.1	**Thallium(0)** — Continued							
25.1.16	**Acetone**							
	$Tl^0 + CH_3COCH_3 \rightarrow Tl^+ + (CH_3)_2\dot{C}O^-$	1.6×10^7	11.3, 12		25	p.r.	Calcd. from rate of approach to equilibrium in soln. contg. acetone, Tl^+ and 0.002 or 0.01 mol L^{-1} OH^-; $k_r = 7.1 \times 10^9$ L mol^{-1} s^{-1}.	89C001
25.1.17	**1,4-Benzoquinone**							
	$Tl^0 + Q \rightarrow Tl^+ + Q^{\cdot -}$	2.8×10^9	7.0		25	p.r.	P.b.k. in soln. contg. 5×10^{-5} mol L^{-1} benzoquinone, 1 mol L^{-1} *tert*-BuOH and 5×10^{-3} mol L^{-1} Tl_2SO_4; 42% Tl^0.	751032
25.1.18	**Formaldehyde**							
	$Tl^0 + HCHO \rightarrow Tl^+ + {}^{\cdot}CH_2O^-$	6×10^6			25	p.r.	Calcd. from rate of approach to equilibrium in soln. contg. formaldehyde and Tl^+; $k_r = 1.5 \times 10^4$ L mol^{-1} s^{-1}.	89C001
25.2	**Thallium(I) ion, complex with Tl(0)**							
25.2.1	**Thallium(I) ion, complex with Tl(0)**							
	$Tl_2^+ + Tl_2^+ \rightarrow Tl_4^{2+}$	8×10^8	12.7			p.r.	D.k. at 420 nm in Ar-satd. soln. contg. 0.2 mol L^{-1} 2-PrOH, 0.01 mol L^{-1} acetone and 0.05 mol L^{-1} $TlClO_4$.	93A299
		1.5×10^9	13			p.r.	D.k. at 420 nm and p.b.k. at 300 nm in soln. contg. 0.1 mol L^{-1} EtOH or 2-PrOH and 0.02 mol L^{-1} $TlClO_4$.	80A123
25.2.2	**Silver(I) ion**							
	$Tl_2^+ + Ag^+ \rightarrow Tl^+ + AgTl^+$	1.3×10^9				p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and $TlClO_4$.	80A123
25.2.3	**Cadmium(II) ion**							
	$Tl_2^+ + Cd^{2+} \rightarrow$	1.2×10^8				p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and $TlClO_4$.	80A123
25.2.4	**Chromium(III) ion**							
	$Tl_2^+ + Cr^{3+} \rightarrow$	2.5×10^8				p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and $TlClO_4$.	80A123
25.2.5	**Copper(II) ion**							
	$Tl_2^+ + Cu^{2+} \rightarrow$	3.1×10^9				p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and $TlClO_4$.	80A123
25.2.6	**Ferricyanide ion**							
	$Tl_2^+ + Fe(CN)_6^{3-} \rightarrow$	3.0×10^9				p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and $TlClO_4$.	80A123
25.2.7	**Nitrous oxide**							
	$Tl_2^+ + N_2O \rightarrow$	1.4×10^7			25	p.r.	γ-radiolysis studies indicate that N_2 is one of the products of this reaction.	720844
25.2.8	**Nickel(II) ion**							
	$Tl_2^+ + Ni^{2+} \rightarrow$	$<1 \times 10^5$				p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and $TlClO_4$.	80A123
25.2.9	**Hydrogen peroxide**							
	$Tl_2^+ + H_2O_2 \rightarrow 2\,Tl^+ + {}^{\cdot}OH + OH^-$	3.0×10^9				p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and $TlClO_4$.	80A123
25.2.10	**Oxygen**							
	$Tl_2^+ + O_2 \rightarrow 2\,Tl^+ + O_2^{\cdot -}$	3.0×10^9				p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and $TlClO_4$.	80A123
25.2.11	**Lead(II) ions**							
	$Tl_2^+ + Pb^{2+} \rightarrow$	1.5×10^9				p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and $TlClO_4$.	80A123

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
25.2	**Thallium(I) ion, complex with Tl(0)** — Continued							
25.2.12	**Tris(2,2'-bipyridine)ruthenium(II) ion**							
	$Tl_2^+ + Ru(bpy)_3^{2+} \rightarrow 2\ Tl^+ + Ru(bpy)_3^+$	5.2×10^9	12.7			p.r.	P.b.k. at 510 nm in Ar-satd. soln. contg. 0.05 mol L^{-1} $TlClO_4$, 0.2 mol L^{-1} 2-PrOH, 0.01 mol L^{-1} acetone and 2.2×10^{-5} mol L^{-1} $Ru(bpy)_3(ClO_4)_2$.	93A299
		5×10^9	7		25	p.r.	P.b.k. at 505 nm in Ar-satd. soln. contg. 0.5 mol L^{-1} 2-PrOH, 5×10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$ and varied [Tl^+].	89C001
25.2.13	**Samarium(II) ion**							
	$Tl_2^+ + Sm^{2+} \rightarrow$	$<6 \times 10^6$				p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and $TlClO_4$.	80A123
25.2.14	**1,4-Dicyanobenzene**							
	$Tl_2^+ + DCNB \rightarrow 2\ Tl^+ + [DCNB]^{\cdot -}$	2.7×10^9	~7			p.r.	D.k. at 490 nm in deaerated soln. contg. 10^{-4} mol L^{-1} DCNB and 10^{-2} mol L^{-1} Tl_2SO_4.	730121
25.2.15	**Hydroxymethyl**							
	$Tl_2^+ + {}^{\cdot}CH_2OH + H^+ \rightarrow 2\ Tl^+ + MeOH$	4.0×10^9	6			p.r.	Calcd. from d.k. at 420 nm. and condy. change in soln. contg. MeOH and Tl^+ assuming values for $2k(Tl_2^+ + Tl_2^+)$, $k(Tl_2^+ + H_2O_2)$ and $2k(R + R)$.	80A123
25.2.16	**1-Hydroxyethyl**							
	$Tl_2^+ + CH_3\dot{C}HOH + H^+ \rightarrow 2\ Tl^+ + EtOH$	3.0×10^9	6			p.r.	Calcd. from d.k. at 420 nm. and condy. change in soln. contg. EtOH and Tl^+ assuming values for $2k(Tl_2^+ + Tl_2^+)$, $k(Tl_2^+ + H_2O_2)$ and $2k(R + R)$.	80A123
25.2.17	**1-Hydroxy-1-methylethyl**							
	$Tl_2^+ + (CH_3)_2\dot{C}OH + H^+ \rightarrow 2\ Tl^+ + 2\text{-PrOH}$	3.0×10^9	6			p.r.	Calcd. from d.k. at 420 nm. and condy. change in soln. contg. 2-PrOH and Tl^+ assuming values for $2k(Tl_2^+ + Tl_2^+)$, $k(Tl_2^+ + H_2O_2)$ and $2k(R + R)$.	80A123
25.3	**Thallium(0), complex with thallium(I) ion, dimer**							
25.3.1	**Thallium(0), complex with thallium(I) ion, dimer**							
	$Tl_4^{2+} + Tl_4^{2+} \rightarrow$	1.8×10^6	13			p.r.	Estd from dose effect on abs. at 300 nm in soln. contg. 0.02 mol L^{-1} $TlClO_4$ and 0.1 mol L^{-1} EtOH or 2-PrOH. Unclear whether k or $2k$.	80A123
25.3.2	**Tris(2,2'-bipyridine)ruthenium(II) ion, electron adduct**							
	$Tl_4^{2+} + Ru(bpy)_3^+ \rightarrow Tl_4^+ + Ru(bpy)_3^{2+}$	6×10^8	12.7			p.r.	D.k. at 510 nm in Ar-satd. soln. contg. 0.05 mol L^{-1} $TlClO_4$, 0.2 mol L^{-1} 2-PrOH, 0.01 mol L^{-1} acetone and 2.2×10^{-5} mol L^{-1} $Ru(bpy)_3(ClO_4)_2$; value obtained from computer fit.	93A299
25.4	**Thallium(II) ion**							
25.4.1	**Chloride ion**							
	$Tl^{2+} + Cl^- \rightarrow TlCl^+$	9×10^9	0	1	23	p.r.	D.k. at 290 nm in soln. contg. 3.0×10^{-3} mol L^{-1} Tl^{3+}, 3.0×10^{-3} mol L^{-1} HCl and 1 mol L^{-1} $HClO_4$; $k_r = 1.4 \times 10^5$ s^{-1}.	741038
25.4.2	**Cobalt(II) ion**							
	$Tl^{2+} + Co^{2+} \rightarrow Tl^+ + Co^{3+}$	6.2×10^3	0.6	0.75	25	f.p.	D.k. at 270 nm in soln. contg. 10^{-3} mol L^{-1} Tl^{3+}. 0.25 mol L^{-1} $HClO_4$ and 0.02-0.2 mol L^{-1} Co^{2+}; $k_r = 3.1 \times 10^{-3}$ L mol^{-1} s^{-1}.	747625

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
25.4	**Thallium(II) ion** — Continued							
25.4.3	**Cobalt(III) ion**							
	$Tl^{2+} + Co^{3+} \rightarrow Tl^{3+} + Co^{2+}$	9.5×10^6	0.3	0.55	22	f.p.	D.k. at 303 nm in soln. contg. 10^{-3} mol L^{-1} Tl^{3+} and 0.5 mol L^{-1} H^+.	757093
25.4.4	**Iron(II) ion**							
	$Tl^{2+} + Fe^{2+} \rightarrow Tl^+ + Fe^{3+}$	2.6×10^6	0.6	0.30	25	f.p.	D.k. at 303 nm in soln. contg. 10^{-3} mol L^{-1} Tl^{3+} and 0.25 mol L^{-1} H^+; studied at 14.7-39.6 °C.; E_a = 4.8 kJ mol^{-1}.	757093
		6.7×10^6	0	1	23	p.r.	D.k. at 290 nm in soln. contg. 10^{-3} mol L^{-1} Tl^+, 10^{-2} mol L^{-1} Tl^{3+}, 1 mol L^{-1} $HClO_4$ and (1-2) × 10^{-3} mol L^{-1} Fe^{2+}	741017
25.4.5	**Iron(II) tris(1,10-phenanthroline-5,6-dione)**							
	$Tl^{2+} + Fe[1,10\text{-}PD]_3^{2+} \rightarrow$	4.0×10^8	3.2			p.r.	P.b.k. at 600 nm in N_2O-satd. soln. contg. Tl_2SO_4, $FeSO_4$ and 1,10-phenanthroline-5,6-dione.	93A292
25.4.6	**Iron(III) ion**							
	$Tl^{2+} + Fe^{3+} \rightarrow Tl^{3+} + Fe^{2+}$	1.1×10^6	0.6	0.30	25	f.p.	D.k. at 270 nm in soln. contg. 10^{-2} mol L^{-1} Tl^+, 2×10^{-3} mol L^{-1} Tl^{3+} and 0.25 mol L^{-1} $HClO_4$.	747625
25.4.7	**Perhydroxyl**							
	$Tl^{2+} + HO_2^{\bullet} \rightarrow Tl^+ + H^+ + O_2$	2.5×10^9	1			p.r.	D.k. in aerated soln. contg. 10^{-3} mol L^{-1} Tl^+. Estimated from initial decay of Tl^{2+}	660097
25.4.8	**Hydrogen peroxide**							
	$Tl^{2+} + H_2O_2 \rightarrow Tl^+ + HO_2^{\bullet} + H^+$	2.8×10^7	1			p.r.	D.k. in aerated soln. contg. 10^{-3} mol L^{-1} Tl^+ and 8.9×10^{-4} mol L^{-1} H_2O_2. Evidence for products from H_2O_2 and H_2 yields in γ-r.-irradiated Tl^+ solutions. [710036].	660097
25.4.9	**Manganese(II) ion**							
	$Tl^{2+} + Mn^{2+} \rightarrow Tl^+ + Mn^{3+}$	1.9×10^4	0.3	0.75	22	f.p.	D.k. at 303 nm in soln. contg. 10^{-3} mol L^{-1} Tl^{3+} and 0.5 mol L^{-1} H^+.	757093
25.4.10	**Thallium(II) ion**							
	$Tl^{2+} + Tl^{2+} \rightarrow Tl^{3+} + Tl^+$	1.9×10^8	0	1	23	p.r.	D.k. at 280 nm in soln. contg. 10^{-2} mol L^{-1} Tl^{3+}, 10^{-3} mol L^{-1} Tl^+ and 1 mol L^{-1} $HClO_4$.	741017
		1.8×10^8	1	0.25	25	f.p.	D.k. at 270 nm in soln. contg. 10^{-3} mol L^{-1} Tl^{3+}, 10^{-3} mol L^{-1} Tl^+ and 0.25 mol L^{-1} $HClO_4$; studied at 15-45 °C, E_a = 7.9 kJ mol^{-1}; recalcd. from the original data using ε_{270} = 3800 L mol^{-1} cm^{-1} [741017].	747625
		1.9×10^8	0.6	0.25				
		3.2×10^8	0.6	0.50				
		4.5×10^8	0.6	1.0				
		4.1×10^8	0.3	1.0				
		4.5×10^8	0	1.0				
25.4.11	**5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) ion**							
	$Tl^{2+} + ZnTMpyP^{4+} \rightarrow Tl^+ + [ZnTMpyP]^{\bullet 5+}$	4.3×10^8	3.3	0.004		p.r.	P.b.k. at 690-700 nm in N_2O-satd. buffered soln. contg. Tl_2SO_4 and (1-4) × 10^{-4} mol L^{-1} porphyrin.	85A038
25.4.12	**6-Aminophenalenone**							
	$Tl^{2+} + 6\text{-}NH_2PHO \rightarrow Tl^+ + [6\text{-}NH_2PHO]^{\bullet +}$	6.0×10^9				p.r.	P.b.k. at 420 nm in N_2O-satd. soln. contg. 0.005 mol L^{-1} Tl_2SO_4.	93A404
25.4.13	**Anisole**							
	$Tl^{2+} + C_6H_5OCH_3 \rightarrow Tl^+ + [C_6H_5OCH_3]^{\bullet +}$	5.0×10^8	4		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 10^{-3} mol L^{-1} Tl_2SO_4 and 10^{-4} mol L^{-1} anisole.	751171

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
25.4	**Thallium(II) ion** — Continued							
25.4.14	**Chlorpromazine, conjugate acid**							
	$Tl^{2+} + CZH^+ \rightarrow Tl^+ + [CZH]^{\cdot 2+}$	1.5×10^9	2.0			p.r.	P.b.k. at 505 nm in N_2O-satd. soln. contg. 0.003 mol L^{-1} Tl_2SO_4; overall rate constant, 86% electron transfer.	83A272
25.4.15	***Diethyl disulfide***							
	$Tl^{2+} + C_2H_5SSC_2H_5 \rightarrow Tl^+ + [C_2H_5SSC_2H_5]^{\cdot +}$	1.4×10^9	3.5			p.r.	D.k. at 260 nm and p.b.k. in N_2O-satd. soln. contg. 2×10^{-3} mol L^{-1} Tl^+ and various lower concn. of disulfide.	761143
25.4.16	**Diethyl sulfoxide**							
	$Tl^{2+} + (C_2H_5)_2SO \rightarrow Tl^+ + [(C_2H_5)_2SO]^{\cdot +}$	1.4×10^7	3.2			p.r.	D.k. in N_2O-satd. soln. contg. 5×10^{-3} mol L^{-1} Tl^+.	89A465
25.4.17	**3,5-Diiodotyrosine**							
	$Tl^{2+} + 3,5\text{-}I_2TyrOH \rightarrow$	1.0×10^9	2			p.r.	P.b.k. at 350 nm in soln. contg. 0.005 mol L^{-1} Tl^+. Reaction occurs by split path forming phenoxyl type radical and radical cation.	94A179
25.4.18	***1,2-Dimethoxybenzene***							
	$Tl^{2+} + 1,2\text{-}C_6H_4(OCH_3)_2 \rightarrow Tl^+ + [1,2\text{-}C_6H_4(OCH_3)_2]^{\cdot +}$	6.0×10^8	4		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 10^{-3} mol L^{-1} Tl_2SO_4 and 10^{-4} mol L^{-1} dimethoxybenzene.	751171
25.4.19	**1,3-Dimethoxybenzene**							
	$Tl^{2+} + 1,3\text{-}C_6H_4(OCH_3)_2 \rightarrow Tl^+ + [1,3\text{-}C_6H_4(OCH_3)_2]^{\cdot +}$	8.0×10^8	4		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 10^{-3} mol L^{-1} Tl_2SO_4 and 10^{-4} mol L^{-1} dimethoxybenzene.	751171
25.4.20	**1,4-Dimethoxybenzene**							
	$Tl^{2+} + 1,4\text{-}C_6H_4(OCH_3)_2 \rightarrow Tl^+ + [1,4\text{-}C_6H_4(OCH_3)_2]^{\cdot +}$	6.5×10^8	4		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 10^{-3} mol L^{-1} Tl_2SO_4 and 10^{-4} mol L^{-1} dimethoxybenzene.	751171
		5.2×10^8	4		22	p.r.	P.b.k. at 430-460 nm in N_2O-satd. soln. contg. 10^{-3} mol L^{-1} Tl_2SO_4.	87A041
25.4.21	**1,4-Dimethoxybenzene radical cation**							
	$Tl^{2+} + [1,4\text{-}C_6H_4(OCH_3)_2]^{\cdot +} \rightarrow Tl^{3+} + 1,4\text{-}C_6H_4(OCH_3)_2$	6.0×10^9	4		22	p.r.	Detd. from dependence of $[1,4\text{-}C_6H_4(OCH_3)_2]^{\cdot +}$ on pulse intensity in N_2O-satd. soln. contg. 10^{-3} mol L^{-1} Tl_2SO_4.	87A041
25.4.22	**2,3-Dimethoxybenzoic acid**							
	$Tl^{2+} + 2,3\text{-}(CH_3O)_2C_6H_3CO_2H \rightarrow Tl^+ + H^+ + [2,3\text{-}(CH_3O)_2C_6H_3CO_2]^{\cdot}$	2.1×10^9	~3		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 1×10^{-3} mol L^{-1} Tl_2SO_4.	771006
25.4.23	**3,4-Dimethoxybenzoic acid**							
	$Tl^{2+} + 3,4\text{-}(CH_3O)_2C_6H_3CO_2H \rightarrow Tl^+ + H^+ + [3,4\text{-}(CH_3O)_2C_6H_3CO_2]^{\cdot}$	1.7×10^9	~3		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 1×10^{-3} mol L^{-1} Tl_2SO_4.	771006
25.4.24	**2,4-Dimethoxybenzoic acid**							
	$Tl^{2+} + 2,4\text{-}(CH_3O)_2C_6H_3CO_2H \rightarrow Tl^+ + H^+ + [2,4\text{-}(CH_3O)_2C_6H_3CO_2]^{\cdot}$	9.1×10^8	~3		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 1×10^{-3} mol L^{-1} Tl_2SO_4.	771006
25.4.25	**2,6-Dimethoxybenzoic acid**							
	$Tl^{2+} + 2,6\text{-}(CH_3O)_2C_6H_3CO_2H \rightarrow Tl^+ + H^+ + [2,6\text{-}(CH_3O)_2C_6H_3CO_2]^{\cdot}$	1.8×10^9	~3		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 1×10^{-3} mol L^{-1} Tl_2SO_4.	771006
25.4.26	**3,5-Dimethoxybenzoic acid**							
	$Tl^{2+} + 3,5\text{-}(CH_3O)_2C_6H_3CO_2H \rightarrow Tl^+ + H^+ + [3,5\text{-}(CH_3O)_2C_6H_3CO_2]^{\cdot}$	2.4×10^9	~3		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 1×10^{-3} mol L^{-1} Tl_2SO_4.	771006

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
25.4 Thallium(II) ion — Continued								
25.4.27	**Dimethyl disulfide**							
	$Tl^{2+} + CH_3SSCH_3 \rightarrow Tl^+ + [CH_3SSCH_3]^{\cdot+}$	2.3×10^9	3.5			p.r.	D.k. at 260 nm and p.b.k. in N_2O-satd. soln. contg. 2×10^{-3} mol L^{-1} Tl^+ and various lower concn. of disulfide.	761143
25.4.28	**Dimethyl sulfoxide**							
	$Tl^{2+} + DMSO \rightarrow Tl^+ + [DMSO]^{\cdot+}$	1.1×10^7	3.2			p.r.	D.k. in N_2O-satd. soln. contg. 5×10^{-3} mol L^{-1} Tl^+.	89A465
25.4.29	**Dimethyl 3,3'-thiodipropionate**							
	$Tl^{2+} + 2\ S(CH_2CH_2CO_2CH_3)_2 \rightarrow Tl^+ + [(CH_3O_2CCH_2CH_2)_2S]^{\cdot+}$	1.7×10^9	1.5		23	p.r.	P.b.k. at 510 nm in O_2-satd. soln. contg. 0.01 mol L^{-1} Tl^+ and (0.4-1.1) $\times 10^{-3}$ mol L^{-1} dimethyl 3,3'-thiodipropionate.	92A059
25.4.30	**Diphenyl selenide**							
	$Tl^{2+} + (C_6H_5)_2Se \rightarrow Tl^+ + [(C_6H_5)_2Se]^{\cdot+}$	2.6×10^9				p.r.	P.b.k. at 750 nm in N_2O-satd. soln. contg. Tl_2SO_4.	94A098
25.4.31	**Diphenyl sulfide**							
	$Tl^{2+} + (C_6H_5)_2S \rightarrow Tl^+ + [(C_6H_5)_2S]^{\cdot+}$	3×10^9				p.r.	P.b.k. at 750 nm in N_2O-satd. soln. contg. Tl_2SO_4.	94A098
25.4.32	**Diphenyl tellurium**							
	$Tl^{2+} + (C_6H_5)_2Te \rightarrow Tl^+ + [(C_6H_5)_2Te]^{\cdot+}$	3.2×10^9				p.r.	P.b.k. at 580 nm in N_2O-satd. soln. contg. Tl_2SO_4.	94A098
25.4.33	**Dipropyl sulfoxide**							
	$Tl^{2+} + (CH_3CH_2CH_2)_2SO \rightarrow Tl^+ + [(CH_3CH_2CH_2)_2SO]^{\cdot+}$	2.2×10^7	3.2			p.r.	D.k. in N_2O-satd. soln. contg. 5×10^{-3} mol L^{-1} Tl^+.	89A465
25.4.34	**Ethanol**							
	$Tl^{2+} + EtOH \rightarrow Tl^+ + H^+ + CH_3\dot{C}HOH$	8.8×10^3	0.43		23	γ-r.	Calculated from the γ-ray induced chain reaction in Tl^{2+} + ethanol solutions, taking $k(Tl^{2+} + Tl^{2+}) = 1.9 \times 10^8$ L mol^{-1} s^{-1} [741017].	700336
25.4.35	**Methanol**							
	$Tl^{2+} + MeOH \rightarrow Tl^+ + H^+ + {}^{\cdot}CH_2OH$	6.9×10^3	0.43		23	γ-r.	Calculated from the γ-ray induced chain reaction in Tl^{2+} + methanol solutions, taking $k(Tl^{2+} + Tl^{2+}) = 1.9 \times 10^8$ L mol^{-1} s^{-1} [741017].	700336
25.4.36	**Methionine**							
	$Tl^{2+} + Met \rightarrow Tl^+ + [Met]^{\cdot+}$	2.5×10^9	3.35			p.r.	D.k. at 260 nm and p.b.k. at 290 nm in N_2O-satd. soln. contg. 2×10^{-3} mol L^{-1} Tl^+ and 2×10^{-5} mol L^{-1} methionine.	81A340
25.4.37	**2-Methoxybenzoic acid**							
	$Tl^{2+} + 2\text{-}CH_3OC_6H_4CO_2H \rightarrow Tl^+ + H^+ + [2\text{-}CH_3OC_6H_4CO_2]^{\cdot}$	1.2×10^9	~3		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 1×10^{-3} mol L^{-1} Tl_2SO_4.	771006
25.4.38	**3-Methoxybenzoic acid**							
	$Tl^{2+} + 3\text{-}CH_3OC_6H_4CO_2H \rightarrow Tl^+ + H^+ + [3\text{-}CH_3OC_6H_4CO_2]^{\cdot}$	1.6×10^9	~3		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 1×10^{-3} mol L^{-1} Tl_2SO_4.	771006
25.4.39	**4-Methoxybenzoic acid**							
	$Tl^{2+} + 4\text{-}CH_3OC_6H_4CO_2H \rightarrow Tl^+ + H^+ + [4\text{-}CH_3OC_6H_4CO_2]^{\cdot}$	5.3×10^8	~3		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 1×10^{-3} mol L^{-1} Tl_2SO_4.	771006
25.4.40	**Methylene Blue cation**							
	$Tl^{2+} + MB^+ + H^+ \rightarrow Tl^+ + [MBH]^{\cdot 3+}$	2.4×10^9	1.7			p.r.	P.b.k. at 525 nm in O_2-satd. soln. contg. 10^{-4} mol L^{-1} methylene blue and 2×10^{-3} mol L^{-1} Tl^{2+}.	89A375

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
25.4	**Thallium(II) ion** — Continued							
25.4.41	**Neutral Red cation**							
	$Tl^{2+} + NRH^+ + H^+ \rightarrow Tl^+ + [NRH_2]^{\cdot 3+}$	1.7×10^9	1.8			p.r.	P.b.k. in O_2-satd. soln. contg. 0.002 mol L^{-1} Tl^+ and 1×10^{-4} mol L^{-1} Neutral Red.	93A100
25.4.42	***N*-Nitrosodimethylamine**							
	$Tl^{2+} + (CH_3)_2NNO \rightarrow$	1.4×10^7	2.7			p.r.	D.k. at 340 nm in N_2O-satd. soln. contg. Tl_2SO_4.	91D17
25.4.43	**Phenylthiourea**							
	$Tl^{2+} + C_6H_5NHCSNH_2 \rightarrow$	3.2×10^9	3.5			p.r.	P.b.k. at 580 nm in soln. contg. Tl^+ and 5×10^{-4} mol L^{-1} phenylthiourea; product suggested to be deprotonated radical cation.	94A002
25.4.44	**Promethazine, conjugate acid**							
	$Tl^{2+} + PZH^+ \rightarrow Tl^+ + [PZH]^{\cdot 2+}$	1.2×10^9	2.5			p.r.	P.b.k. at 505 nm in N_2O-satd. soln. contg. 0.003 mol L^{-1} Tl_2SO_4; overall rate constant, 93% electron transfer.	83A272
25.4.45	**2-Propanol**							
	$Tl^{2+} + 2\text{-PrOH} \rightarrow Tl^+ + H^+ + (CH_3)_2\dot{C}OH$	5.8×10^3	0.43		23	γ-r.	Calculated from the γ-ray induced chain reaction in Tl^{2+} + 2-propanol solutions, taking $k(Tl^{2+} + Tl^{2+}) = 1.9 \times 10^8$ L mol^{-1} s^{-1} [741017].	700336
25.4.46	**Safranine cation, conjugate monoacid**							
	$Tl^{2+} + STH^{2+} \rightarrow [STH]^{\cdot 3+} + Tl^+$	2.2×10^9	2			p.r.	P.b.k. at 460 nm in O_2-satd. soln. contg. 0.002 mol L^{-1} Tl_2SO_4.	92A008
25.4.47	**Sulfacetamide**							
	$Tl^{2+} + H_2NC_6H_4SO_2NHAc \rightarrow [H_2NC_6H_4SO_2NHAc]^{\cdot +} + Tl^+$	7.0×10^8	3.3			p.r.	P.b.k. at 440 nm in N_2O-satd. soln. contg. Tl^+ and sulfacetamide.	94A208
25.4.48	**1,2,4,5-Tetramethoxybenzene**							
	$Tl^{2+} + 1,2,4,5\text{-}C_6H_2(CH_3O)_4 \rightarrow Tl^+ + [1,2,4,5\text{-}C_6H_2(CH_3O)_4]^{\cdot +}$	1.0×10^9	4			p.r.	P.b.k. at 447 nm in N_2O-satd. soln. contg. 10^{-3} mol L^{-1} Tl_2SO_4.	87A041
25.4.49	**3,3'-Thiodipropanol**							
	$Tl^{2+} + S(CH_2CH_2CH_2OH)_2 \rightarrow Tl^+ + [(CH_2OHCH_2CH_2)_2S]^{\cdot +}$	2.0×10^9	1.5		23	p.r.	P.b.k. in O_2-satd. soln. contg. 0.01 mol L^{-1} Tl^+.	92A05
25.4.50	**3,3'-Thiodipropionic acid**							
	$Tl^{2+} + S(CH_2CH_2CO_2H)_2 \rightarrow Tl^+ + [S(CH_2CH_2CO_2H)_2]^{\cdot +}$	3.8×10^9	1.5			p.r.	P.b.k. at 390 nm in O_2-satd. soln. contg. 2.0×10^{-3} mol L^{-1} Tl^+.	90A488
25.4.51	**Thionine cation**							
	$Tl^{2+} + Th^+ + H^+ \rightarrow Tl^+ + [ThH]^{\cdot 3+}$	3×10^9	2.5			p.r.	P.b.k. at 480 nm in N_2O-satd. soln. contg. 2×10^{-3} mol L^{-1} Tl^+; product is semioxidized thionine. $Tl(OH)^+$ generates same product at pH 5.8.	87A452
25.4.52	**Toluidine Blue cation**							
	$Tl^{2+} + TB^+ + H^+ \rightarrow Tl^+ + [TBH]^{\cdot 3+}$	1.7×10^9	1.8			p.r.	P.b.k. at 500 nm in soln. contg. 0.002 mol L^{-1} Tl^+.	90A238
25.4.53	**1,2,3-Trimethoxybenzene**							
	$Tl^{2+} + 1,2,3\text{-}C_6H_3(OCH_3)_3 \rightarrow Tl^+ + [1,2,3\text{-}C_6H_3(OCH_3)_3]^{\cdot +}$	3.2×10^8	4		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 10^{-3} mol L^{-1} Tl_2SO_4 and 10^{-4} mol L^{-1} trimethoxybenzene.	751171
25.4.54	**1,2,4-Trimethoxybenzene**							
	$Tl^{2+} + 1,2,4\text{-}C_6H_3(OCH_3)_3 \rightarrow Tl^+ + [1,2,4\text{-}C_6H_3(OCH_3)_3]^{\cdot +}$	6.8×10^8	4		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 10^{-3} mol L^{-1} Tl_2SO_4 and 10^{-4} mol L^{-1} trimethoxybenzene.	751171

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
25.4	**Thallium(II) ion** — Continued							
25.4.55	**1,3,5-Trimethoxybenzene**							
	$Tl^{2+} + 1,3,5\text{-}C_6H_3(OCH_3)_3 \rightarrow Tl^+ + [1,3,5\text{-}C_6H_3(CH_3O)_3]^{\cdot+}$	7.0×10^8	4		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 10^{-3} mol L^{-1} Tl_2SO_4 and 10^{-4} mol L^{-1} trimethoxybenzene.	751171
25.4.56	**2,3,4-Trimethoxybenzoic acid**							
	$Tl^{2+} + 2,3,4\text{-}(CH_3O)_3C_6H_2CO_2H \rightarrow Tl^+ + H^+ + [2,3,4\text{-}(CH_3O)_3C_6H_2CO_2]^{\cdot}$	1.6×10^9	~3		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 1×10^{-3} mol L^{-1} Tl_2SO_4.	771006
25.4.57	**3,4,5-Trimethoxybenzoic acid**							
	$Tl^{2+} + 3,4,5\text{-}(CH_3O)_3C_6H_2CO_2H \rightarrow Tl^+ + H^+ + [3,4,5\text{-}(CH_3O)_3C_6H_2CO_2]^{\cdot}$	8.4×10^8	~3		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 1×10^{-3} mol L^{-1} Tl_2SO_4.	771006
25.4.58	**2,4,5-Trimethoxybenzoic acid**							
	$Tl^{2+} + 2,4,5\text{-}(CH_3O)_3C_6H_2CO_2H \rightarrow Tl^+ + H^+ + [2,4,5\text{-}(CH_3O)_3C_6H_2CO_2]^{\cdot}$	8.2×10^8	~3		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 1×10^{-3} mol L^{-1} Tl_2SO_4.	771006
25.4.59	**2,4,6-Trimethoxybenzoic acid**							
	$Tl^{2+} + 2,4,6\text{-}(CH_3O)_3C_6H_2CO_2H \rightarrow Tl^+ + H^+ + [2,4,6\text{-}(CH_3O)_3C_6H_2CO_2]^{\cdot}$	1.5×10^9	~3		20	p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 1×10^{-3} mol L^{-1} Tl_2SO_4.	771006
25.5	**Hydroxythallium(II) ion**							
25.5.1	**Iron(II) tris(1,10-phenanthroline-5,6-dione)**							
	$TlOH^+ + Fe[1,10\text{-}PD]_3^{2+} \rightarrow$	7.0×10^8	5.1			p.r.	P.b.k. at 600 nm in N_2O-satd. soln. contg. Tl_2SO_4, $FeSO_4$ and 1,10-phenanthroline-5,6-dione.	93A292
25.5.2	**Hydrogen ion**							
	$TlOH^+ + H^+ \rightarrow Tl^{2+} + H_2O$	1.4×10^{10}	2-7	var	21	p.r.	D.k. at 360 nm in N_2O-satd. soln. contg. 10^{-3} mol L^{-1} Tl_2SO_4 and $HClO_4$. Evidence for equilibrium from optical and conductivity measurements.	751130
		1.0×10^{10}		0.01	25	p.r.	D.k. at 360 nm in soln. contg. 0.001 mol L^{-1} Tl^+, 0.01 mol L^{-1} $NaClO_4$ and varied $[H^+]$; $K_{eq} = 6.0 \times 10^4$ M^{-1}.	84C015
25.5.3	**Hydroxythallium(II) ion**							
	$TlOH^+ + TlOH^+ \rightarrow$	1.9×10^9	6.5	~0		p.r.	D.k. at 260 nm in N_2O-satd. soln. contg. 5×10^{-4} mol L^{-1} Tl^+.	660097
		1.9×10^9	5.6			p.r.	D.k. in N_2O-satd. soln.	761192
25.5.4	**Adenosine**							
	$TlOH^+ + A \rightarrow Tl^+ + OH^- + A^{\cdot+}$	6.3×10^7	7-7.4	0.006	20	p.r.	D.k. at 360 nm in N_2O-satd. soln. contg. 2×10^{-3} mol L^{-1} Tl_2SO_4; mixt. with $Tl(OH)_2$.	89A247
25.5.5	**Adenylyl-(3'→5')-guanosine**							
	$TlOH^+ + ApG \rightarrow$	5×10^8	~7		20	p.r.	D.k. in N_2O-satd. soln. contg. 0.002 mol L^{-1} Tl^+ and 1×10^{-4} mol L^{-1} ApG.	93A118
25.5.6	**Chlorpromazine, conjugate acid**							
	$TlOH^+ + CZH^+ \rightarrow Tl^+ + OH^- + [CZH]^{\cdot 2+}$	1.6×10^9	6.5			p.r.	P.b.k. at 505 nm in N_2O-satd. soln. contg. 0.003 mol L^{-1} Tl_2SO_4; overall rate constant, 59% electron transfer.	83A272
25.5.7	**2'-Deoxyadenosine 5'-monophosphate**							
	$TlOH^+ + dAMP \rightarrow Tl^+ + OH^- + [dAMP]^{\cdot+}$	1.6×10^8	7-7.4	0.006	20	p.r.	D.k. at 360 nm in N_2O-satd. soln. contg. 2×10^{-3} mol L^{-1} Tl_2SO_4; mixt. with $Tl(OH)_2$.	89A247
25.5.8	**2'-Deoxyguanosine 5'-monophosphate**							
	$TlOH^+ + dGMP \rightarrow Tl^+ + OH^- + [dGMP]^{\cdot+}$	3.4×10^9	7-7.4	→0	20	p.r.	D.k. at 360 nm in N_2O-satd. soln. contg. 2×10^{-3} mol L^{-1} Tl_2SO_4; mixt. with $Tl(OH)_2$.	89A247

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref
25.5	**Hydroxythallium(II) ion** — Continued							
25.5.9	**Diethyl disulfide**							
	$TlOH^+ + C_2H_5SSC_2H_5 \rightarrow Tl^+ + OH^- + [C_2H_5SSC_2H_5]^{\cdot+}$	1.4×10^9	5.5-6			p.r.	D.k. at 260 nm and p.b.k. in N_2O-satd. soln. contg. 2×10^{-3} mol L^{-1} Tl^+ and various lower concn. of disulfide.	761143
25.5.10	**1,2-Dimethoxybenzene**							
	$TlOH^+ + 1,2\text{-}C_6H_4(OCH_3)_2 \rightarrow$	1.2×10^9	>4.7			p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg. 10^{-3} mol L^{-1} Tl_2SO_4 and 10^{-4} mol L^{-1} dimethoxybenzene	751086
25.5.11	**1,4-Dimethoxybenzene**							
	$TlOH^+ + 1,4\text{-}C_6H_4(OCH_3)_2 \rightarrow$	4.5×10^8	>4.7			p.r.	P.b.k. and d.k. in N_2O-satd. soln. contg 10^{-3} mol L^{-1} Tl_2SO_4 and 10^{-4} mol L^{-1} dimethoxybenzene.	751086
25.5.12	**Dimethyl disulfide**							
	$TlOH^+ + CH_3SSCH_3 \rightarrow Tl^+ + OH^- + [CH_3SSCH_3]^{\cdot+}$	$\sim 1.5 \times 10^9$	5.6			p.r.	D.k. at 260 nm and p.b.k. at 440 nm in N_2O-satd. soln. contg. 2×10^{-3} mol L^{-1} Tl^+ and various lower concn. of disulfide	761143 761192
25.5.13	**Ethanol**							
	$TlOH^+ + EtOH \rightarrow Tl^+ + H_2O + CH_3\dot{C}HOH$	$\sim 1 \times 10^6$				p.r.	D.k. at 360 nm; mixt. with $Tl(OH)_2$.	89C001
25.5.14	**Formaldehyde**							
	$TlOH^+ + HCHO \rightarrow Tl^+ + H_2O + {}^{\cdot}CHO$	$\sim 1 \times 10^6$				p.r.	D.k. at 420 nm; mixt. with $Tl(OH)_2$.	89C001
25.5.15	**Guanosine**							
	$TlOH^+ + G \rightarrow$	1.3×10^9	7-7.4	0.006	20	p.r.	D.k. at 360 nm in N_2O-satd. soln. contg. 2×10^{-3} mol L^{-1} Tl_2SO_4.	89A247
25.5.16	**Glycyltryptophan**							
	$TlOH^+ + GlyTrpH \rightarrow Tl^+ + [GlyTrp]^{\cdot} + H_2O$	1.4×10^9	7-7.4	0.006	20	p.r.	D.k. at 360 nm in N_2O-satd. soln. contg. 2×10^{-3} mol L^{-1} Tl_2SO_4; mixt. with $Tl(OH)_2$.	89A247
25.5.17	**Methanol**							
	$TlOH^+ + MeOH \rightarrow Tl^+ + H_2O + {}^{\cdot}CH_2OH$	$\sim 1 \times 10^6$				p.r.	D.k. at 360 nm in N_2O-satd. soln.; mixt. with $Tl(OH)_2$.	89C001
25.5.18	**1-Methylcytosine**							
	$TlOH^+ + 1\text{-}MeCy \rightarrow$	$<10^7$	7-7.4	0.006	20	p.r.	D.k. at 360 nm in N_2O-satd. soln. contg. 2×10^{-3} mol L^{-1} Tl_2SO_4; mixt. with $Tl(OH)_2$.	89A247
25.5.19	**Methylene Blue cation**							
	$TlOH^+ + MB^+ \rightarrow Tl^+ + [MB]^{\cdot 2+} + OH^-$	2.4×10^9	6.7			p.r.	P.b.k. at 525 nm in N_2O satd. soln. contg. 10^{-4} mol L^{-1} methylene blue and 2×10^{-3} mol L^{-1} Tl^{2+}.	89A375
25.5.20	**1-Methylthymine**							
	$TlOH^+ + 1,5\text{-}Me_2U \rightarrow$	$<10^7$	7-7.4	0.006	20	p.r.	D.k. at 360 nm in N_2O-satd. soln. contg. 2×10^{-3} mol L^{-1} Tl_2SO_4; mixt. with $Tl(OH)_2$.	89A247
25.5.21	**1,10-Phenanthroline-5,6-dione**							
	$TlOH^+ + 1,10\text{-}PD \rightarrow$	9.5×10^8	5.6			p.r.	P.b.k. at 600 nm in N_2O-satd. soln. contg. Tl_2SO_4 and 1,10-phenanthroline-5,6-dione.	93A292
25.5.22	**2-Propanol**							
	$TlOH^+ + 2\text{-}PrOH \rightarrow Tl^+ + H_2O + (CH_3)_2\dot{C}OH$	$\sim 1 \times 10^6$				p.r.	D.k. at 360 nm in N_2O-satd. soln.; mixt. with $Tl(OH)_2$.	89C001

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
25.5	**Hydroxythallium(II) ion** — Continued							
25.5.23	**Safranine cation**							
	$TlOH^+ + ST^+ \rightarrow [ST]^{\cdot 2+} + Tl^+ + OH^-$	2.0×10^9	6			p.r.	P.b.k. at 460 nm in N_2O-satd. soln. contg. 0.002 mol L^{-1} Tl_2SO_4.	92A008
25.5.24	**Thymidylyl-(3'→5')-2'-deoxyguanosine**							
	$TlOH^+ + TpdG \rightarrow$	5×10^8	~7		0	p.r.	D.k. in N_2O-satd. soln. contg. 0.002 mol L^{-1} Tl^+ and 1×10^{-4} mol L^{-1} TpdG.	93A118
25.5.25	**Toluidine Blue cation**							
	$TlOH^+ + TB^+ \rightarrow Tl^+ + OH^- + [TB]^{\cdot 2+}$	1.7×10	6.8			p.r.	P.b.k. in soln. contg. 0.002 mol L^{-1} Tl^+.	90A238
25.6	**Dihydroxythallium(II)**							
25.6.1	**Dihydroxythallium(II)**							
	$Tl(OH)_2 + Tl(OH)_2 \rightarrow$	3.2×10^5	9.0			p.r.	D.k. in N_2O-satd. soln.	761192
25.6.2	**Metiazinic acid, conjugate base**							
	$Tl(OH)_2 + MZ^- \rightarrow [MZ]^{\cdot} + Tl^+ + 2\ OH^-$	2.5×10^9	10			p.r.	D.k. at 460 nm in N_2O-satd. soln. contg. 3×10^{-3} mol L^{-1} $TlSO_4$; 71% e-transfer.	81A162
25.6.3	**Tetranitromethane**							
	$Tl(OH)_2 + C(NO_2)_4 \rightarrow Tl(III) + {}^{\cdot}NO_2 + C(NO_2)_3^-$	4×10^8	8-9			p.r.	D.k. at 410 nm and p.b.k. at 350 nm in N_2O-satd. soln. contg. 2×10^{-3} mol L^{-1} Tl^+ and ~ 10^{-4} mol L^{-1} tetranitromethane.	761192
25.7	**Chlorothallium(II) ion**							
25.7.1	**Iron(II) ion**							
	$TlCl^+ + Fe^{2+} \rightarrow TlCl + Fe^{3+}$	8×10^6	0	1	21	p.r.	Calcd. from p.b.k. at 340 nm in soln. contg. 1 mol L^{-1} $HClO_4$, 1×10^{-4} mol L^{-1} Cl^-, 2.6×10^{-4} mol L^{-1} Tl(III) and 9×10^{-4} mol L^{-1} Tl(I).	761154
		6×10^5	0	1	21	p.r.	Calcd. from p.b.k. at 340 nm in soln. contg. 1 mol L^{-1} $HClO_4$, 1×10^{-4}-1 mol L^{-1} Cl^-, 2.6×10^{-4} mol L^{-1} Tl(III) and 9×10^{-4} mol L^{-1} Tl(I).	761154
25.7.2	**Chloroiron(III) ion**							
	$TlCl^+ + FeCl^{2+} \rightarrow TlCl_2^+ + Fe^{2+}$	3.9×10^8	0	1	21	p.r.	D.k. at 340 nm in soln. contg. 1 mol L^{-1} $HClO_4$, 1×10^{-4} mol L^{-1} Cl^-, 2.6×10^{-4} mol L^{-1} Tl(III) and 9×10^{-4} mol L^{-1} Tl(I); same k for $TlCl_2 + FeCl^{2+}$, $TlCl_3^- + FeCl^{2+}$, etc. For reaction of same Tl(II) species with $FeOH^{2+}$, $k = 3 \times 10^8$ L mol^{-1} s^{-1}.	761154
25.8	**Dichlorothallium(II)**							
25.8.1	**Iron(II) ion**							
	$TlCl_2 + Fe^{2+} \rightarrow TlCl + FeCl^{2+}$	2×10^6	0	1	21	p.r.	Calcd. from p.b.k. at 340 nm in soln. contg. 1 mol L^{-1} $HClO_4$, 1×10^{-4}-1 mol L^{-1} Cl^-, 2.6×10^{-4} mol L^{-1} Tl(III) and 9×10^{-4} mol L^{-1} Tl(I).	761154
		2×10^6	0	1	21	p.r.	Calcd. from p.b.k. at 340 nm in soln. contg. 1 mol L^{-1} $HClO_4$, 1×10^{-4}-1 mol L^{-1} Cl^-, 2.6×10^{-4} mol L^{-1} Tl(III) and 9×10^{-4} mol L^{-1} Tl(I).	761154

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
25.9	**Trichlorothallate(II) ion**							
25.9.1	**Iron(II) ion**							
	$TlCl_3^- + Fe^{2+} \rightarrow TlCl_3^{2-} + Fe^{3+}$	$<1 \times 10^6$	0	1	21	p.r.	Calcd. from p.b.k. at 340 nm in soln. contg. 1 mol L^{-1} $HClO_4$, 1×10^{-4}-1 mol L^{-1} Cl^{-1}, 2.6×10^{-4} mol L^{-1} Tl(III) and 9×10^{-4} mol L^{-1} Tl(I).	761154
		1.5×10^7	0	1	21	p.r.	Calcd. from p.b.k. at 340 nm in soln. contg. 1 mol L^{-1} $HClO_4$, 1×10^{-4}-1 mol L^{-1} Cl^{-1}, 2.6×10^{-4} mol L^{-1} Tl(III) and 9×10^{-4} mol L^{-1} Tl(I).	761154
25.10	**Tetrachlorothallate(II) ion**							
25.10.1	**Iron(II) ion**							
	$TlCl_4^{2-} + Fe^{2+} \rightarrow TlCl_3^{2-} + FeCl^{2+}$	1×10^8	0	1	21	p.r.	Calcd. from p.b.k. at 340 nm in soln. contg. 1 mol L^{-1} $HClO_4$, 1×10^{-4}-1 mol L^{-1} Cl^{-1}, 2.6×10^{-4} mol L^{-1} Tl(III) and 9×10^{-4} mol L^{-1} Tl(I).	761154
25.10.2	**Tris(2,2'-bipyridine)ruthenium(III) ion**							
	$TlCl_4^{2-} + Ru(bpy)_3^{3+} \rightarrow TlCl_4^- + Ru(bpy)_3^{2+}$	2.9×10^{10}	<0	3.0		f.p./oq	P.b.k. at 452 nm, in soln. contg. $Ru(bpy)_3^{2+}$, 3.0 mol L^{-1} HCl and $Tl(NO_3)_3$ (OQ).	82A111
25.11	**Thallium(II) ions**							
25.11.1	**Thallium(II) ions**							
	Tl(II) + Tl(II) →	2.7×10^9	0	1	23	p.r.	D.k. at 300 nm in deaerated soln. contg. 0.001 mol L^{-1} Tl(I), 5×10^{-4} mol L^{-1} Tl(III), 0.001 mol L^{-1} Cl^- and 1 mol L^{-1} $HClO_4$; $k = 2.8 \times 10^9$, 2.4×10^9 and 1.9×10^9 L mol^{-1} s^{-1} in the presence of 9.7×10^{-3}, 0.1 and 0.98 mol L^{-1} Cl^-, respectively. In each case $[H^+] = 1$ mol L^{-1} and $I = 1$.	741038

TABLE 26. Rate constants for vanadium transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
26.1	**Vanadyl(III) ion**							
26.1.1	**Hydrogen ion**							
	$VO^{+} + H^{+} \rightarrow VOH^{2+}$	1.5×10^{10}	3.8-4.6		25	p.r.	Condy. change in Ar-satd. soln. contg. VO^{2+} and 0.12 mol L^{-1} *tert*-BuOH or 0.01-0.05 mol L^{-1} EtOH. For $VOOH + H^{+} \rightarrow V(OH)_2^{+}$, $k = 3.5 \times 10^{10}$ L mol^{-1} s^{-1}. Values obtained by computer fit.	86A152

TABLE 27. Rate constants for tungsten transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
27.1	**12-Tungstate ion(7-), dihydrogen**							
27.1.1	**Oxygen**							
	$H_2W_{12}O_{40}^{7-} + O_2 \rightarrow$	* ~90				p.r.	D.k. in air-satd. or O_2-satd. soln. contg. 0.01 mol L^{-1} $H_2W_{12}O_{40}^{6-}$; complex kinetics. * Calcd. from data reported by the authors.	90A069

TABLE 28. Rate constants for zinc transients

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
28.1	**Zinc(I) ion**							
28.1.1	**First-order reaction**							
	$Zn(I) \rightarrow Zn(II) + e_{aq}^-$	4.3×10^6 s^{-1}	≥14			p.r.	D.k. at 380 nm in deaerated soln. contg. *tert*-BuOH, ZnO and 1 to 5 mol L^{-1} OH^-	81A195
28.2	**Zinc(I) ion**							
28.2.1	**Zinc(I) ion**							
	$Zn^+ + Zn^+ \rightarrow Zn^{2+} + Zn^0$	3.5×10^8			22	p.r.	D.k. at 310 nm in soln. contg. 0.01 mol L^{-1} $ZnSO_4$ in the presence of 107 atm H_2, or 0.01-0.2 mol L^{-1} MeOH, 2-PrOH or *tert*-BuOH. Value obtained from computer fit.	771011
28.2.2	**Hydrogen atom**							
	$Zn^+ + H^\cdot \rightarrow ZnH^+$	1.9×10^9			22	p.r.	D.k. at 310 nm in soln. contg. 0.01 mol L^{-1} $ZnSO_4$ in the presence of 107 atm H. Value obtained from computer fit.	771011
28.2.3	**Hydroxyl**							
	$Zn^+ + {}^\cdot OH \rightarrow$	$\sim 1.5 \times 10^{10}$			18	p.r.	D.k. in soln. contg. Zn^{2+}; value corrected for $\varepsilon(Zn^+) = 12{,}800$ L mol^{-1} cm^{-1} [92A182].	66A001
		$\sim 2 \times 10^{10}$			25	p.r.	Estimated from d.k. at 300 nm in Ar-satd. soln. contg. $ZnSO_4$ in absence of ${}^\cdot OH$ scavengers taking into account competing reactions such as $Zn^+ + Zn^+$, $Zn^+ + H_2O_2$, ${}^\cdot OH + {}^\cdot OH$ etc.; value corrected for $\varepsilon(Zn^+) = 12{,}800$ L mol^{-1} cm^{-1} [92A182].	751027
28.2.4	**Hydroxymethyl**							
	$Zn^+ + {}^\cdot CH_2OH + H^+ \rightarrow Zn^{2+} + MeOH$	2.5×10^9			22	p.r.	D.k. at 310 nm in soln. contg. 0.2 mol L^{-1} MeOH and 0.005 mol L^{-1} $ZnSO_4$ in absence and presence of 0.02 atm. N_2O. Value obtained from computer fit.	771011
28.2.5	**1-Hydroxy-1-methylethyl**							
	$Zn^+ + (CH_3)_2\dot{C}OH + H^+ \rightarrow Zn^{2+} + 2\text{-PrOH}$	1.3×10^9			22	p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} 2-PrOH and 0.01 mol L^{-1} $ZnSO_4$ in presence and absence of $HClO_4$. Value obtained from computer fit.	771011
28.2.6	**Carbon dioxide radical anion**							
	$Zn^+ + CO_2^{\cdot -} + H^+ \rightarrow Zn^{2+} + HCO_2^-$	$\sim 4 \times 10^9$			22	p.r.	D.k. at 310 nm in soln. contg. 0.01 mol L^{-1} formate and 0.002 mol L^{-1} $ZnSO_4$. Value obtained from computer fit.	771011
28.2.7	**2-Hydroxy-2,2-dimethylethyl**							
	$Zn^+ + {}^\cdot CH_2C(CH_3)_2OH + H^+ \rightarrow Zn^{2+} + tert\text{-BuOH}$	1.0×10^9			22	p.r.	D.k. at 310 nm in soln. contg. *tert*-BuOH and $ZnSO_4$. Value obtained from computer fit.	771011
28.2.8	**Bromate ion**							
	$Zn^+ + BrO_3^- \rightarrow$	2.1×10^9		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and varied $[BrO_3^-]$.	68G855
28.2.9	**Chlorate ion**							
	$Zn^+ + ClO_3^- \rightarrow$	$<3 \times 10^6$		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and varied $[ClO_3^-]$.	68G855
28.2.10	**Cobalt(II) ion**							
	$Zn^+ + Co^{2+} \rightarrow$	$<3 \times 10^6$		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and varied $[Co^{2+}]$.	68G855

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
28.2	**Zinc(I) ion** — Continued							
28.2.11	**Tris(2,2'-bipyridine)cobalt(III) ion**							
	$Zn^+ + Co(bpy)_3^{3+} \rightarrow Zn^{2+} + Co(bpy)_3^{2+}$	2.6×10^9				p.r.	D.k. in soln. contg. 0.05 mol L^{-1} Zn^{2+}, 0.1 mol L^{-1} *tert*-BuOH and 1×10^{-4} mol L^{-1} $Co(bpy)_3^{3+}$.	720381
28.2.12	**Tris(ethylenediamine)cobalt(III) ion**							
	$Zn^+ + Co(en)_3^{3+} \rightarrow Zn^{2+} + Co(en)_3^{2+}$	2.5×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.13	***cis*-Dichlorobis(ethylenediamine)cobalt(III) ion**							
	$Zn^+ + cis\text{-}Co(en)_2Cl_2^+ \rightarrow Zn^{2+} + Co(en)_2Cl_2$	1.9×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.14	***trans*-Dichlorobis(ethylenediamine)cobalt(III) ion**							
	$Zn^+ + trans\text{-}Co(en)_2Cl_2^+ \rightarrow Zn^{2+} + Co(en)_2Cl_2$	2.3×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.15	**Carbonatobis(ethylenediamine)cobalt(III) ion**							
	$Zn^+ + Co(en)_2CO_3^+ \rightarrow Zn^{2+} + Co(en)_2CO_3$	4.7×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.16	***cis*-Bis(ethylenediamine)difluorocobalt(III) ion**							
	$Zn^+ + cis\text{-}Co(en)_2F_2^+ \rightarrow Zn^{2+} + cis\text{-}Co(en)_2F_2$	5.4×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.17	**Aquabis(ethylenediamine)fluorocobalt(III) ion**							
	$Zn^+ + Co(en)_2(H_2O)F^{2+} \rightarrow Zn^{2+} + Co(en)_2(H_2O)F^+$	4.7×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.18	***cis*-Amminechlorobis(ethylenediamine)cobalt(III) ion**							
	$Zn^+ + cis\text{-}Co(en)_2(NH_3)Cl^{2+} \rightarrow Zn^{2+} + cis\text{-}Co(en)_2(NH_3)Cl^+$	1.5×10^9	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.19	***cis*-Nitroamminebis(ethylenediamine)cobalt(III) ion**							
	$Zn^+ + cis\text{-}Co(en)_2(NH_3)NO_2^{2+} \rightarrow Zn^{2+} + cis\text{-}Co(en)_2(NH_3)NO_2^+$	2.7×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.20	**Hexaamminecobalt(III) ion**							
	$Zn^+ + Co(NH_3)_6^{3+} \rightarrow Zn^{2+} + Co(NH_3)_6^{2+}$	8.4×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.21	**Pentaammine(bromo)cobalt(III) ion**							
	$Zn^+ + Co(NH_3)_5Br^{2+} \rightarrow Zn^{2+} + Co(NH_3)_5Br^+$	2.6×10^9	4.0	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$. 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.22	**Pentaammine(chloro)cobalt(III) ion**							
	$Zn^+ + Co(NH_3)_5Cl^{2+} \rightarrow Zn^{2+} + Co(NH_3)_5Cl^+$	2.2×10^9	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.23	**Pentaammine(cyano)cobalt(III) ion**							
	$Zn^+ + Co(NH_3)_5(CN)^{2+} \rightarrow Zn^{2+} + Co(NH_3)_5(CN)^+$	1.3×10^9	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
28.2	**Zinc(I) ion** — Continued							
28.2.24	**Pentaammine(fluoro)cobalt(III) ion**							
	$Zn^+ + Co(NH_3)_5F^{2+} \rightarrow Zn^{2+} + Co(NH_3)_5F^+$	8.2×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.25	**Pentaammine(fumarato)cobalt(III) ion**							
	$Zn^+ + Co(NH_3)_5fumarate^+ \rightarrow Zn^{2+} + Co(NH_3)_5fumarate$	1.2×10^9	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.26	**Pentaammine(aqua)cobalt(III) ion**							
	$Zn^+ + Co(NH_3)_5(H_2O)^{3+} \rightarrow Zn^{2+} + Co(NH_3)_5(H_2O)^{2+}$	1.6×10^9	4.0	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.27	**Pentaammine(hydroxy)cobalt(III) ion**							
	$Zn^+ + Co(NH_3)_5OH^{2+} \rightarrow Zn^{2+} + Co(NH_3)_5OH^+$	1.1×10^9	6.6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.28	**Pentaammine(azido)cobalt(III) ion**							
	$Zn^+ + Co(NH_3)_5(N_3)^{2+} \rightarrow Zn^{2+} + Co(NH_3)_5(N_3)^+$	1.5×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.29	**Pentaammine(thiocyanato-*N*)cobalt(III) ion**							
	$Zn^+ + Co(NH_3)_5(NCS)^{2+} \rightarrow Zn^{2+} + Co(NH_3)_5(NCS)^+$	1.7×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.30	**(Acetato)pentaamminecobalt(III) ion**							
	$Zn^+ + Co(NH_3)_5(OAc)^{2+} \rightarrow Zn^{2+} + Co(NH_3)_5(OAc)^+$	5.0×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.31	**Hexaamminebis(μ-hydroxy)-μ-(trifluoroacetato)dicobalt(III) ion**							
	$Zn^+ + CF_3CO_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	1.2×10^9			22	p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} $ZnSO_4$ and 0.1 mol L^{-1} *tert*-BuOH.	83A140
28.2.32	**Hexaammine-μ-(difluoroacetato)bis(μ-hydroxy)dicobalt(III) ion**							
	$Zn^+ + CHF_2CO_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	1.0×10^9			22	p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} $ZnSO_4$ and 0.1 mol L^{-1} *tert*-BuOH.	83A140
28.2.33	**Hexaammine-μ-(fluoroacetato)bis(μ-hydroxy)dicobalt(III) ion**							
	$Zn^+ + CH_2FCO_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	7.6×10^8			22	p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} $ZnSO_4$ and 0.1 mol L^{-1} *tert*-BuOH.	83A140
28.2.34	**μ-Acetatohexaamminebis(μ-hydroxy)dicobalt(III) ion**							
	$Zn^+ + CH_3CO_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	5.5×10^8			22	p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} $ZnSO_4$ and 0.1 mol L^{-1} *tert*-BuOH.	83A140
28.2.35	**Tris(2,2'-bipyridine)chromium(III) ion**							
	$Zn^+ + Cr(bpy)_3^{3+} \rightarrow Zn^{2+} + Cr(bpy)_3^{2+}$	1.9×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L^{-1} *tert*-BuOH, 0.01 mol L^{-1} $ZnSO_4$ and varied $[Cr(bpy)_3^{3+}]$.	87A309
28.2.36	**Tris(1,10-phenanthroline)chromium(III) ion**							
	$Zn^+ + Cr(phen)_3^{3+} \rightarrow Zn^{2+} + Cr(phen)_3^{2+}$	1.7×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L^{-1} *tert*-BuOH, 0.01 mol L^{-1} $ZnSO_4$ and varied $[Cr(phen)_3^{3+}]$.	87A309
28.2.37	**Bis(2,2'-bipyridine)oxalatochromium(III)ion**							
	$Zn^+ + Cr(bpy)_2(C_2O_4)^+ \rightarrow Zn^{2+} + Cr(bpy)_2(C_2O_4)$	2.2×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L^{-1} *tert*-BuOH, 0.01 mol L^{-1} $ZnSO_4$ and varied $[Cr(bpy)_2(C_2O_4)^+]$.	87A309

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
28.2	**Zinc(I) ion** — Continued							
28.2.38	**Bis(1,10-phenanthroline)(oxalato)chromium(III) ion**							
	$Zn^+ + Cr(phen)_2(C_2O_4)^+ \rightarrow Zn^{2+} + Cr(phen)_2(C_2O_4)$	2.1×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L^{-1} *tert*-BuOH, 0.01 mol L^{-1} $ZnSO_4$ and varied $[Cr(phen)_2(C_2O_4)^+]$.	87A309
28.2.39	**2,2'-Bipyridinebis(oxalato)chromate(III) ion**							
	$Zn^+ + Cr(bpy)(C_2O_4)_2^- \rightarrow Zn^{2+} + Cr(bpy)(C_2O_4)_2^{2-}$	2.2×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L^{-1} *tert*-BuOH, 0.01 mol L^{-1} $ZnSO_4$ and varied $[Cr(bpy)(C_2O_4)_2^-]$.	87A309
28.2.40	**Bis(oxalato)phenanthrolinechromate(III) ion**							
	$Zn^+ + Cr(phen)(C_2O_4)_2^- \rightarrow Zn^{2+} + Cr(phen)(C_2O_4)_2^{2-}$	2.2×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L^{-1} *tert*-BuOH, 0.01 mol L^{-1} $ZnSO_4$ and varied $[Cr(phen)(C_2O_4)_2^-]$.	87A309
28.2.41	**Dichromate(VI) ion**							
	$Zn^+ + Cr_2O_7^{2-} \rightarrow$	1.6×10^{10}		0.02	25	p.r.	D.k. in soln. contg. 0.01 mol L^{-1} $ZnSO_4$.	761072
28.2.42	**Copper(II) ion**							
	$Zn^+ + Cu^{2+} \rightarrow$	2.5×10^8		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and varied $[Cu^{2+}]$.	68G855
28.2.43	**Hydrogen peroxide**							
	$Zn^+ + H_2O_2 \rightarrow Zn^{2+} + OH^- + {}^{\bullet}OH$	2.5×10^9			22	p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} 2-PrOH, 6.8 or 18.3×10^{-5} mol L^{-1} H_2O_2 and 0.01 mol L^{-1} $ZnSO_4$.	771011
		2.3×10^9			25	p.r.	D.k. in soln. contg. $ZnSO_4$; $E_a = 10.5$ kJ mol^{-1}.	761072
		1.8×10^9				p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$ and 0.001 mol L^{-1} MeOH.	68G855
28.2.44	**Hydrogen ion**							
	$Zn^+ + H^+ \rightarrow$	$\leq 10^6$		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and varied $[H^+]$.	68G855
28.2.45	**Iodate ion**							
	$Zn^+ + IO_3^- \rightarrow$	3.6×10^9		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and varied $[IO_3^-]$.	68G855
28.2.46	**Hydroxymanganese(III) ion**							
	$Zn^+ + MnOH^{2+} \rightarrow Zn^{2+} + Mn^{2+} + OH^-$	2.4×10^9	~6		23	p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} $MnSO_4$ and 0.03 mol L^{-1} $ZnSO_4$. Value obtained from computer fit.	78A041
28.2.47	**Bis(μ-oxo)(ethylenediaminetetraacetato)bis[oxomolybdate(V)] ion**							
	$Zn^+ + [Mo_2O_4(EDTA)]^{2-} \rightarrow Zn^{2+} + [Mo_2O_4(EDTA)]^{3-}$	5.0×10^9	6		25	p.r.	D.k. at 320 nm in soln. contg. 1×10^{-4} mol L^{-1} complex, 0.1 mol L^{-1} $ZnSO_4$ and 0.1 mol L^{-1} *tert*-BuOH.	85A363
28.2.48	**Bis(μ-oxo)bis[(cysteinato)oxomolybdate(V)] ion**							
	$Zn^+ + [Mo_2O_4(Cys)_2]^{2-} \rightarrow Zn^{2+} + [Mo_2O_4(Cys)_2]^{3-}$	4.5×10^9	6		25	p.r.	D.k. at 320 nm in soln. contg. 1×10^{-4} mol L^{-1} complex, 0.1 mol L^{-1} $ZnSO_4$ and 0.1 mol L^{-1} *tert*-BuOH.	85A363
28.2.49	**Nitrite ion**							
	$Zn^+ + NO_2^- \rightarrow$	2.2×10^9		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and varied $[NO_2^-]$.	68G855

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
28.2	**Zinc(I) ion** — Continued							
28.2.50	**Nitrate ion**							
	$Zn^+ + NO_3^- \rightarrow$	2.1×10^9		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and varied [NO_3^-].	68G855
28.2.51	**Nitrous oxide**							
	$Zn^+ + N_2O \rightarrow ZnO^+ + N_2$	1.6×10^7			22	p.r.	D.k. at 310 nm in soln. satd. with 0.3 or 1.0 atm N_2O, contg. 0.1 mol L^{-1} *tert*-BuOH and 0.1 mol L^{-1} $ZnSO_4$.	771011
						p.r.	Studied at 1-30 °C, E_a = 35.5 kJ mol^{-1}.	761072
28.2.52	**Nickel(II) ion**							
	$Zn^+ + Ni^{2+} \rightarrow$	$<5 \times 10^6$		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and varied [Ni^{2+}].	68G855
28.2.53	**Oxygen**							
	$Zn^+ + O_2 \rightarrow Zn^{2+} + O_2^{\cdot -}$	2.4×10^9				p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} $ZnSO_4$, 0.001 mol L^{-1} MeOH and varied [O_2].	68G855
		3.3×10^9			18	p.r.	D.k. in soln. contg. Zn^{2+}.	66A001
28.2.54	**Lead(II) ions**							
	$Zn^+ + Pb^{2+} \rightarrow Zn^{2+} + Pb^+$	4.0×10^8			18	p.r.	D.k. in soln. contg. Zn^{2+}.	66A001
28.2.55	**Tris(2,2'-bipyridine)ruthenium(II) ion**							
	$Zn^+ + Ru(bpy)_3^{2+} \rightarrow Zn^{2+} + Ru(bpy)_3^+$	1.6×10^9	5.2		24	p.r.	P.b.k. at 510 nm in deaerated soln. contg. 4 × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$, 0.05 mol L^{-1} $ZnSO_4$ and 0.017 mol L^{-1} *tert*-BuOH.	78A002
		1.5×10^9	6-7		24	f.p./pi	P.b.k. at 510 nm in soln. contg. (9.0-27) × 10^{-6} mol L^{-1} $Ru(bpy)_3^{2+}$ and (1.3-10) × 10^{-3} mol L^{-1} $ZnSO_4$.	771093
		2.5×10^9				p.r.	P.b.k. in soln. contg. 0.05 mol L^{-1} Zn^{2+}, 1.0 mol L^{-1} *tert*-BuOH and 5.0 × 10^{-5} mol L^{-1} $Ru(bpy)_3^{2+}$.	720381
28.2.56	**Hexaammineruthenium(III) ion**							
	$Zn^+ + Ru(NH_3)_6^{3+} \rightarrow Zn^{2+} + Ru(NH_3)_6^{2+}$	2.2×10^9		0.08		p.r.	D.k. in soln. contg. 0.02 mol L^{-1} $ZnSO_4$ and (0.5-6.0) × 10^{-4} mol L^{-1} $Ru(NH_3)_6^{3+}$.	701229
28.2.57	**Peroxodisulfate ion**							
	$Zn^+ + S_2O_8^{2-} \rightarrow Zn^{2+} + SO_4^{\cdot -} + SO_4^{2-}$	1.3×10^9		0.02	25	p.r.	D.k. in soln. contg. 0.01 mol L^{-1} $ZnSO_4$ and (0.5-10) × 10^{-4} mol L^{-1} $S_2O_8^{2-}$.	761072
28.2.58	**Acetone**							
	$Zn^+ + CH_3COCH_3 \rightarrow$	$<10^8$			22	p.r.	Decay at 310 nm was unaffected by presence of 3 × 10^{-4} mol L^{-1} acetone in soln. contg. 0.1 mol L^{-1} $ZnSO_4$ and 0.025 mol L^{-1} MeOH.	771011
28.2.59	**Allyl alcohol**							
	$Zn^+ + H_2C{=}CHCH_2OH \rightarrow [Zn(CH_2CHCH_2OH)]^+$	$\sim 10^8$			25	p.r.	D.k. in soln. contg. 0.01 mol L^{-1} $ZnSO_4$, 1.24 mol L^{-1} MeOH and 1.2 × 10^{-3} mol L^{-1} allyl alcohol.	761072
28.2.60	**Benzophenone**							
	$Zn^+ + (C_6H_5)_2CO \rightarrow Zn^{2+} + (C_6H_5)_2CO^-$	2.5×10^9	7.0			p.r.	P.b.k. in soln. contg. 5 × 10^{-3} mol L^{-1} $ZnSO_4$, ~1.0 mol L^{-1} *tert*-BuOH and 5 × 10^{-5} mol L^{-1} benzophenone.	751032
28.2.61	**1,4-Benzoquinone**							
	$Zn^+ + Q \rightarrow Zn^{2+} + Q^{\cdot -}$	3.0×10^9	5.7		25	p.r.	P.b.k. at 430 nm in soln. contg. Zn^{2+} and 1 mol L^{-1} *tert*-BuOH.	761134

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
28.2	**Zinc(I) ion** — Continued							
28.2.61	**1,4-Benzoquinone** — Continued							
		4.8×10^9	7.0			p.r.	P.b.k. in soln. contg. 5×10^{-3} mol L^{-1} $ZnSO_4$, ~1.0 mol L^{-1} *tert*-BuOH and 5×10^{-5} mol L^{-1} 1,4-benzoquinone.	751032
28.2.62	**2-Methyl-1,4-naphthoquinone**							
	$Zn^+ + 2\text{-}CH_3NQ \rightarrow Zn^{2+} + [2\text{-}CH_3NQ]^{\cdot-}$	3.8×10^9	7.1			p.r.	P.b.k. in soln. contg. 0.005 mol L^{-1} Zn^{2+}, ~1.0 mol L^{-1} *tert*-BuOH and 5×10^{-5} mol L^{-1} 2-CH_3-NQ.	751032 731047
28.3	**1,4,8,11-Tetrazacyclotetradecanezinc(I) ion**							
28.3.1	**Nitrous oxide**							
	$Zn(cyclam)^+ + N_2O \rightarrow$	6.4×10^7	5-7		23	p.r.	D.k. in 0-30% N_2O-satd. soln. contg. 1.7 mol L^{-1} *tert*-BuOH and 0.09 mol L^{-1} $Zn(cyclam)^{2+}$.	80A380
28.4	**Tetrakis-4-(*N,N,N*-trimethylammonio)phenylporphinezinc(II) radical anion**							
28.4.1	**Dihydroxytetrakis(4-sulfonatophenyl)porphinatocobaltate(II) ion**							
	$[ZnTAPP]^{\cdot 3+} + CoTPPS(OH)_2^{6-} \rightarrow$	3.8×10^8	13			p.r.	D.k. at 700-740 nm in N_2- or N_2O-satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and varied [Co(III) complex].	81A317
28.4.2	**Dihydroxytetrakis[4-(*N,N,N*-trimethylammonio)phenyl]porphinecobalt(II) ion**							
	$[ZnTAPP]^{\cdot 3+} + CoTAPP(OH)_2^{2+} \rightarrow$	5.4×10^8	13			p.r.	D.k. at 700-740 nm in N_2- or N_2O-satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and varied [Co(III) complex].	81A317
28.4.3	**Dihydroxytetrakis(1-methylpyridinium-4-yl)porphinecobalt(II) ion**							
	$[ZnTAPP]^{\cdot 3+} + CoTMpyP(OH)_2^{2+} \rightarrow$	4.9×10^8	13			p.r.	D.k. at 700-740 nm in N_2- or N_2O-satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and varied [Co(III) complex].	81A317
28.5	**5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinezinc(II) radical anion**							
28.5.1	**Dihydroxytetrakis(4-sulfonatophenyl)porphinatocobaltate(II) ion**							
	$[ZnTMpyP]^{\cdot 3+} + CoTPPS(OH)_2^{6-} \rightarrow$	1.1×10^9	13			p.r.	D.k. at 700-740 nm in N_2- or N_2O-satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and varied [Co(III) complex].	81A317
28.5.2	**Dihydroxytetrakis[4-(*N,N,N*-trimethylammonio)phenyl]porphinecobalt(II) ion**							
	$[ZnTMpyP]^{\cdot 3+} + CoTAPP(OH)_2^{2+} \rightarrow$	1.6×10^8	13			p.r.	D.k. at 700-740 nm in N_2- or N_2O-satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and varied [Co(III) complex].	81A317
28.5.3	**Dihydroxytetrakis(1-methylpyridinium-4-yl)porphinecobalt(II) ion**							
	$[ZnTMpyP]^{\cdot 3+} + CoTMpyP(OH)_2^{2+} \rightarrow$	4.0×10^8	13			p.r.	D.k. at 700-740 nm in N_2- or N_2O-satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and varied [Co(III) complex].	81A317
28.5.4	**Sulfur dioxide**							
	$[ZnTMpyP]^{\cdot 3+} + SO_2 \rightarrow ZnTMpyP^{4+} + SO_2^{\cdot-}$	8×10^8	1			p.r.	D.k. at 700 nm in N_2-satd. soln. contg. $NaHSO_3$, $ZnTMpyP^{4+}$ and 0.1 mol L^{-1} HCl or $HClO_4$.	87A083
28.6	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) radical anion**							
28.6.1	**Dihydroxytetrakis(4-sulfonatophenyl)porphinatocobaltate(II) ion**							
	$[ZnTPPS]^{\cdot 5-} + CoTPPS(OH)_2^{6-} \rightarrow$	2.0×10^7	13			p.r.	D.k. at 700-740 nm in N_2- or N_2O-satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and varied [Co(III) complex].	81A317

TABLE 28. Rate constants for zinc transients — Continued

Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
28.6 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) radical anion — Continued							
28.6.2 Dihydroxytetrakis[4-(*N,N,N*-trimethylammonio)phenyl]porphinecobalt(II) ion							
$[ZnTPPS]^{\cdot 5-} + CoTAPP(OH)_2^{2+} \rightarrow$	5.5×10^8	13			p.r.	D.k. at 700-740 nm in N_2- or N_2O-satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and varied [Co(III) complex].	81A317
28.6.3 Dihydroxytetrakis(1-methylpyridinium-4-yl)porphinecobalt(II) ion							
$[ZnTPPS]^{\cdot 5-} + CoTMpyP(OH)_2^{2+} \rightarrow$	1.4×10^9	13			p.r.	D.k. at 700-740 nm in N_2- or N_2O-satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and varied [Co(III) complex].	81A317
28.6.4 Ferricyanide ion							
$[ZnTPPS]^{\cdot 5-} + Fe(CN)_6^{3-} \rightarrow$ $ZnTPPS^{4-} + Fe(CN)_6^{4-}$	1.0×10^9	7	0.5		f.p./pi	D.k. at 650 nm in soln. contg. 2×10^{-3} mol L^{-1} $Fe(CN)_6^{4-}$, 5.0×10^{-5} mol L^{-1} $ZnTPPS^{4-}$ and 0.5 mol L^{-1} NaCl.	87A200 86A265
28.7 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-4-yl]porphinatozinc(II) radical anion							
28.7.1 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-4-yl]porphinatozinc(II) radical anion							
$[ZnTZP]^{\cdot -} + [ZnTZP]^{\cdot -} \rightarrow$	4.1×10^6	6.8			p.r.	D.k. at 620 nm in soln. contg. ZnTZP and 0.1 mol L^{-1} 2-PrOH; disproportionation reaction.	83C026
28.8 Tetrakis-*N*-methyl-2,3-pyridinoporphyrazinezinc(II) radical anion							
28.8.1 Tetrakis-*N*-methyl-2,3-pyridinoporphyrazinezinc(II) radical anion							
$[ZnTMPz]^{\cdot 3+} + [ZnTMPz]^{\cdot 3+} \rightarrow$ $ZnTMPz^{4+} + ZnTMPz^{2+}$	1.7×10^9	7			p.r.	D.k. at 550 nm in N_2O-satd. phosphate buffered soln. contg. 10% 2-PrOH (v:v).	86B153
28.9 Trisulfophthalocyaninezincate(II) radical anion							
28.9.1 Oxygen							
$[ZnPCS]^{\cdot 4-} + O_2 \rightarrow ZnPCS^{3-} + O_2^{\cdot -}$	4.6×10^8	7			f.p./rq	D.k. in aerated soln. contg. $[ZnPCS]^{3-}$ and 4-aminophenol (RQ).	90A022
28.10 Nitrilotriacetatozinc(II), H-abstraction product							
28.10.1 First-order reaction							
* A →	4.0×10^3 s^{-1} 7×10^2 s^{-1} 8×10^2 s^{-1}	4.0 7.0 9.0		22	p.r.	D.k. in N_2O-satd. soln. contg. $Zn(NTA)^-$. * Species A suggested to have site of H-abstraction different from Species B.	78A436
28.10.2 Nitrilotriacetatozinc(II), H-abstraction product							
* B + B →	1.9×10^8 1.3×10^7 0.8×10^7	4.0 5.0 7.0		22	p.r.	D.k. in N_2O-satd. soln. contg. $Zn(NTA)^-$. * Species B suggested to have site of H-abstraction different from Species A.	78A436
28.10.3 Oxygen							
$[ZnNTA\text{-}H]^{\cdot -} + O_2 \rightarrow$	1.5×10^8 3.4×10^8	4.0 9.0		22	p.r.	D.k. in N_2O/O_2 satd. soln. contg. $Zn(NTA)^-$.	78A436
28.11 Ethylenediaminetetraacetatozinc(II), H-abstraction product							
28.11.1 First-order reaction							
* C →	5.0×10^2 s^{-1}	4,5,7,9		22	p.r.	D.k. in N_2O-satd. soln. contg. $Zn(EDTA)^{2-}$. * Species C suggested to have site of H-abstraction different from Species D.	78A436
28.11.2 Ethylenediaminetetraacetatozinc(II), H-abstraction product							
* D + D →	0.5×10^7 1.2×10^6 1.6×10^6 1.0×10^6	4.0 5.0 7.0 9.0		22	p.r.	D.k. in N_2O-satd. soln. contg. $Zn(EDTA)^{2-}$. * Species D suggested to have site of H-abstraction different from Species C.	78A436

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
28.11	**Ethylenediaminetetraacetatozinc(II), H-abstraction product — Continued**							
28.11.3	**Oxygen**							
	$[ZnEDTA\text{-}H]^{\cdot 2-} + O_2 \rightarrow$	2.3×10^8 4.0×10^8	4.0 9.0		22	p.r.	D.k. in N_2O/O_2 satd. soln. contg. $Zn(EDTA)^{2-}$.	78A436
28.12	**5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)porphinatozinc(II), H-adduct**							
28.12.1	**First-order reaction**							
	$[Zn(3\text{-}TMpyP\text{-}H)]^{\cdot 4+} \rightarrow$	5.7×10^3 s^{-1}	3-10			p.r.	D.k. at 470 nm in N_2O-satd. soln. contg. $Zn(3\text{-}TMpyP)^{4+}$ and 0.01 mol L^{-1} KBr.	86A243
28.13	**5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)porphinatozinc(II) radical cation**							
28.13.1	**5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)porphinatozinc(II) radical cation**							
	$[Zn(3\text{-}TMpyP)]^{\cdot 5+} +$ $[Zn(3\text{-}TMpyP)]^{\cdot 5+} \rightarrow$	$\sim 1.5 \times 10^7$ $\sim 1.3 \times 10^8$	4-9 11			p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. $Zn(3\text{-}TMpyP)^{4+}$ and 0.01 mol L^{-1} KBr; values taken from graph of k vs pH.	86A243
		3.7×10^7	2	0.01		f.p./oq	D.k. at 700 nm in soln. contg. $Zn(3\text{-}TMpyP)^{4+}$ and $S_2O_8^{2-}$ (OQ).	86A243
28.13.2	**Iron(II) ion**							
	$[Zn(3\text{-}TMpyP)]^{\cdot 5+} + Fe^{2+} \rightarrow$ $Zn(3\text{-}TMpyP)^{4+} + Fe^{3+}$	1.2×10^8	2	0.01		f.p./oq	D.k. at 700 nm in soln. contg. $Zn(3\text{-}TMpyP)^{4+}$ and Fe^{3+} (OQ) and Fe^{2+}.	86A243
28.13.3	**Ferrocyanide ion**							
	$[Zn(3\text{-}TMpyP)]^{\cdot 5+} + Fe(CN)_6^{4-} \rightarrow$ $Zn(3\text{-}TMpyP)^{4+} + Fe(CN)_6^{3-}$	3.2×10^9	11	0.01				86A243
28.14	**5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) radical cation**							
28.14.1	**5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) radical cation**							
	$[ZnTMpyP]^{\cdot 5+} + [ZnTMpyP]^{\cdot 5+} \rightarrow$	3.2×10^9	7.0	4.4- $32.4 \times$ 10^{-3}		p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. $ZnTMpyP^{4+}$, 2.0×10^{-3} mol L^{-1} N_3^- and 2×10^{-4} mol L^{-1} phosphate buffer; $k = 4.2 \times 10^9$ and 1.1×10^{10} L mol^{-1} s^{-1} in the presence of 5×10^{-3} and 3.0×10^{-2} mol L^{-1} N_3^-, respectively. Decay involves complexes of the radical cation with azide.	88A277
		3.2×10^9	7.0			p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. $ZnTMpyP^{4+}$ and N_3^-. Decay involves complexes of the radical cation with azide.	85A038
		1.1×10^9	3.2	0.1		p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. $ZnTMpyP^{4+}$ and 0.1 mol L^{-1} NaCl. Decay involves complexes of the radical cation with chloride.	85A038
		9.7×10^7 5.0×10^8 7.0×10^8 9.0×10^8	3.2-7 9.0 11.0 12.0			p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. $ZnTMpyP^{4+}$ and 0.01 mol L^{-1} KBr. Decay involves complexes of the radical cation with bromide.	85A038
		6×10^8	7			p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. $ZnTMpyP^{4+}$ and SCN^-. Decay involves complexes of the radical cation with thiocyanate.	85A038
		4.5×10^8	7			p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. 10^{-4} mol L^{-1} $ZnTMpyP^{4+}$, 0.01 mol L^{-1} KBr and 0.1% v/v pyridine. Decay involves a complex of the radical cation with pyridine.	85A038
		1.5×10^7	4.0			p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. $ZnTMpyP^{4+}$ and Ag^+; $k = 1.8 \times 10^7$ L mol^{-1} s^{-1} in the presence of Tl^+.	85A038

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
28.14	**5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) radical cation** — Continued							
28.14.2	**Ethylenediaminetetraacetatocobaltate(II) ion**							
	$[ZnTMpyP]^{\cdot 5+}$ + $CoEDTA^{2-}$ → $ZnTMpyP^{4+}$ + $CoEDTA^{-}$	~2.2×10^9				f.p./oq	D.k. at 700 nm in Ar-satd. soln. contg. $ZnTMpyP^{4+}$ and $CoEDTA^{-}$ (OQ).	85A430
28.14.3	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocobaltate(II) ion**							
	$[ZnTMpyP]^{\cdot 5+}$ + $CoTPPS^{4-}$ →	2.8×10^9	7			p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} bromide ion and varied [Co(II) complex].	81A317
28.14.4	**Iron(II) ion**							
	$[ZnTMpyP]^{\cdot 5+}$ + Fe^{2+} → $ZnTMpyP^{4+}$ + Fe^{3+}	2×10^8	2.5	0.1		f.p./oq	Soln. contg. $ZnTMpyP^{4+}$, Fe^{3+} (OQ) and 0.1 mol L^{-1} NaCl.	82A321
28.14.5	**1,1'-Bis(2-sulfonatoethyl)-4,4'-bipyridinium radical anion**							
	$[ZnTMpyP]^{\cdot 5+}$ + $[SEV]^{\cdot -}$ → $ZnTMpyP^{4+}$ + SEV	8.3×10^9	6.5		20	f.p./oq	D.k. in soln. contg. $ZnTMpyP^{4+}$, SEV (OQ) and 0.04 mol L^{-1} phosphate buffer.	89A362
28.14.6	**1,1'-Bis(3-sulfonatopropyl)-4,4'-bipyridinium radical anion**							
	$[ZnTMpyP]^{\cdot 5+}$ + $[SPV]^{\cdot -}$ → $ZnTMpyP^{4+}$ + SPV	3.5×10^9				f.p./oq	D.k. at 700 nm in soln. contg. 3×10^{-5} mol L^{-1} $ZnTMpyP^{4+}$ and 1×10^{-3} mol L^{-1} SPV (OQ).	86N075
		2×10^9				f.p./oq	D.k. at 395 nm in soln. contg. $ZnTMpyP^{4+}$ and SPV (OQ).	84N212
28.14.7	**1,1'-Bis[3-(trimethylammonio)propyl]-4,4'-bipyridinium radical cation**							
	$[ZnTMpyP]^{\cdot 5+}$ + $[APV]^{\cdot 3+}$ → $ZnTMpyP^{4+}$ + APV^{4+}	3.3×10^8	6.5		20	f.p./oq	D.k. in soln. contg. $ZnTMpyP^{4+}$, APV^{4+} (OQ) and 0.04 mol L^{-1} phosphate buffer.	89A362
28.14.8	**1,1'-Dimethyl-4,4'-bipyridinium radical cation**							
	$[ZnTMpyP]^{\cdot 5+}$ + $MV^{\cdot +}$ → $ZnTMpyP^{4+}$ + MV^{2+}	2.0×10^9	6.5		20	f.p./oq	D.k. in soln. contg. $ZnTMpyP^{4+}$, MV^{2+} (OQ) and 0.04 mol L^{-1} phosphate buffer.	89A362
		1.2×10^9 5.0×10^8 3.9×10^8 1.3×10^8		0.03 0.015 0.006 →0		f.p./oq	D.k. at 390, 605 and 700 nm in Ar-satd. soln. contg. 0.01 mol L^{-1} $ZnTMpyP^{4+}$ and (2-10) × 10^{-3} mol L^{-1} MV^{2+} (OQ).	84A264
		4×10^8				f.p./oq	D.k. at 395 nm in soln. contg. $ZnTMpyP^{4+}$ and MV^{2+} (OQ).	84N212
		1.4×10^9	4.7	0.1		f.p./oq	D.k. at 605 and 705 nm in soln. contg. $ZnTMpyP^{4+}$ and 0.015 mol L^{-1} MV^{2+} (OQ).	82N168
		3.7×10^8	5.0	0.05		f.p./oq	D.k. in soln. contg. $ZnTMpyP^{4+}$ and MV^{2+} (OQ).	81F164
28.14.9	**1,1'-Dipropyl-4,4'-bipyridinium radical cation**							
	$[ZnTMpyP]^{\cdot 5+}$ + $[C_3V]^{\cdot +}$ → $ZnTMpyP^{4+}$ + C_3V^{2+}	3×10^8				f.p./oq	D.k. at 395 nm in soln. contg. $ZnTMpyP^{4+}$ and C_3V^{2+} (OQ).	84N212
28.14.10	**1,1'-Dihexyl-4,4'-bipyridinium radical cation**							
	$[ZnTMpyP]^{\cdot 5+}$ + $[C_6V]^{\cdot +}$ → $ZnTMpyP^{4+}$ + C_6V^{2+}	4×10^8				f.p./oq	D.k. at 395 nm in soln. contg. $ZnTMpyP^{4+}$ and C_6V^{2+} (OQ).	84N212
28.14.11	**1,1'-Diheptyl-4,4'-bipyridinium radical cation**							
	$[ZnTMpyP]^{\cdot 5+}$ + $[C_7V]^{\cdot +}$ → $ZnTMpyP^{4+}$ + C_7V^{2+}	8.4×10^8				f.p/oq	D.k. at 700 nm in soln. contg. $ZnTMpyP^{4+}$ and 3×10^{-3} mol L^{-1} C_7V^{2+} (OQ).	85A430
28.14.12	**1,1'-Dioctyl-4,4'-bipyridinium radical cation**							
	$[ZnTMpyP]^{\cdot 5+}$ + $[C_8V]^{\cdot +}$ → $ZnTMpyP^{4+}$ + C_8V^{2+}	6×10^8				f.p./oq	D.k. at 395 nm in soln. contg. $ZnTMpyP^{4+}$ and C_8V^{2+} (OQ).	84N212
28.14.13	**1,1'-Didodecyl-4,4'-bipyridinium radical cation**							
	$[ZnTMpyP]^{\cdot 5+}$ + $[C_{12}V]^{\cdot +}$ → $ZnTMpyP^{4+}$ + $C_{12}V^{2+}$	3×10^8				f.p./oq	D.k. at 395 nm in soln. contg. $ZnTMpyP^{4+}$ and $C_{12}V^{2+}$ (OQ).	84N212

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
28.14	**5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) radical cation** — Continued							
28.14.14	**1-Dodecyl-1'-methyl-4,4'-bipyridinium radical cation**							
	$[ZnTMpyP]^{\cdot 5+} + [C_{12}MV]^{\cdot +} \rightarrow ZnTMpyP^{4+} + C_{12}MV^{2+}$	6×10^8				f.p./oq	D.k. at 395 nm in soln. contg. $ZnTMpyP^{4+}$ and $C_{12}MV^{2+}$ (OQ).	84N212
28.14.15	**Ethylenediaminetetraacetate ions**							
	$[ZnTMpyP]^{\cdot 5+} + EDTA \rightarrow ZnTMpyP^{4+} + [EDTA_{ox}]^{\cdot}$	* 1.9×10^7				f.p./oq	D.k. at 700 nm in Ar-satd. soln. contg. 2×10^{-4} mol L^{-1} $ZnTMpyP^{4+}$, 0.001 mol L^{-1} $CoEDTA^-$ (OQ) and 5×10^{-3} mol L^{-1} EDTA.	85A430
		* 2.7×10^6	5.0	0.05		f.p./oq	D.k. in soln. contg. $ZnTMpyP^{4+}$, 0.005 mol L^{-1} MV^{2+} (OQ) and (1-20) $\times 10^{-3}$ mol L^{-1} EDTA.	81F164
							* Unexplained discrepancy in these data.	
28.14.16	**1-Methyl-1'-tetradecyl-4,4'-bipyridinium radical cation**							
	$[ZnTMpyP]^{\cdot 5+} + [C_{14}MV]^{\cdot +} \rightarrow ZnTMpyP^{4+} + C_{14}MV^{2+}$	5×10^9				f.p/oq	D.k. at 602 nm in soln. contg. 5×10^{-5} mol L^{-1} $ZnTMpyP^{4+}$ and 10^{-3} mol L^{-1} $C_{14}MV^{2+}$ (OQ).	81N002
28.14.17	**1-Methyl-1'-(2-sulfonato)ethyl-4,4'-bipyridinium radical cation**							
	$[ZnTMpyP]^{\cdot 5+} + [MSEV]^{\cdot} \rightarrow ZnTMpyP^{4+} + MSEV^-$	5.5×10^9	6.5		20	f.p./oq	D.k. in soln. contg. $ZnTMpyP^{4+}$, $MSEV^-$ (OQ) and 0.04 mol L^{-1} phosphate buffer.	89A362
28.14.18	**1-Methyl-1'-[3-(trimethylammonio)propyl]-4,4'-bipyridinium radical cation**							
	$[ZnTMpyP]^{\cdot 5+} + [MTMAPV]^{\cdot 2+} \rightarrow ZnTMpyP^{4+} + MTMAPV^{3+}$	1.0×10^9	6.5		20	f.p./oq	D.k. in soln. contg. $ZnTMpyP^{4+}$, $MTMAPV^{3+}$ (OQ) and 0.04 mol L^{-1} phosphate buffer.	89A362
28.15	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) radical cation**							
28.15.1	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) radical cation**							
	$[ZnTPPS]^{\cdot 3-} + [ZnTPPS]^{\cdot 3-} \rightarrow$	1.5×10^5	7			p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. 0.01 mol L^{-1} SCN^- and 10^{-4} mol L^{-1} $ZnTPPS^{4-}$. Decay involves complexes of the radical cation with SCN^-. When SCN^- is replaced by Br^- decay is approximately first-order with half-life ~6 s between pH 3.2 and 7 and then half-life decreases with increasing pH (half-life = 3 ms at pH 13).	85A038
28.15.2	**Superoxide radical anion**							
	$[ZnTPPS]^{\cdot 3-} + O_2^{\cdot -} \rightarrow$	1.1×10^9	7.5			f.p./oq	D.k. at 700 nm in N_2/O_2 (95:5) satd. soln. contg. 1.5×10^{-4} mol L^{-1} $ZnTPPS^{4-}$, 3×10^{-3} mol L^{-1} metronidazole (OQ) and 2.5×10^{-2} mol L^{-1} phosphate buffer.	88A285
28.15.3	**5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocobaltate(II) ion**							
	$[ZnTPPS]^{\cdot 3-} + CoTPPS^{4-} \rightarrow$	1.1×10^8	7			p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. 0.1 mol L^{-1} bromide ion and varied [Co(II) complex].	81A317
28.15.4	**Ferrocyanide ion**							
	$[ZnTPPS]^{\cdot 3-} + Fe(CN)_6^{4-} \rightarrow ZnTPPS^{4-} + Fe(CN)_6^{3-}$	3.7×10^7	9	0.01		p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. $ZnTPPS^{4-}$ and 0.01 mol L^{-1} KBr.	85S167
28.15.5	**Oxygen**							
	$[ZnTPPS]^{\cdot 3-} + O_2 \rightarrow$	$<2 \times 10^4$	7.5			f.p./oq	D.k. at 700 nm in N_2/O_2 (95:5) satd. soln. contg. 1.5×10^{-4} mol L^{-1} $ZnTPPS^{4-}$, 3×10^{-3} mol L^{-1} metronidazole (OQ) and 2.5×10^{-2} mol L^{-1} phosphate buffer.	88A285
28.15.6	**1,1'-Bis(carboxyethyl)-4,4'-bipyridinium radical ion (1+)**							
	$[ZnTPPS]^{\cdot 3-} + [CEV]^{\cdot +} \rightarrow ZnTPPS^{4-} + CEV^{2+}$	6×10^8			25	f.p./oq	D.k. in soln. contg. $ZnTPPS^{4-}$ and CEV^{2+} (OQ).	82N022

TABLE 28. Rate constants for zinc transients — Continued

Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
28.15 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) radical cation — Continued							
28.15.7 1,1'-Bis(2-sulfonatoethyl)-4,4'-bipyridinium radical anion							
$[ZnTPPS]^{\cdot 3-} + [SEV]^{\cdot -} \rightarrow ZnTPPS^{4-} + SEV$	9×10^8	6.5		20	f.p./oq	D.k. in soln. contg. $ZnTPPS^{4-}$, SEV (OQ) and 0.04 mol L^{-1} phosphate buffer.	89A362
28.15.8 1,1'-Bis[3-(trimethylammonio)propyl]-4,4'-bipyridinium radical cation							
$[ZnTPPS]^{\cdot 3-} + [APV]^{\cdot 3+} \rightarrow ZnTPPS^{4-} + APV^{4+}$	3.3×10^{10}	6.5		20	f.p./oq	D.k. in soln. contg. $ZnTPPS^{4-}$, APV^{4+} (OQ) and 0.04 mol L^{-1} phosphate buffer.	89A362
28.15.9 1,1'-Dimethyl-4,4'-bipyridinium radical cation							
$[ZnTPPS]^{\cdot 3-} + MV^{\cdot +} \rightarrow ZnTPPS^{4-} + MV^{2+}$	2×10^9	~7		22	f.p./oq	D.k. at 600 and 460 nm in soln. contg. 2×10^{-5} mol L^{-1} $ZnTPPS^{4-}$, $(2\text{-}5) \times 10^{-4}$ mol L^{-1} MV^{2+} (OQ) and 0.2 mol L^{-1} NaCl or 0.05 mol L^{-1} $ZnSO_4$.	85F141
28.15.10 1-Methyl-1'-(2-sulfonato)ethyl-4,4'-bipyridinium radical cation							
$[ZnTPPS]^{\cdot 3-} + [MSEV]^{\cdot} \rightarrow ZnTPPS^{4-} + MSEV^{-}$	3.7×10^9	6.5		20	f.p./oq	D.k. in soln. contg. $ZnTPPS^{4-}$, $MSEV^{-}$ (OQ) and 0.04 mol L^{-1} phosphate buffer.	89A362
28.15.11 1-Methyl-1'-[3-(trimethylammonio)propyl]-4,4'-bipyridinium radical cation							
$[ZnTPPS]^{\cdot 3-} + [MTMAPV]^{\cdot 2+} \rightarrow ZnTPPS^{4-} + MTMAPV^{3+}$	2×10^{10}	6.5		20	f.p./oq	D.k. in soln. contg. $ZnTPPS^{4-}$, $MTMAPV^{3+}$ (OQ) and 0.04 mol L^{-1} phosphate buffer.	89A362
28.15.12 Nitrobenzene radical anion							
$[ZnTPPS]^{\cdot 3-} + [C_6H_5NO_2]^{\cdot -} \rightarrow ZnTPPS^{4-} + C_6H_5NO_2$	2×10^8	~7			f.p./oq	D.k. in soln. contg. $ZnTPPS^{4-}$ nitrobenzene (OQ).	85F141
28.15.13 Tryptophan							
$[ZnTPPS]^{\cdot 3-} + TrpH \rightarrow$	$<4 \times 10^5$	9.2			f.p./oq	D.k. at 700 nm in Ar-satd. soln. contg. $ZnTPPS^{4-}$ and 4×10^{-4} mol L^{-1} metronidazole (OQ).	86A063
28.15.14 Tyrosine							
$[ZnTPPS]^{\cdot 3-} + TyrOH \rightarrow$	8.2×10^7	9.2			f.p./oq	D.k. at 700 nm in Ar-satd. soln. contg. $ZnTPPS^{4-}$ and 4×10^{-4} mol L^{-1} metronidazole (OQ).	86A063
28.16 Hydroxy(tetrakis(2-hydroxyphenyl)porphinato)zinc(II) radical cation, deprotonated							
28.16.1 Hydroxy(tetrakis(2-hydroxyphenyl)porphinato)zinc(II) radical cation, deprotonated							
$(HO)[ZnT(o\text{-}OP)P]^{\cdot 4-} + (HO)[ZnT(o\text{-}OP)P]^{\cdot 4-} \rightarrow$	2.7×10^7	12			p.r.	D.k. at 680 nm in N_2O-satd. soln. contg. 10^{-4} mol L^{-1} zinc porphyrin and 0.01 mol L^{-1} KBr.	86A242
28.17 Hydroxy(tetrakis(3-hydroxyphenyl)porphinato)zinc(II) radical cation, deprotonated							
28.17.1 Hydroxy(tetrakis(3-hydroxyphenyl)porphinato)zinc(II) radical cation, deprotonated							
$(HO)[ZnT(m\text{-}OP)P]^{\cdot 4-} + (HO)[ZnT(m\text{-}OP)P]^{\cdot 4-} \rightarrow$	3.4×10^7	12			p.r.	D.k. at 680 nm in N_2O-satd. soln. contg. 10^{-4} mol L^{-1} zinc porphyrin and 0.01 mol L^{-1} KBr; $k = 3.2 \times 10^7$ and 4.0×10^7 L mol^{-1} s^{-1} at pH 13 and 14, respectively.	86A242
28.18 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-4-yl]porphinatozinc(II) radical cation							
28.18.1 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-4-yl]porphinatozinc(II) radical cation							
$[ZnTZP]^{\cdot +} + [ZnTZP]^{\cdot +} \rightarrow$	3.0×10^9	7.0			p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. 10^{-4} mol L^{-1} ZnTZP and 0.01 mol L^{-1} KBr. Decay involves a complex of the radical cation with bromide.	85A038

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	k (L mol^{-1} s^{-1})	pH	I	t(°C)	Method	Comment	Ref.
28.19	**5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-2-yl]porphinatozinc(II) radical cation**							
28.19.1	**Iron(II) ions**							
	$[Zn(2\text{-}TZP)]^{\bullet+}$ + Fe(II) → Zn(2-TZP) + Fe(III)	3.2×10^5	0			f.p./oq	D.k. at 700 nm in soln. contg. Zn(2-TZP), Fe(III) (OQ), 1 mol L^{-1} nitric acid and added Fe(II).	87A261
28.20	**5,10,15,20-Tetrakis(2-*N*-hexylpyridyl)porphinatozinc(II) radical cation**							
28.20.1	**Iron(II) ions**							
	$[Zn(2\text{-}THpyP)]^{\bullet5+}$ + Fe(II) → $Zn(2\text{-}THpyP)^{4+}$ + Fe(III)	3.2×10^5	0			f.p./oq	D.k. at 700 nm in soln. contg. $Zn(2\text{-}THpyP)^{4+}$, Fe(III) (OQ), 1 mol L^{-1} nitric acid and added Fe(II).	87A261
28.21	**Tetrakis-4-(*N,N,N*-trimethylammonio)phenylporphinezinc(II) radical cation**							
28.21.1	**Tetrakis-4-(*N,N,N*-trimethylammonio)phenylporphinezinc(II) radical cation**							
	$[ZnTAPP]^{\bullet5+}$ + $[ZnTAPP]^{\bullet5+}$ →	7×10^6	7			p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. 10^{-4} mol L^{-1} $ZnTAPP^{4+}$ and 0.01 mol L^{-1} KBr. Decay involves a complex of the radical cation with bromide.	85A038
28.22	**5,10,15,20-Tetrakis(2,6-dichloro-3-sulfonatophenyl)porphinatozincate(II) radical cation**							
28.22.1	**5,10,15,20-Tetrakis(2,6-dichloro-3-sulfonatophenyl)porphinatozincate(II) radical cation**							
	$[ZnTCPPS]^{\bullet3-}$ + $[ZnTCPPS]^{\bullet3-}$ → $ZnTCPPS^{4-}$ + $ZnTCPPS^{2-}$	2×10^7	7			p.r.	D.k. at 700 nm in N_2O-satd. soln. contg. $ZnTCPPS^{4-}$ and 0.01 mol L^{-1} NaN_3; unclear whether k or $2k$.	90R041
28.22.2	**1,4-Benzosemiquinone radical ion**							
	$[ZnTCPPS]^{\bullet3-}$ + $Q^{\bullet-}$ → $ZnTCPPS^{4-}$ + Q	4.8×10^9	7			f.p./oq	D.k. in N_2-satd. soln. contg. $ZnTCPPS^{4-}$, benzoquinone (OQ) and 0.2 mol L^{-1} Na_2SO_4.	90R041
28.22.3	**2,6-Dimethylbenzosemiquinone radical ion**							
	$[ZnTCPPS]^{\bullet3-}$ + $[2,6\text{-}(CH_3)_2Q]^{\bullet-}$ → $ZnTCPPS^{4-}$ + $2,6\text{-}(CH_3)_2Q$	4.8×10^9	7			f.p./oq	D.k. in N_2-satd. soln. contg. $ZnTCPPS^{4-}$, 2,6-dimethylbenzoquinone (OQ) and 0.2 mol L^{-1} Na_2SO_4.	90R041
28.22.4	**1,4-Benzenediol**							
	$[ZnTCPPS]^{\bullet3-}$ + QH_2 → $ZnTCPPS^{4-}$ + $Q^{\bullet-}$ + 2 H^+	8.8×10^8	7			f.p./oq	D.k. in N_2-satd. soln. contg. $ZnTCPPS^{4-}$, benzoquinone (OQ), excess hydroquinone and 0.2 mol L^{-1} Na_2SO_4.	90R041
28.23	**Zinc(II) uroporphyrin radical cation**							
28.23.1	**Nicotinamide adenine dinucleotide**							
	$[ZnUP]^{\bullet+}$ + NAD → ZnUP + NAD^+	1.4×10^8	7		25	f.p./oq	D.k. at 380 and 670 nm in soln. contg. zinc(II) uroporphyrin, NAD^+ (OQ), 1.1×10^{-4} mol L^{-1} K_2HPO_4 and 0.1 mol L^{-1} KCl.	75A245
28.23.2	***N*-Benzyl-3-carbamylpyridinyl**							
	$[ZnUP]^{\bullet+}$ + $C_6H_5CH_2\dot{p}yCONH_2$ → ZnUP + $C_6H_5CH_2py^+CONH_2$	1.4×10^8	7		25	f.p./oq	D.k. at 380 and 670 nm in soln. contg. zinc(II) uroporphyrin, *N*-benzylnicotinamide (OQ), 1.1×10^{-4} mol L^{-1} K_2HPO_4 and 0.1 mol L^{-1} KCl.	75A245
28.24	**Zinc(II) hematoporphyrin radical anion**							
28.24.1	**Zinc(II) hematoporphyrin radical anion**							
	$[ZnHP]^{\bullet-}$ + $[ZnHP]^{\bullet-}$ → $[ZnHP]_2^{2-}$	2.1×10^8	13			p.r.	D.k. in N_2O-satd. soln. contg. 1.0 mol L^{-1} 2-PrOH, 1×10^{-5} mol L^{-1} zinc(II) hematoporphyrin, 1×10^{-4} mol L^{-1} $ZnSO_4$ and 0.1 mol L^{-1} NaOH; unclear whether k or $2k$.	741040

7. References to Tables

640133 Pulsradiolytische Untersuchung schneller Reaktionen von hydratisierten Elektronen, freien Radikalen und Ionen mit Tetranitromethan in Waessriger Loesung. Asmus, K.-D.; Henglein, A.; Ebert, M.; Keene, J.P., *Ber. Bunsenges. Phys. Chem.* **68**: 657-63 (1964)

650044 The pulse radiolysis of aqueous solutions of some inorganic compounds. Baxendale, J.H.; Fielden, E.M.; Keene, J.P., *Proc. Roy. Soc. (London) Ser. A* **286**: 320-36 (1965)

650385 Determination of some fast reaction rates using the pulsed radiolysis of permanganate solutions. Baxendale, J.H.; Keene, J.P.; Stott, D.A., *Pulse Radiolysis*, Ebert, M.; Keene, J.P.; Swallow, A.J.; Baxendale, J.H. (eds.), Academic Press, New York, 1965, p.107-15

660097 Novel valence states of thallium as studied by pulse radiolysis. Cercek, B.; Ebert, M.; Swallow, A.J., *J. Chem. Soc. Pt. A* : 612-5 (1966)

66A001 Reactions and relative potentials of some metal ions in unstable valency states. Baxendale, J.H.; Keene, J.P.; Stott, D.A., *Chem. Commun.* : 715-6 (1966)

680066 Reactions of nitrosodimethylaniline with free radicals. Dainton, F.S.; Wiseall, B., *Trans. Faraday Soc.* **64**: 694-705 (1968)

680169 Pulse radiolysis studies on stable and transient complexes of platinum. Adams, G.E.; Broszkiewicz, R.B.; Michael, B.D., *Trans. Faraday Soc.* **64**: 1256-64 (1968)

680302 A pulse radiolysis study of bivalent and zerovalent gold in aqueous solutions. Ghosh-Mazumdar, A.S.; Hart, E.J., *Adv. Chem. Ser.* **81**: 193-209 (1968)

680431 Pulsradiolytische Untersuchung einiger Elementarprozesse der Silberreduktion. Pukies, J.; Roebke, W.; Henglein, A., *Ber. Bunsenges. Phys. Chem.* **72**: 842-7 (1968)

680435 Pulsradiolytische Untersuchung der Reduktion des Ag^+-Ions in ammoniakalischer Loesung. Pukies, J.; Roebke, W., *Ber. Bunsenges. Phys. Chem.* **72**: 1101-5 (1968)

68G855 Reductions by monovalent zinc, cadmium, and nickel cations. Meyerstein, D.; Mulac, W.A., *J. Phys. Chem.* **72**: 784-8 (1968)

690144 Electron pulse radiolysis of aqueous tetrachloro and tetracyano complexes of Pt^{II}. Ghosh-Mazumdar, A.S.; Hart, E.J., *Int. J. Radiat. Phys. Chem.* **1**: 165-76 (1969)

690277 Effect of ligands on reactivity of metal cations towards the hydrated electron. Part 2.-Effect of glycine, ethylenediamine and nitrilotriacetic acid. Meyerstein, D.; Mulac, W.A., *Trans. Faraday Soc.* **65**: 1818-26 (1969)

690428 Reduction of cobalt(III) complexes by monovalent zinc, cadmium, and nickel ions in aqueous solutions. Meyerstein, D.; Mulac, W.A., *J. Phys. Chem.* **73**: 1091-5 (1969)

690434 Pulse-radiolysis study of some unstable complexes of iron. Jayson, G.G.; Keene, J.P.; Stirling, D.A.; Swallow, A.J., *Trans. Faraday Soc.* **65**: 2453-64 (1969)

700178 Radiolysis of aqueous solutions of ruthenium(III) hexa-ammine and chloropenta-ammine. Baxendale, J.H.; Rodgers, M.A.J.; Ward, M.D., *J. Chem. Soc. Pt. A* : 1246-50 (1970)

700336 Radiation-induced oxidation of alcohols by Tl(III) in acid aqueous solution. Burchill, C.E.; Hickling, G.G., *Can. J. Chem.* **48**: 2466-73 (1970)

700512 Pulse radiolytic induced transient electrical conductance in liquid solutions. Part 3. Radiolysis of aqueous solutions of some inorganic systems. Barker, G.C.; Fowles, P., *Trans. Faraday Soc.* **66**: 1661-9 (1970)

700580 Une etude par radiolyse pulsee sur l'espece transitoire Au II. Baxendale, J.H.; Koulkes-Pujo, A-M., *J. Chim. Phys.* **67**: 1602-7 (1970)

701228 The effect of ligands on the chemical properties of monovalent cadmium ions. Meyerstein, D.; Mulac, W.A., *Inorg. Chem.* **9**: 1762-6 (1970)

701229 The reduction of ruthenium(III) hexaammine by hydrogen atoms and monovalent zinc, cadmium, and nickel ions in aqueous solutions. Navon, G.; Meyerstein, D., *J. Phys. Chem.* **74**: 4067-70 (1970)

707726 The rates of oxidation of Fe^{2+}, Mn^{2+}, and Co^+ by Br_2^- radical ions. Thornton, A.T.; Laurence, G.S., *Chem. Commun.* : 443-4 (1970)

710036 Effect of thallous ions on the yields of hydrogen and hydrogen peroxide in radiolyzed aqueous solutions. Faraggi, M.; Zehavi, D.; Anbar, M., *Trans. Faraday Soc.* **67**: 2057-67 (1971)

710097 Pulse radiolysis of aqueous solutions of pentacyanocobaltate(II). The detection and characterization of pentacyanocobaltate(I). Venerable, G.D.,II; Halpern, J., *J. Am. Chem. Soc.* **93**: 2176-9 (1971)

710174 Trivalent copper. I. A pulse radiolytic study of the chemical properties of the aquo complex. Meyerstein, D., *Inorg. Chem.* **10**: 638-41 (1971)

710234 A study of the oxidation and reduction of $Ru(NH_3)_5N_2^{2+}$ by γ- and electron pulse radiolysis. Baxendale, J.H.; Mulazzani, O.G., *J. Inorg. Nucl. Chem.* **33**: 823-30 (1971)

710775 Trivalent copper. II. A pulse radiolytic study of the formation and decomposition of amino complexes. Meyerstein, D., *Inorg. Chem.* **10**: 2244-9 (1971)

720290 Pulse radiolysis of metallic ions in aqueous solutions. I. Pulse radiolysis in Hg^{2+} and Hg_2^{2+} ions aqueous solutions. Faraggi, M.; Amozig, A., *Int. J. Radiat. Phys. Chem.* **4**: 353-8 (1972)

720381 Transient species in the reactions of some pyridyl complex ions with hydrated electrons. Baxendale, J.H.; Fiti, M., *J. Chem. Soc., Dalton Trans.* : 1995-8 (1972)

720460 Trivalent nickel. I. A pulse radiolytic study of the formation and decomposition of the ammoniacal complex in aqueous solution. Lati, J.; Meyerstein, D., *Inorg. Chem.* **11**: 2393-7 (1972)

720461 Trivalent nickel. II. A pulse radiolytic study of the formation and decomposition of the ethylenediamine and glycine complexes in aqueous solution. Lati, J.; Meyerstein, D., *Inorg. Chem.* **11**: 2397-401 (1972)

720844 Sellers, R.M., Ph.D. Thesis, Univ. of Leeds, 1972

727193 The photochemistry of the monoxalatoiron(III) ion. Cooper, G.D.; DeGraff, B.A., *J. Phys. Chem.* **76**: 2618-25 (1972)

730038 Oxidation of ferrous ions by perhydroxyl radicals. Jayson, G.G.; Parsons, B.J.; Swallow, A.J., *J. Chem. Soc., Faraday Trans. 1* **69**: 236-42 (1973)

730039 Radiation chemical study of the reaction of Ni^+, Co^+ and Cd^+ with N_2O. Evidence for the formation of a hyperoxidised state by oxygen atom transfer. Buxton, G.V.; Dainton, F.S.; McCracken, D.R., *J. Chem. Soc., Faraday Trans. 1* **69**: 243-54 (1973)

730043 Reduction of mercuric chloride by hydrated electrons and reducing radicals in aqueous solutions. Formation and reactions of HgCl. Nazhat, N.B.; Asmus, K.-D., *J. Phys. Chem.* **77**: 614-20 (1973)

730112 Pulse radiolytic investigations of the catalyzed disproportionation of peroxy radicals. Aqueous cupric ions. Rabani, J.; Klug-Roth, D.; Lilie, J., *J. Phys. Chem.* **77**: 1169-75 (1973)

730121 Pulse radiolysis of 1,4-dicyanobenzene in aqueous solutions in the presence and absence of thallium(I) ions. Robinson, E.A.; Schulte-Frohlinde, D., *J. Chem. Soc., Faraday Trans. 1* **69**: 707-18 (1973)

731022 Appearance of sulphatoferric complexes in the oxidation of ferrous sulphate solutions. A study by pulse radiolysis. Jayson, G.G.; Parsons, B.J.; Swallow, A.J., *J. Chem. Soc., Faraday Trans. 1* **69**: 1079-89 (1973)

731047 One-electron redox reactions of free radicals in solution. Rate of electron transfer processes to quinones. Rao, P.S.; Hayon, E., *Biochim. Biophys. Acta* **292**: 516-33 (1973)

731053 Pulse radiolysis of liquids at high pressures. IV. Hydrogen-atom reactions in aqueous 0.1M $HClO_4$ solutions. Farhataziz; Mihalcea, I.; Sharp, L.J.; Hentz, R.R., *J. Chem. Phys.* **59**: 2309-15 (1973)

731066 Pulse radiolysis studies on complexes of iridium. Broszkiewicz, R.K., *J. Chem. Soc., Dalton Trans.* : 1799-802 (1973)

731080 Pulse radiolysis of mercuric ion in aqueous solutions. Fujita, S.; Horii, H.; Taniguchi, S., *J. Phys. Chem.* **77**: 2868-71 (1973)

731104 Rate constants of electron transfer processes in solution: Dependence on the redox potential of the acceptor. Rao, P.S.; Hayon, E., *Nature (London)* **243**: 344-6 (1973)

737317 Kinetics of oxidation of transition-metal ions by halogen radical anions. Part III. The oxidation of manganese(II) by dibromide and dichloride ions generated by flash photolysis. Laurence, G.S.; Thornton, A.T., *J. Chem. Soc., Dalton Trans.* : 1637-44 (1973)

737514 Photodecomposition of hydrogen peroxide in the presence of copper ions. IV. Determination of rate constants of elementary reactions. Kozlov, Yu.N.; Berdnikov, V.M., *Russ. J. Phys. Chem.* **47**: 338-40 (1973) Translated from: *Zh. Fiz. Khim.* **47**: 598-602 (1973)

741017 A pulse radiolysis study of thallium(II) in aqueous perchloric acid solutions. Schwarz, H.A.; Comstock, D.; Yandell, J.K.; Dodson, R.W., *J. Phys. Chem.* **78**: 488-93 (1974)

741037 Pulse radiolytic study of Ni^+. Nickel-carbon bond formation. Kelm, M.; Lilie, J.; Henglein, A.; Janata, E., *J. Phys. Chem.* **78**: 882-7 (1974)

741038 Pulse radiolysis studies of chloride complexes of thallium(II). Absorption spectra and stability constants of $TlCl^+$, $TlCl_2$, and $TlCl_3$. Dodson, R.W.; Schwarz, H.A., *J. Phys. Chem.* **78**: 892-9 (1974)

741040 On the mechanism of reduction of porphyrins. A pulse radiolytic study. Harel, Y.; Meyerstein, D., *J. Am. Chem. Soc.* **96**: 2720-7 (1974)

741072 Gamma and pulse radiolysis of tetracyanonickelate(II) anion in aqueous solution. Mulazzani, Q.G.; Ward, M.D.; Semerano, G.; Emmi, S.S.; Giordani, P., *Int. J. Radiat. Phys. Chem.* **6**: 187-201 (1974)

741142 Ultraviolet-visible spectrum, and kinetics of formation and decomposition, of penta-aquahydridochromium(III) and chromium(I) in aqueous perchlorate solutions: A pulse-radiolysis study. Cohen, H.; Meyerstein, D., *J. Chem. Soc., Dalton Trans.* : 2559-64 (1974)

741146 Chromium-carbon bonds in aqueous solutions. A pulse radiolytic study. Cohen, H.; Meyerstein, D., *Inorg. Chem.* **13**: 2434-43 (1974)

747159 Electron transfer quenching of the luminescent excited state of tris(2,2'-bipyridine)ruthenium(II). A flash photolysis relaxation technique for measuring the rates of very rapid electron transfer reactions. Bock, C.R.; Meyer, T.J.; Whitten, D.G., *J. Am. Chem. Soc.* **96**: 4710-2 (1974)

747625 Aqueous chemistry of thallium(II). Part I. Kinetics of reaction of thallium(II) with cobalt(II) and iron(III) ions and oxidation-reduction potentials of thallium(II). Falcinella, B.; Felgate, P.D.; Laurence, G.S., *J. Chem. Soc. Dalton Trans.* : 1367-73 (1974)

751027 Pulse radiolysis study of monovalent cadmium, cobalt, nickel and zinc in aqueous solution. Pt. 1. Formation and decay of the monovalent ions. Buxton, G.V.; Sellers, R.M., *J. Chem. Soc., Faraday Trans. 1* **71**: 558-67 (1975)

751032 One electron oxidation of odd-valent metal ions in solution. Rao, P.S.; Hayon, E., *J. Phys. Chem.* **79**: 865-8 (1975)

751044 Pulse radiolysis of mercuric oxide in neutral aqueous solutions. Fujita, S.; Horii, H.; Mori, T.; Taniguchi, S., *J. Phys. Chem.* **79**: 960-4 (1975)

751049 Reactivity of coordinated nitrosyls. IV. One-electron reduction of ruthenium nitrosylpentaammine(3+) ion in aqueous solution. Armor, J.N.; Hoffman, M.Z., *Inorg. Chem.* **14**: 444-6 (1975)

751063 Formation of CrO_2^{2+} in oxidation of chromium(II) by molecular oxygen. Sellers, R.M.; Simic, M.G., *J. Chem. Soc., Chem. Commun.* : 401-2 (1975)

751064 Pulse radiolytic investigation of the reduction of cadmium(II) ions. Kelm, M.; Lilie, J.; Henglein, A., *J. Chem. Soc., Faraday Trans. 1* **71**: 1132-42 (1975)

751077 Reactivity of coordinated nitrosyls. V. Generation and characterization of a ruthenium(II) alkylnitroso complex. Armor, J.N.; Furman, R.; Hoffman, M.Z., *J. Am. Chem. Soc.* **97**: 1737-42 (1975)

751086 Formation of radical cations from 1,2- and 1,4-dimethoxybenzene by electron transfer to Tl^{2+} and Ag^{2+} in aqueous solution. A pulse radiolysis and in situ radiolysis EPR study. O'Neill, P.; Steenken, S.; Schulte-Frohlinde, D., *Angew. Chem., Int. Ed. Engl.* **14**: 430-1 (1975)

751092 Kinetics of complexation of copper(I) ions with maleate and fumarate in aqueous solutions. A pulse radiolytic study. Meyerstein, D., *Inorg. Chem.* **14**: 1716-7 (1975)

751128 Chemical behavior of rhodium(II)-ammine complexes generated by the pulse radiolytic one-electron reduction of rhodium(III) ammines. Lilie, J.; Simic, M.G.; Endicott, J.F., *Inorg. Chem.* **14**: 2129-33 (1975)

751130 Evidence for formation of a $(TlOH)^+$ complex. O'Neill, P.; Schulte-Frohlinde, D., *J. Chem. Soc., Chem. Commun.* : 387-8 (1975)

751135 Formation and properties of the trivalent nickel-ethylene diamine tetra-acetic acid (EDTA) complex in aqueous solutions: A pulse-radiolytic study. Lati, J.; Meyerstein, D., *Int. J. Radiat. Phys. Chem.* **7**: 611-6 (1975)

751153 Kinetics of spur reactions of electrons in ethylene glycol-water glassy ice. A pulse radiolytic study. Barkatt, A.; Rabani, J., *J. Phys. Chem.* **79**: 2592-7 (1975)

751171 Formation of radical cations of methoxylated benzenes by reaction with OH radicals, Tl^{2+}, Ag^{2+}, and $SO_4^{\cdot -}$ in aqueous solution. An optical and conductometric pulse radiolysis and in situ radiolysis electron spin resonance study. O'Neill, P.; Steenken, S.; Schulte-Frohlinde, D., *J. Phys. Chem.* **79**: 2773-9 (1975)

751188 A pulse radiolysis study of some platinum(II) and platinum(IV) complex ions in aqueous solutions. The formation and characterization of platinum(I) and platinum(III) transients. Storer, D.K.; Waltz, W.L.; Brodovitch, J.C.; Eager, R.L., *Int. J. Radiat. Phys. Chem.* **7**: 693-704 (1975)

751203 Pulse radiolysis of $Hg(CN)_2$ in aqueous solutions. Fujita, S.; Horii, H.; Mori, T.; Taniguchi, S., *Bull. Chem. Soc. Jpn.* **48**: 3067-72 (1975)

751215 The formation of CrO_2^{2+} in the reaction of $Cr^{2+} + O_2$ in aqueous acid solutions. Ilan, Y.A.; Czapski, G.; Ardon, M., *Isr. J. Chem.* **13**: 15-21 (1975)

751218 Pulsed radiolysis of aqueous solutions of compounds of divalent mercury. Pikaev, A.K.; Sibirskaya, G.K.; Spitsyn, V.I., *Dokl. Phys. Chem.* **224**: 994-7 (1975) Translated from: *Dokl. Akad. Nauk SSSR* **224**: 638-41 (1975)

757093 Aqueous chemistry of thallium(II). Part II. Kinetics of reaction of thallium(II) with manganese(II), iron(II), and cobalt(III) ions. Falcinella, B.; Felgate, P.D.; Laurence, G.S., *J. Chem. Soc., Dalton Trans.* : 1-9 (1975)

757415 Reaction of tris(bipyridine)ruthenium(III) with hydroxide and its application in a solar energy storage system. Creutz, C.; Sutin, N., *Proc. Natl. Acad. Sci. U.S.A.* **72**: 2858-62 (1975)

757592 Interaction of the o-benzosemiquinone radical with the divalent copper ion. Kuz'min, V.A.; Khudyakov, I.V.; Popkov, A.V.; Koroli, L.L., *Bull. Acad. Sci. USSR, Div. Chem. Sci.* **24**: 2319-22 (1975) Translated from: *Izv. Akad. Nauk SSSR, Ser. Khim.* : 2431-5 (1975)

75A245 Photosynthesis and porphyrin excited state redox reactions. Carapellucci, P.A.; Mauzerall, D.C., *Ann. N.Y. Acad. Sci.* **244**: 214-37 (1975)

761001 The reactivity of cobalt(I) complexes containing unsaturated macrocyclic ligands in aqueous solution. Tait, A.M.; Hoffman, M.Z.; Hayon, E., *J. Am. Chem. Soc.* **98**: 86-93 (1976)

761039 Reactivity of nickel(I) and copper(I) complexes containing 14-membered macrocyclic ligands in aqueous solution. Tait, A.M.; Hoffman, M.Z.; Hayon, E., *Inorg. Chem.* **15**: 934-9 (1976)

761042 Reduction of mercuric halides and pseudohalides in aqueous solution. Formation and some physicochemical properties of HgCl, HgBr, HgI, HgSCN, and HgCN radical molecules. Jungbluth, H.; Beyrich, J.; Asmus, K.-D., *J. Phys. Chem.* **80**: 1049-53 (1976)

761072 Pulse radiolysis study of monovalent cadmium, cobalt, nickel and zinc in aqueous solution. Part 2. Reactions of the monovalent ions. Buxton, G.V.; Sellers, R.M.; McCracken, D.R., *J. Chem. Soc., Faraday Trans. 1* **72**: 1464-76 (1976)

761074 The reaction mechanism and rate constants in the radiolysis of Fe^{2+}-Cu^{2+} solutions. Bjergbakke, E.; Sehested, K.; Rasmussen, O.L., *Radiat. Res.* **66**: 433-42 (1976)

761087 Pulse radiolysis of $HgBr_2$ in aqueous solutions. Fujita, S.; Horii, H.; Mori, T.; Taniguchi, S., *Bull. Chem. Soc. Jpn.* **49**: 1250-3 (1976)

761093 A pulse radiolysis and flash photolysis study of the formation and characterization of platinum (III) amine complex ions. Brodovitch, J.C.; Storer, D.K.; Waltz, W.L.; Eager, R.L., *Int. J. Radiat. Phys. Chem.* **8**: 465-75 (1976)

761109 Pulse radiolytic studies of aqueous $Mn(ClO_4)_2$ solutions. Pick-Kaplan, M.; Rabani, J., *J. Phys. Chem.* **80**: 1840-3 (1976)

761134 Pulse radiolysis study of the reactions of some reduced metal ions with molecular oxygen in aqueous solution. Sellers, R.M.; Simic, M.G., *J. Am. Chem. Soc.* **98**: 6145-50 (1976)

761136 Kinetics of the reduction of some cobalt(III) complexes with monovalent cobalt. Mihalcea, I.; Hentz, R.R., *Radiochem. Radioanal. Lett.* **26**: 309-18 (1976)

761143 Free radical oxidation of organic disulfides. Bonifacic, M.; Asmus, K.-D., *J. Phys. Chem.* **80**: 2426-30 (1976)

761149 The kinetics of ligand detachment from labile cobalt(II)-amine complexes in aqueous solution. Lilie, J.; Shinohara, N.; Simic, M.G., *J. Am. Chem. Soc.* **98**: 6516-20 (1976)

761154 Reactions of thallium(II) chloride complexes with iron(II) and iron(III). Schwarz, H.A.; Dodson, R.W., *J. Phys. Chem.* **80**: 2543-8 (1976)

761186 Oxidation of copper(I)-olefin complexes in aqueous solution by oxygen and hydrogen peroxide. Buxton, G.V.; Green, J.C.; Sellers, R.M., *J. Chem. Soc., Dalton Trans.* : 2160-5 (1976)

761192 On the equilibrium between thallium(II) hydroxide and hydroxothallium(II) ion: A pulse-radiolysis study. Bonifacic, M.; Asmus, K.-D., *J. Chem. Soc., Dalton Trans.* : 2074-6 (1976)

761233 Pulse radiolysis of aqueous solutions of bismuth salts. Panchvidze, M.V.; Makhonina, L.V.; Nanobashvili, E.M., *Soobshch. Akad. Nauk Cruz. SSSR* **82**: 377-80 (1976)

766404 Mechanism of the quenching of the emission of substituted polypyridineruthenium(II) complexes by iron(III), chromium(III), and europium(III) ions. Lin, C-T.; Boettcher, W.; Chou, M.; Creutz, C.; Sutin, N., *J. Am. Chem. Soc.* **98**: 6536-44 (1976)

767412 Electron-transfer reactions of excited states: Direct evidence for reduction of the charge-transfer excited state of tris(2,2'-bipyridine)ruthenium(II). Creutz, C.; Sutin, N., *J. Am. Chem. Soc.* **98**: 6384-5 (1976)

767517 Bimolecular electron transfer processes of electronically excited tris(2,2'-bipyridine)chromium(III). Ballardini, R.; Varani, G.; Scandola, F.; Balzani, V., *J. Am. Chem. Soc.* **98**: 7432-3 (1976)

76A265 Contrast in the effect of penta-amminecobalt(III) on the chemical properties of nicotineamide and isonicotineamide ligands. Cohen, H.; Meyerstein, D., *J. Chem. Soc., Dalton Trans.* : 1976-9 (1976)

71003 The trans-influence and axial interactions in low spin, tetragonal cobalt(II) complexes containing macrocyclic and/or cyano ligands. Pulse radiolytic studies in fluid solution, electron paramagnetic resonance spectra at 77K, and single-crystal X-ray structures. Endicott, J.F.; Lilie, J.; Kuszaj, J.M.; Ramaswamy, B.S.; Schmonsees, W.G.; Simic, M.G.; Glick, M.D.; Rillema, D.P., *J. Am. Chem. Soc.* **99**: 429-39 (1977)

771006 Formation of radical zwitterions from methoxylated benzoic acids. I. One electron oxidation by Tl^{2+}, Ag^{2+}, and SO_4^-. Steenken, S.; O'Neill, P.; Schulte-Frohlinde, D., *J. Phys. Chem.* **81**: 26-30 (1977)

771011 Pulse radiolysis studies of Zn^+ reactions. Rabani, J.; Mulac, W.A.; Matheson, M.S., *J. Phys. Chem.* **81**: 99-104 (1977)

771018 Reaction of Cob(I)alamin with nitrous oxide and Cob(III)alamin. Blackburn, R.; Kyaw, M.; Swallow, A.J., *J. Chem. Soc., Faraday Trans. 1* **73**: 250-5 (1977)

771027 Kinetics of ligand-to-metal intramolecular electron transfer in cobalt(III)-ammine complexes containing a coordinated radical. Simic, M.G.; Hoffman, M.Z.; Brezniak, N.V., *J. Am. Chem. Soc.* **99**: 2166-72 (1977)

771028 Addition of superoxide radical anion to cobalt(II) macrocyclic complexes in aqueous solution. Simic, M.G., Hoffman, M.Z., *J. Am. Chem. Soc.* **99**: 2370-1 (1977)

771053 A pulse radiolysis study of the reactions of platinum(II) glycine complexes in aqueous media. Waltz, W.L.; Brodovitch, J.C.; Kundu, K.P., *Radiat. Phys. Chem.* **10**: 77-87 (1977)

771093 Transients in the flash photolysis of aqueous solutions of tris(2,2'-bipyridine)ruthenium(II) ion. Meisel, D.; Matheson, M.S.; Mulac, W.A.; Rabani, J., *J. Phys. Chem.* **81**: 1449-55 (1977)

771151 Spectroscopic evidence for non-planarity in nickel(III) complexes of macrocyclic ligands. Pulse radiolysis and electron spin resonance studies in aqueous solution. Ferraudi, G.; Patterson, L., *J. Chem. Soc., Chem. Commun.* : 755-6 (1977)

777164 Measurement of rates of electron transfer between $Ru(bpy)_3^{3+}$ and $Fe(phen)_3^{2+}$ and between $Ru(phen)_3^{3+}$ and $Ru(bpy)_3^{2+}$ by differential excitation flash photolysis. Young, R.C.; Keene, F.R.; Meyer, T.J. *J. Am. Chem. Soc.* **99**: 2468-73 (1977)

777315 Photoredox reactions of thionine. Ferreira, M.I.C.; Harriman, A., *J. Chem. Soc., Faraday Trans. 1* **73**: 1085-92 (1977)

77A234 Kinetics and mechanism of ligand dissociation of cobalt(II)-polyamine complexes in aqueous solution. Shinohara, N.; Lilie, J.; Simic, M.G., *Inorg. Chem.* **16**: 2809-13 (1977)

78A002 Photolytic and radiolytic studies of $Ru(bpy)_3^{2+}$ in micellar solutions. Meisel, D.; Matheson, M.S.; Rabani, J., *J. Am. Chem. Soc.* **100**: 117-22 (1978)

78A041 Radiolytic studies of reactions in the Zn^+ + Mn(III) system. Rabani, J.; Matheson, M.S., *Radiat. Phys. Chem.* **11**: 1-10 (1978)

78A068 On the nature of $Ru(bpy)_3^+$ in aqueous solution. Mulazzani, Q.G.; Emmi, S.; Fuochi, P.G.; Hoffman, M.Z.; Venturi, M., *J. Am. Chem. Soc.* **100**: 981-3 (1978)

78A070 Reaction of e_{aq}^- into excited states of $Ru(bpy)_3^{2+}$. Jonah, C.D.; Matheson, M.S.; Meisel, D., *J. Am. Chem. Soc.* **100**: 1449-56 (1978)

78A087 Mechanism of the quenching of the emission of substituted poly(pyridine)ruthenium(II) complexes by europium(II). Creutz, C., *Inorg. Chem.* **17**: 1046-51 (1978)

78A090 Kinetics and mechanism of the quenching of the emission of substituted polypyridineruthenium(II) complexes. Reactions of RuL_3^+, $*RuL_3^{2+}$, and RuL_3^{3+} with the copper(I)-copper(II) couple. Hoselton, M.A.; Lin, C.-T.; Schwarz, H.A.; Sutin, N., *J. Am. Chem. Soc.* **100**: 2383-8 (1978)

78A110 Redox-catalyzed aquation of nitrosylpentaammineruthenium(3+) ion. Cheney, R.P.; Hoffman, M.Z.; Lust, J.A., *Inorg. Chem.* **17**: 1177-80 (1978)

78A186 An electrochemical method for studying the kinetics of quenching reactions. Ohsawa, Y.; Aoyagui, S., *J. Electroanal. Chem. Interfacial Electrochem.* **90**: 143-6 (1978)

78A200 Kinetics of the formation and decomposition of carbon-cobalt(III) bonds in aqueous solutions by the reaction of aliphatic free radicals with a coenzyme B-12r model cobalt(II) complex. Elroi, H.; Meyerstein, D., *J. Am. Chem. Soc.* **100**: 5540-8 (1978)

78A206 Pulse radiolytic formation of univalent lead and its reactivity towards some Co(III) complexes. Mihalcea, I.; Hentz, R.R., *Radiochem. Radioanal. Lett.* **34**: 15-22 (1978)

78A299 Redox reactions of free radicals with Ni(II) complexes. A pulse radiolytic study. Maruthamuthu, P.; Patterson, L.K.; Ferraudi, G., *Inorg. Chem.* **17**: 3157-63 (1978)

78A300 Photochemical redox reactivity of dimeric and monomeric copper(II) and cobalt(II) sulfophthalocyanines. Ferraudi, G.; Srisankar, E.V., *Inorg. Chem.* **17**: 3164-8 (1978)

78A322 Reactions of some simple α- and β-hydroxyalkyl radicals with Cu^{2+} and Cu^+ ions in aqueous solution. A radiation chemical study. Buxton, G.V.; Green, J.C., *J. Chem. Soc., Faraday Trans. 1* **74**: 697-714 (1978)

78A351 Hydrogen evolution from water by visible light, a homogeneous three component test system for redox catalysis. Kalyanasundaram, K.; Kiwi, J.; Graetzel, M., *Helv. Chim. Acta* **61**: 2720-30 (1978)

78A363 The reactions of hydroxyl radical with some transition-metal compounds containing organic molecules. Waltz, W.L.; Woods, R.J.; Whitburn, K.D., *Photochem. Photobiol.* **28**: 681-5 (1978)

78A373 Electron transfer between cobalt(I) and cobalt(III) in vitamin B_{12}. Ryan, D.A.; Espenson, J.H.; Meyerstein, D.; Mulac, W.A., *Inorg. Chem.* **17**: 3725-6 (1978)

78A410 Reactivity of silver atoms in aqueous solution. II. A pulse radiolysis study. Tausch-Treml, R.; Henglein, A.; Lilie, J., *Ber. Bunsenges. Phys. Chem.* **82**: 1335-43 (1978)

78A436 Oxidation of first-row bivalent transition-metal complexes containing ethylenediaminetetra-acetate and nitrilotriacetate ligands by free radicals: A pulse-radiolysis study. Lati, J.; Meyerstein, D., *J. Chem. Soc., Dalton Trans.* : 1105-18 (1978)

78A449 Decay kinetics of aryloxy and semiquinone radicals in the presence of copper ions. Khudyakov, I.V.; Kuz'min, V.A.; Emanuel, N.M., *Int. J. Chem. Kinet.* **10**: 1005-18 (1978)

78C006 On the hydrolysis of Ag^{II}, Tl^{II}, Sn^{III} and Cu^{III}. Asmus, K.-D.; Bonifacic, M.; Toffel, P.; O'Neill, P.; Schulte-Frohlinde, D.; Steenken, S., *J. Chem. Soc., Faraday Trans. 1* **74**: 1820-6 (1978)

78E293 Quenching of the luminescent excited state of tris(2,2'-bipyridine)ruthenium(II) by complexes of pentaamminecobalt(III) with pyridine, 4,4'-bipyridine, and derivatives of 4,4'-bipyridine. Leopold, K.R.; Haim, A., *Inorg. Chem.* **17**: 1753-7 (1978)

78F301 Photochemical generation of metastable methylcopper complexes. Oxidation-reduction of methyl radicals by copper complexes. Ferraudi, G., *Inorg. Chem.* **17**: 2506-8 (1978)

78F683 Reversible excited-state electron-transfer reactions of transition metal complexes. DeGraff, B.A.; Demas, J.N.; Taylor, D.G., Solar Energy, Chemical Conversion and Storage, R.R. Hautala, R.B. King and C. Kutal (eds.), Humana Press Inc., Clifton, NJ, Pub. 1979, p.189-202

78Z002 Complexes of cations in unstable oxidation states in aqueous solutions as studied by pulse radiolysis. Meyerstein, D., *Acc. Chem. Res.* **11**: 43-8 (1978)

79A002 Oxidation of a nickel(II) complex with an unsaturated macrocyclic ligand in aqueous solutions. A pulse radiolytic study. Jaacobi, M.; Meyerstein, D.; Lilie, J., *Inorg. Chem.* **18**: 429-33 (1979)

79A004 Photoinduced oxygenation of trans-aquohydridotetraamminerhodium (III). Evidence for a transition-metal chain carrier. Endicott, J.F.; Wong, C.-L.; Inoue, T.; Natarajan, P., *Inorg. Chem.* **18**: 450-4 (1979)

79A016 Oxidation-reduction reactions of complexes with macrocyclic ligands. Halide-mediated electron transfer involving low-spin cobalt(III)-(II) couples. Durham, B.; Endicott, J.F.; Wong, C.-L.; Rillema, D.P., *J. Am. Chem. Soc.* **101**: 847-57 (1979)

79A034 One-electron reduction of tris(2,2'-bipyridine) and tris(1,10-phenanthroline) complexes of cobalt(III) in aqueous solution. Simic, M.G.; Hoffman, M.Z.; Cheney, R.P.; Mulazzani, Q.G., *J. Phys. Chem.* **83**: 439-43 (1979)

79A038 Radical oxidation of nickel(II) complexes of tetra-azamacrocyclic ligands and the reactions of the resulting nickel(III) complexes: A pulse-radiolysis and flash-photolysis study. Whitburn, K.D.; Laurence, G.S., *J. Chem. Soc., Dalton Trans.* : 139-48 (1979)

79A046 Pulse radiolytic study of the oxidation of vitamin B_{12r} by dibromide ions. Meyerstein, D.; Espenson, J.H.; Ryan, D.A.; Mulac, W.A., *Inorg. Chem.* **18**: 863-4 (1979)

79A063 Pulse radiolysis of aqueous solutions of mercurous sulfate. Pikaev, A.K.; Sibirskaya, G.K., *Radiochem. Radioanal. Lett.* **38**: 39-45 (1979)

79A080 Oxidation of (5,7,7,12,14,14-hexamethyl-1,4,8,11-tetra-azacyclotetradeca-4, 11-diene)copper(II) by radicals produced by flash photolysis and reactions of the oxidized copper complex. Whitburn, K.D.; Laurence, G.S., *J. Chem. Soc., Dalton Trans.* : 334-7 (1979)

79A090 Photochemical pathways of the dimeric, mixed dimer, and monomeric sulfophthalocyanines of cobalt(III) and iron(II). Ferraudi, G., *Inorg. Chem.* **18**: 1005-13 (1979)

79A134 Radiation synthesis of iron(II) and ruthenium(II) alkylnitroso complexes. Cheney, R.P.; Pell, S.D.; Hoffman, M.Z., *J. Inorg. Nucl. Chem.* **41**: 489-93 (1979)

79A167 Solar energy storage reactions involving polynuclear rhodium isocyanide complexes. Flash photolysis studies in aqueous sulfuric acid solutions. Miskowski, V.M.; Sigal, I.S.; Mann, K.R.; Gray, H.B.; Milder, S.J.; Hammond, G.S.; Ryason, P.R., *J. Am. Chem. Soc.* **101**: 4383-5 (1979)

79A168 Primary processes in the photochemistry of $Co(NH_3)_5Cl^{2+}$. Lilie, J., *J. Am. Chem. Soc.* **101**: 4417-9 (1979)

79A213 Intramolecular electron transfer in the reaction of hydroxyl radicals with (pyridine)pentaamminecobalt(III) ion in aqueous solution. Hoffman, M.Z.; Kimmel, D.W.; Simic, M.G., *Inorg. Chem.* **18**: 2479-85 (1979)

79A218 Influence of acid on the photoredox reaction between tris(2,2'-bipyridyl)ruthenium(II) and iron(III). Ferreira, M.I.C.; Harriman, A., *J. Chem. Soc., Faraday Trans. 2* **75**: 874-9 (1979)

79A249 Complexation of a nickel(III) macrocyclic complex by sulfate ion. A pulse radiolytic study. Cohen, H.; Kirschenbaum, L.J.; Zeigerson, E.; Jaacobi, M.; Fuchs, E.; Ginzburg, G.; Meyerstein, D., *Inorg. Chem.* **18**: 2763-6 (1979)

79A255 Radiation chemistry of cobalt(II) nitrilotriacetate in aqueous solutions. Bhattacharyya, S.N.; Srisankar, E.V., *J. Chem. Soc., Faraday Trans. 1* **75**: 2089-99 (1979)

79A272 The interaction of 3-hydroxyphenoxyl and 5-methyl-3-hydroxyphenoxyl radicals with copper(II) ions. Renge, I.V.; Khudyakov, I.V.; Gubergrits, M.Ya., *Bull. Acad. Sci. USSR, Div. Chem. Sci.* **28**: 278-81 (1979) Izv. Akad. Nauk SSSR, Ser. Khim. (2): 304-7 (1979)

79A297 Kinetics of aquation of the tris(acetylacetonate) complexes of divalent chromium, cobalt, and ruthenium. A pulse radiolytic study. Meisel, D.; Schmidt, K.H.; Meyerstein, D., *Inorg. Chem.* **18**: 971-5 (1979)

79A304 Oxidation of Ag^+ and $Ag(NH_3)_2^+$ as studied by pulse radiolysis. Kumar, A.; Neta, P., *J. Phys. Chem.* **83**: 3091-5 (1979)

79A317 Mechanism of the formation of dihydrogen from the photoinduced reactions of tris(bipyridine)ruthenium(II) with tris(bipyridine)rhodium(III). Brown, G.M.; Chan, S.-F.; Creutz, C.; Schwarz, H.A.; Sutin, N., *J. Am. Chem. Soc.* **101**: 7638-40 (1979)

79F045 Excited-state photochemistry in the tris(2,2'-bipyridine)ruthenium(II)-sulfite system. Creutz, C.; Sutin, N.; Brunschwig, B.S., *J. Am. Chem. Soc.* **101**: 1297-8 (1979)

79F046 Homogeneous catalysis of the photoreduction of water by visible light. Mediation by a tris(2,2'-bipyridine)ruthenium(II)-cobalt(II) macrocycle system. Brown, G.M.; Brunschwig, B.S.; Creutz, C.; Endicott, J.F.; Sutin, N., *J. Am. Chem. Soc.* **101**: 1298-300 (1979)

79F488 The step excitation method for studying reversible excited-state electron-transfer reactions. Experimental realization. Taylor, D.G.; Demas, J.N., *J. Chem. Phys.* **71**: 1032-3 (1979)

79G260 The radiation chemistry of electron- and gamma-irradiated aqueous solutions of Fe^{2+} and Cu^{2+}. Bjergbakke, E., *Nukleonika* **24**: 825-45 (1979)

79Z056 Light-induced electron transfer reactions. Sutin, N., *J. Photochem.* **10**: 19-40 (1979)

80A003 Measurement of the rates of the electron-transfer reactions between $Ru(bpy)_3^{3+}$ and $Co(phen)_3^{2+}$ or $Co(bpy)_3^{2+}$ by flash photolysis techniques. Berkoff, R.; Krist, K.; Gafney, H.D., *Inorg. Chem.* **19**: 1-7 (1980)

80A011 One-electron reduction of ferrideuteroporphyrin IX and reaction of the oxidized and reduced forms with chlorinated methyl radicals. Brault, D.; Bizet, C.; Morliere, P.; Rougee, M.; Land, E.J.; Santus, R.; Swallow, A.J., *J. Am. Chem. Soc.* **102**: 1015-20 (1980)

80A069 Reduction of superoxobridged dicobalt(III) cation by cadmium(I) via an inner-sphere pathway. Pulse radiolysis study. Natarajan, P.; Raghavan, N.V., *J. Chem. Soc., Chem. Commun.* : 268-9 (1980)

80A072 Pulse radiolysis study of Cd $EDTA^{2-}$ and Pb $EDTA^{2-}$ in alkaline solution in the presence of alcohols. Buitenhuis, R.; Bakker, C.N.M.; Stock, F.R.; Louwrier, P.W.F., *Radiochim. Acta* **27**: 15-8 (1980)

80A123 Elementary reactions of the reduction of Tl^+ in aqueous solution. Butler, J.; Henglein, A., *Radiat. Phys. Chem.* **15**: 603-12 (1980)

80A153 Pulse radiolysis study of $Cu(EDTA)^{2-}$ in aqueous solution in the presence of alcohols. Buitenhuis, R.; Bakker, C.N.M.; Stock, F.R.; Louwrier, P.W.F., *Radiat. Phys. Chem.* **16**: 5-10 (1980)

80A189 Nature and mechanism of decomposition of the complex of copper(I) with 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca 4, 11 diene in aqueous solutions. A pulse radiolytic study. Freiberg, M.; Lilie, J.; Meyerstein, D., *Inorg. Chem.* **19**: 1908-12 (1980)

80A194 Pulse and γ-radiolysis of nickel(II) nitrilotriacetate in aqueous solutions. Srisankar, E.V.; Bhattacharyya, S.N., *J. Chem. Soc., Dalton Trans.* : 675-80 (1980)

80A239 Photolysis of copper(II) oxalato complexes in aqueous solution. Das, S.; Johnson, G.R.A., *J. Chem. Soc., Faraday Trans. 2* **76**: 1779-89 (1980)

80A277 Reactions of aliphatic free radicals with copper cations in aqueous solution. Part 2. Reactions with cupric ions: A pulse radiolysis study. Freiberg, M.; Meyerstein, D., *J. Chem. Soc., Faraday Trans. 1* **76**: 1825-37 (1980)

80A278 Reactions of aliphatic free radicals with copper cations in aqueous solutions. Part 3. Reactions with cuprous ions: A pulse radiolysis study. Freiberg, M.; Mulac, W.A.; Schmidt, K.H.; Meyerstein, D., *J. Chem. Soc., Faraday Trans. 1* **76**: 1838-48 (1980)

80A286 Formation and characterization of platinum(III)-ethylenediamine complex ions using pulse radiolysis. Waltz, W.L.; Lilie, J.; Walters, R.T.; Woods, R.J., *Inorg. Chem.* **19**: 3284-91 (1980)

80A307 Complexation and oxidation of glycine and related compounds by Ag(II). Kumar, A.; Neta, P., *J. Am. Chem. Soc.* **102**: 7284-9 (1980)

80A350 Comparative study of the electrochemical and pulse-radiolytic oxidation of the complexes of nickel(II) and copper(II) containing 1,4,8,11-tetraazacyclotetradecane. Zeigerson, E.; Ginzburg, G.; Meyerstein, D.; Kirschenbaum, L.J., *J. Chem. Soc., Daltón Trans.* : 1243-7 (1980)

80A380 Complexes of zinc(I), cadmium(I), and mercury(I) with 1,4,8,11-tetraazacyclotetradecane in aqueous solutions. A pulse radiolytic study. Weddell, J.K.; Allred, A.L.; Meyerstein, D.; Mulac, W.A., *J. Inorg. Nucl. Chem.* **42**: 219-22 (1980)

80C004 Applications of light-induced electron-transfer reactions: Generation and reaction of Ag^0 in solution via visible light photolysis of $Ru(bpy)_3^{2+}$. Foreman, T.K.; Giannotti, C.; Whitten, D.G., *J. Am. Chem. Soc.* **102**: 1170-1 (1980)

80E224 An electrochemical study of quenching reactions of polypyridine complexes of Ru(II) and Os(II) in excited states. Ohsawa, Y.; Saji, T.; Aoyagui, S., *J. Electroanal. Chem. Interfacial Electrochem.* **106**: 327-38 (1980)

80M397 Oxidation-reduction reactions of complexes with macrocyclic ligands. Oxygen uptake kinetics, equilibria, and intermediates in aqueous $Co^{II}(N_4)$ systems. Wong, C.-L.; Switzer, J.A.; Balakrishnan, K.P.; Endicott, J.F., *J. Am. Chem. Soc.* **102**: 5511-8 (1980)

80N025 Light-induced charge separation by functional micellar assemblies. Brugger, P.-A.; Graetzel, M., *J. Am. Chem. Soc.* **102**: 2461-3 (1980)

80R105 Photochemistry of manganese porphyrins. Part 3. Interconversion of Mn^{II}/Mn^{III}. Duncan, I.A.; Harriman, A.; Porter, G., *J. Chem. Soc., Faraday Trans. 2* **76**: 1415-28 (1980)

81A023 Hydrogen abstraction and one-electron oxidation in nickel(II)-iminodiacetate complexes. Bhattacharyya, S.N.; Saha, N.C.; Neta, P., *J. Phys. Chem.* **85**: 300-5 (1981)

81A042 Electron-transfer reactions of quinones, hydroquinones and methyl viologen, photosensitized by tris(2,2'-bipyridine)-ruthenium(II). Darwent, J.R.; Kalyanasundaram, K., *J. Chem. Soc., Faraday Trans. 2* **77**: 373-82 (1981)

81A057 A pulse radiolysis study of the MnO_4^{2-} ion. The stability of Mn(V) in 0.1 M NaOH. Kirschenbaum, L.J.; Meyerstein, D., *Inorg. Chim. Acta* **53**: L99-L100 (1981)

81A060 Chromium(II)-polypyridyl complexes: Formation, spectra, and electron-transfer kinetics. Serpone, N.; Jamieson, M.A.; Emmi, S.S.; Fuochi, P.G.; Mulazzani, Q.G.; Hoffman, M.Z., *J. Am. Chem. Soc.* **103**: 1091-8 (1981)

81A065 Flash-photolysis studies of the electron-transfer reactions of dioxygen complexes of cobalt(III) with tris(2,2'-bipyridyl)ruthenium(III). Chadrasekaran, K.; Natarajan, P., *J. Chem. Soc., Dalton Trans.* : 478-80 (1981)

81A123 Reactions of iron porphyrins with methyl radicals. Brault, D.; Neta, P., *J. Am. Chem. Soc.* **103**: 2705-10 (1981)

81A134 Generation of rhodium(II) and rhodium(I) from the one-electron reduction of tris(2,2'-bipyridine)rhodium(III) ion in aqueous solution. Mulazzani, Q.G.; Emmi, S.; Hoffman, M.Z.; Venturi, M., *J. Am. Chem. Soc.* **103**: 3362-70 (1981)

81A144 Anion radical oxidation of nickel(II) macrocyclic complexes. Pulse radiolysis of (2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1] heptadeca-1(17),13,15-triene)nickel(II) in sodium bromide solution. Morliere, P.; Patterson, L.K., *Inorg. Chem.* **20**: 1458-65 (1981)

81A162 Free radical reactions of the phenothiazine, metiazinic acid. Bahnemann, D.; Asmus, K.-D.; Willson, R.L., *J. Chem. Soc., Perkin Trans. 2* : 890-5 (1981)

81A195 Investigation of the reversible reaction of the hydrated electron with divalent zinc in alkaline solutions by the method of pulse radiolysis. Gogolev, A.V.; Makarov, I.E.; Pikaev, A.K., *High Energy Chem.* **15**: 85-9 (1981) Translated from: *Khim. Vys. Energ.* **15**: 109-13 (1981)

81A209 Oxidative C-C bond cleavage of 1,2-diols by silver(II). Kumar, A., *J. Am. Chem. Soc.* **103**: 5179-82 (1981)

81A225 Mechanism of oxidation of an amine coordinated to ruthenium. Ridd, M.J.; Keene, F.R., *J. Am. Chem. Soc.* **103**: 5733-40 (1981)

81A238 Laser-flash-induced dissociation and recombination of aqueous pentacyano(2-methylpyrazine)ferrate(II) ion. Malin, J.M.; Brunschwig, B.S.; Brown, G.M.; Kwan, K.-S., *Inorg. Chem.* **20**: 1438-41 (1981)

81A239 Photochemistry of copper(II) complexes with macrocyclic amine ligands. Muralidharan, S.; Ferraudi, G., *Inorg. Chem.* **20**: 2306-11 (1981)

81A247 Reduction and demetalation of silver porphyrins in aqueous solutions. Kumar, A.; Neta, P., *J. Phys. Chem.* **85**: 2830-2 (1981)

81A285 Difference in the stabilities of the diastereoisomers of the tervalent nickel complex with 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane in sulfate- and perchlorate-containing aqueous solutions. An electrochemical and pulse radiolysis study. Zeigerson, E.; Ginzburg, G.; Becker, J.Y.; Kirschenbaum, L.J.; Cohen, H.; Meyerstein, D., *Inorg. Chem.* **20**: 3988-92 (1981)

81A317 One-electron transfer reactions involving zinc and cobalt porphyrins in aqueous solutions. Neta, P., *J. Phys. Chem.* **85**: 3678-84 (1981)

81A337 Photochemical generation and chemical reactivity of hydridopentaaquochromium(III) ions. Ryan, D.A.; Espenson, J.H., *Inorg. Chem.* **20**: 4401-4 (1981)

81A340 Tl^{2+} and Ag^{2+} metal-ion-induced oxidation of methionine in aqueous solution. A pulse radiolysis study. Hiller, K.-O.; Asmus, K.-D., *Int. J. Radiat. Biol. Relat. Stud. Phys., Chem. Med.* **40**: 597-604 (1981)

81A344 Spectroscopic properties and redox chemistry of the phosphorescent excited state of $Pt_2(P_2O_5)_4H_8^{4-}$. Che, C.-M.; Butler, L.G.; Gray, H.B., *J. Am. Chem. Soc.* **103**: 7796-7 (1981)

81A353 Formation and characterization of transitory platinum-ammonia complex ions using pulse radiolysis. Khan, H.M.; Waltz, W.L.; Woods, R.J.; Lilie, J., *Can. J. Chem.* **59**: 3319-25 (1981)

81C041 On the one and two-electron oxidations of water-soluble zinc porphyrins in aqueous media. Neumann-Spallart, M.; Kalyanasundaram, K., *Z. Naturforsch., Teil B* **36B**: 596-600 (1981)

81F164 Photosensitised reduction of water to hydrogen using water-soluble zinc porphyrins. Harriman, A.; Porter, G.; Richoux, M.-C., *J. Chem. Soc., Faraday Trans. 2* **77**: 833-44 (1981)

81F406 Photochemical properties of copper(II)-amino acid complexes. Natarajan, P.; Ferraudi, G., *Inorg. Chem.* **20**: 3708-12 (1981)

81N002 Photoredox reactions in functional micellar assemblies. Use of amphiphilic redox relays to achieve light energy conversion and charge separation. Brugger, P.-A.; Infelta, P.P.; Braun, A.M.; Graetzel, M., *J. Am. Chem. Soc.* **103**: 320-6 (1981)

81N003 Mechanism of the formation of dihydrogen from the photoinduced reactions of poly(pyridine)ruthenium(II) and poly(pyridine)rhodium(III) complexes. Chan, S.-F.; Chou, M.; Creutz, C.; Matsubara, T.; Sutin, N., *J. Am. Chem. Soc.* **103**: 369-79 (1981)

81N054 Photosensitized electron-transfer reactions in colloidal SiO_2 systems: Charge separation at a solid-aqueous interface. Willner, I.; Otvos, J.W.; Calvin, M., *J. Am. Chem. Soc.* **103**: 3203-5 (1981)

81N178 Photo-oxidation of water to oxygen sensitised by tris(2,2'-bipyridyl)ruthenium(II). Harriman, A.; Porter, G.; Walters, P., *J. Chem. Soc., Faraday Trans. 2* **77**: 2373-83 (1981)

81S157 Visible light-induced oxygen generation and cyclic water cleavage sensitized by porphyrins. Borgarello, E.; Kalyanasundaram, K.; Okuno, Y.; Graetzel, M., *Helv. Chim. Acta* **64**: 1937-42 (1981)

82A030 Photochemical generation of the acid-labile (β-hydroxyethyl)pentaaquochromium(III) ion. Ryan, D.A.; Espenson, J.H., *Inorg. Chem.* **21**: 527-30 (1982)

82A060 Ligand-metal interrelationships. I. The tervalent nickel complex of 11,13-dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-diene. A pulse radiolytic study. Ulman, A.; Cohen, H.; Meyerstein, D., *Inorg. Chim. Acta* **64**: L127-L129 (1982)

82A074 Formation and characterization of platinum(III)-ammonia complex ions using pulse radiolysis. Khan, H.M.; Waltz, W.L.; Lilie, J.; Woods, R.J., *Inorg. Chem.* **21**: 1489-97 (1982)

82A087 Evidence for Br_2^- reaction with Ni(III) macrocyclic complexes: Br_2^- as a possible reducing agent. Morliere, P.; Patterson, L.K., *Inorg. Chim. Acta* **64**: L183-L185 (1982)

82A098 Kinetics of complexation and oxidation of ethanolamine and diols by silver(II). Kumar, A., *J. Phys. Chem.* **86**: 1674-8 (1982)

82A104 Properties of copper(II) hydride formed in the reaction of aquacopper(I) ions with hydrogen atoms. A pulse radiolytic study. Mulac, W.A.; Meyerstein, D., *Inorg. Chem.* **21**: 1782-4 (1982)

82A106 Chemical kinetics of nickel(III) macrocyclic complexes. Pulse radiolysis study of Ni^{II}(CR+4H), Ni^{II}(CR), and Ni^{II}(CR-2H) in aqueous solutions of Br^- and CNS^-. Morliere, P.; Patterson, L.K., *Inorg. Chem.* **21**: 1837-45 (1982)

82A107 One-electron reduction of 18-molybdodiphosphate and 18-tungstodiphosphate ions in aqueous solution. A pulse radiolysis study. Papaconstantinou, E.; Hoffman, M.Z., *Inorg. Chem.* **21**: 2087-9 (1982)

82A111 Influence of added salts on the cage escape yields in the photoredox quenching of $Ru(bpy)_3^{2+}$ excited states. Kalyanasundaram, K.; Neumann-Spallart, M., *Chem. Phys. Lett.* **88**: 7-12 (1982)

82A119 Chemical properties of water-soluble porphyrins. 2. The reaction of iron(III) tetrakis(4-N-methylpyridyl)porphyrin with the superoxide radical dioxygen couple. Solomon, D.; Peretz, P.; Faraggi, M., *J. Phys. Chem.* **86**: 1842-9 (1982)

82A130 Kinetics and mechanism of the forward and reverse reactions between N,N'-dimethyl-4,4'-bipyridinium and hexacyanoferrate(II). de Oliveira, L.A.A.; Haim, A., *J. Am. Chem. Soc.* **104**: 3363-6 (1982)

82A135 Reaction mechanisms for the radiation-induced oxidation and reduction of (dinitrogen)decaamminediruthenium(II). Cabelli, D.E.; Bielski, B.H.J., *J. Phys. Chem.* **86**: 2072-5 (1982)

82A145 Poly(pyridine)ruthenium(II)-photoinduced redox reactions of bipyridinium cations, poly(pyridine)rhodium complexes, and osmium ammines. Creutz, C.; Keller, A.D.; Sutin, N.; Zipp, A.P., *J. Am. Chem. Soc.* **104**: 3618-27 (1982)

82A146 Reduction of cobalt(III) complexes by intramolecular electron transfer from bound free radicals. A pulse radiolytic study. Cohen, H.; Nutkovich, M.; Meyerstein, D.; Wieghardt, K., *J. Chem. Soc., Dalton Trans.* : 943-50 (198

82A278 Homogeneous catalysis of the photoreduction of water by visible light. 3. Mediation by polypyridine complexes of ruthenium(II) and cobalt(II). Krishnan, C.V.; Creutz, C.; Mahajan, D.; Schwarz, H.A.; Sutin, N., *Isr. J. Chem.* **22**: 98-106 (1982)

82A279 Reactions of photoexcited triplet states of zinc porphyrin with transient radicals in aqueous solutions. Neta, P.; Levanon, H., *Isr. J. Chem.* **22**: 107-11 (1982)

82A290 Electron transfer in the quenching of triplet states of zinc phthalocyanine and methylene blue by the use of Fe(III), Co(III), and organic oxidants. Ohno, T.; Kato, S.; Lichtin, N.N., *Bull. Chem. Soc. Jpn.* **55**: 2753-9 (1982)

82A315 Homolytic decomposition of tertiary organochromium(III complexes and evidence for their decomposition via reactions with aliphatic free radicals. A pulse radiolysis study. Mulac, W.A.; Cohen H.; Meyerstein, D., *Inorg. Chem.* **21**: 4016-20 (1982)

82A320 On the nature and mechanism of decomposition of monovalent copper complexes with tetra-aza macrocyclic ligands in aqueous solutions. A pulse radiolytic study. Freiberg, M.; Meyerstein, D.; Yamamoto, Y., *J. Chem. Soc., Dalton Trans.* : 1137-41 (1982)

82A321 Photogalvanic effect from a metalloporphyrin. Harriman, A.; Williams, D., *J. Electroanal. Chem. Interfacial Electrochem.* **139**: 413-8 (1982)

82A343 Pulse-radiolytic investigation of the oxidation of iron(II) and iron(III) complexes with 2,2'-bipyridine. Dimitrijevic, N.M.; Micic, O.I., *J. Chem. Soc., Dalton Trans.* : 1953-7 (1982)

82A365 Tris(2,2'-bipyridine)ruthenium(II)-sensitized photooxidation of phenols. Environmental effects on electron transfer yields and kinetics. Miedlar, K.; Das, P.K., *J. Am. Chem. Soc.* **104**: 7462-9 (1982)

82B053 Measurement of the extinction coefficient of the methyl viologen cation radical and the efficiency of its formation by semiconductor photocatalysis. Watanabe, T.; Honda, K., *J. Phys. Chem.* **86**: 2617-9 (1982)

82C019 On the effect of electron relay redox potential on electron transfer reactions in a water photoreduction model system. Amouyal, E.; Zidler, B., *Isr. J. Chem.* **22**: 117-24 (1982)

82F048 Effect of nitro and triethylphosphonium substituents on the photophysical and photoredox properties of tris(2,2'-bipyridine)ruthenium(II) complexes. Basu, A.; Weiner, M.A.; Strekas, T.C.; Gafney, H.D., *Inorg. Chem.* **21**: 1085-92 (1982)

82F316 Improved hydrogen production with tetramethyl- and hexamethylviologen as electron-transfer agents in the system H_2O-$Ru(bpy)_3^{2+}$-edta-Pt. Launikonis, A.; Loder, J.W.; Mau, A.W.-H.; Sasse, W.H.F.; Wells, D., *Isr. J. Chem.* **22**: 158-62 (1982)

82N022 "Zwitterion" mediator/quenchers. Coulombic minimization of the back-reaction in photocatalysis. Brugger, P.-A.; Graetzel, M.; Guarr, T.; McLendon, G., *J. Phys. Chem.* **86**: 944-6 (1982)

82N118 A novel effect of a polyelectrolyte on a photochemically induced electron transfer process involving a zwitterion. Sassoon, R.E.; Rabani, J., *Isr. J. Chem.* **22**: 138-41 (1982)

82N168 Colloidal platinum catalysts for reversible photoredox processes. Harriman, A.; Porter, G.; Richoux, M.-C., *J. Chem. Soc., Faraday Trans. 2* **78**: 1955-70 (1982)

82S257 Solar reduction of water. III. Improved electron-transfer agents for the system water-tris(2,2'-bipyridine)ruthenium dication ethylenediaminetetraacetic acid-platinum. Launikonis, A.; Loder, J.W. Mau, A.W.-H.; Sasse, W.H.F.; Summers, L.A.; Wells, D., *Aust. J. Che* **35**: 1341-55 (1982)

83A013 Oxidation-reduction reactions of complexes with macrocyclic ligands. Kinetic and electrochemical studies of metal-ligand synergism. Switzer, J.A.; Endicott, J.F.; Khalifa, M.A.; Rotzinger, F.P.; Kumar, K., *J. Am. Chem. Soc.* **105**: 56-61 (1983)

83A046 Reactions of tris- and bis(2,2'-bipyridine)rhodium(II) complexes in aqueous solution. Schwarz, H.A.; Creutz, C., *Inorg. Chem.* **22**: 707-13 (1983)

83A047 Kinetics of the oxidation of chromium(II) by hydrogen peroxide: Flash-photolytic and stopped-flow studies based on radical-trapping reactions. Bakac, A.; Espenson, J.H., *Inorg. Chem.* **22**: 779-83 (1983)

83A088 Reduction and alkylation of cobalt(II) tetrakis(4-sulfonatophenyl)porphyrin in aqueous solutions. A kinetic spectrophotometric study. Baral, S.; Neta, P., *J. Phys. Chem.* **87**: 1502-9 (1983)

83A140 Selectivity of outer-sphere electron-transfer reactions. 3. Cohen, H.; Efrima, S.; Meyerstein, D.; Nutkovich, M.; Wieghardt, K., *Inorg. Chem.* **22**: 688-90 (1983)

83A148 Macrobicyclic (hexaamine)platinum(IV) complexes: Synthesis, characterization, and electrochemistry. Boucher, H.A.; Lawrance, G.A.; Lay, P.A.; Sargesón, A.M.; Bond, A.M.; Sangster, D.F.; Sullivan, J.C., *J. Am. Chem. Soc.* **105**: 4652-61 (1983)

83A178 Pulse radiolysis of alkaline aqueous solutions of divalent mercury compounds. Liu, E.; Makarov, I.E.; Pikaev, A.K., *High Energy Chem.* **17**: 41-6 (1983) Translated from: *Khim. Vys. Energ.* **17**: 50-5 (1983)

83A206 Pulse radiolysis of aqueous solutions of In(III). Sukhov, N.L.; Ershov, B.G., *High Energy Chem.* **17**: 91-4 (1983) Translated from: *Khim. Vys. Energ.* **17**: 113-6 (1983)

83A238 Reaction of $\cdot CH_2C(CH_3)_2OH$ radicals with cobalt(II) tetrasulfophthalocyanine in aqueous solutions. A pulse radiolytic study. Sorek, Y.; Cohen, H.; Mulac, W.A.; Schmidt, K.H.; Meyerstein, D. *Inorg. Chem.* **22**: 3040-6 (1983)

83A271 Oxidation-reduction reactions with macrocyclic ligands. Dependence of the rate advantage for the inner-sphere electron-transfer pathway on electronic structure for low-spin $Co^{III,II}$, $Ni^{III,II}$, and $Cu^{III,II}$ couples. Kumar, K.; Rotzinger, F.P.; Endicott, J.F., *J. Am. Chem. Soc.* **105**: 7064-74 (1983)

83A272 Free radical induced one-electron oxidation of the phenothiazines chlorpromazine and promethazine. Bahnemann, D.; Asmus, K.-D.; Willson, R.L., *J. Chem. Soc., Perkin Trans. 2* : 1661-8 (1983)

83A298 Synthesis and properties of macrobicyclic amine complexes of rhodium(III) and iridium(III). Harrowfield, J.M.; Herlt, A.J.; Lay, P.A.; Sargeson, A.M.; Bond, A.M.; Mulac, W.A.; Sullivan, J.C., *J. Am. Chem. Soc.* **105**: 5503-5 (1983)

83A299 Mechanisms of the dismutation of superoxide catalyzed by the copper(II) phenanthroline complex and of the oxidation of the copper(I) phenanthroline complex by oxygen in aqueous solution. Goldstein, S.; Czapski, G., *J. Am. Chem. Soc.* **105**: 7276-80 (1983)

83A322 Properties of (1,4,7,10,13-penta-azacyclohexadecane)nickel(III) in aqueous solutions: A pulse radiolytic study. Fabbrizzi, L.; Cohen, H.; Meyerstein, D., *J. Chem. Soc., Dalton Trans.* : 2125-6 (1983)

83A382 Spectral and kinetic properties of the products resulting from reactions of HO_2/O_2^- with manganese(II) complexes. Bielski, B.H.J.; Arudi, R.L.; Cabelli, D.E., *Oxygen Radicals Chem. Biol.*, W. Bors, M. Saran and D. Tait (eds.), de Gruyter, Berlin, Fed. Rep. Germany, Pub. 1984, p.1-15

83B029 Intermolecular vs. intramolecular reduction of cobalt(III) centers by coordinated pyridinyl radicals. Cohen, H.; Gould, E.S.; Meyerstein, D.; Nutkovich, M.; Radlowski, C.A., *Inorg. Chem.* **22**: 1374-7 (1983)

83C017 Reduction potentials for 2,2'-bipyridine and 1,10-phenanthroline couples in aqueous solutions. Krishnan, C.V.; Creutz, C.; Schwarz, H.A.; Sutin, N., *J. Am. Chem. Soc.* **105**: 5617-23 (1983)

83C026 Redox chemistry of metalloporphyrins in aqueous solution. Harriman, A.; Richoux, M.C.; Neta, P., *J. Phys. Chem.* **87**: 4957-65 (1983)

83N008 One-electron transfer equilibria and kinetics of N-methylphenothiazine in micellar systems. Minero, C.; Pramauro, E.; Pelizzetti, E.; Meisel, D., *J. Phys. Chem.* **87**: 399-407 (1983)

83N214 Light-induced electron-transfer reactions involving the tris(2,2'-bipyridine)ruthenium dication and related complexes. II. Effect of the 2-(thiazol-2'-yl)pyridine ligand. Fitzpatrick, L.J.; Goodwin, H.A.; Launikonis, A.; Mau, A.W.-H.; Sasse, W.H.F., *Aust. J. Chem.* **36**: 2169-73 (1983)

84A008 Pulse radiolysis of aqueous indium(III) perchlorate solutions. Schwok, A.S.; Rabani, J., *Radiat. Phys. Chem.* **23**: 211-6 (1984)

84A036 Effect of pH and acetate on the rate of hydrolysis of the chromium-carbon bond in (α-hydroxyalkyl)chromium(III) complexes. Cohen, H; Meyerstein, D., *Inorg. Chem.* **23**: 84-87 (1984)

84A077 Electron-transfer quenching of ruthenium(II) photosensitizers by mercury(II) chlorides. 1. Reactions in aqueous solution. Hauenstein, B.L.,Jr.; Mandal, K.; Demas, J.N.; DeGraff, B.A., *Inorg. Chem.* **23**: 1101-7 (1984)

84A112 Free radical route to formation of the metal hydride complex hydridoaquobis(2,2'-bipyridine)cobalt(III). Creutz, C.; Schwarz, H.A.; Sutin, N., *J. Am. Chem. Soc.* **106**: 3036-7 (1984)

84A120 Redox reactions of manganese porphyrins in aqueous solutions. Steady-state and pulse radiolysis spectrophotometric studies. Morehouse, K.M.; Neta, P., *J. Phys. Chem.* **88**: 1575-9 (1984)

84A121 One- and two-electron reduction of aluminum and tin pyridylporphyrins. A kinetic spectrophotometric study. Baral, S.; Hambright, P.; Neta, P., *J. Phys. Chem.* **88**: 1595-600 (1984)

84A148 Electron-transfer quenching of ruthenium(II) photosensitizers by mercury(II) in aqueous nitrate media. Hauenstein, B.L.,Jr.; Dressick, W.J.,Jr.; Demas, J.N.; DeGraff, B.A., *J. Phys. Chem.* **88**: 2418-22 (1984)

84A177 Photoionization of $Ru(bipy)_2(CN)_2$ in aqueous and aqueous sodium dodecyl sulfate solutions. Atherton, S.J., *J. Phys. Chem.* **88**: 2840-4 (1984)

84A189 Pulse radiolysis study of the kinetics and mechanisms of the reactions between manganese(II) complexes and HO_2/O_2^- radicals. 1. Sulfate, formate, and pyrophosphate complexes. Cabelli, D.E.; Bielski, B.H.J., *J. Phys. Chem.* **88**: 3111-5 (1984)

84A190 Kinetics of demetallation of manganese(II) porphyrins in aqueous solutions. Morehouse, K.M.; Neta, P., *J. Phys. Chem.* **88**: 3118-20 (1984)

84A238 Ground- and excited-state electron-transfer reactions: Photoinduced redox reactions of poly(pyridine)ruthenium(II) complexes and cobalt(III) cage compounds. Mok, C.-Y.; Zanella, A.W.; Creutz, C.; Sutin, N., *Inorg. Chem.* **23**: 2891-7 (1984)

84A241 Generation of binuclear $(d^8\text{-}d^8)p\sigma$ platinum and rhodium complexes by pulse radiolysis. Che, C.-M.; Atherton, S.J.; Butler, L.G.; Gray, H.B., *J. Am. Chem. Soc.* **106**: 5143-5 (1984)

84A249 Reactivity of superoxide anion towards Co^{II} and Co^{III}edta complexes. Lecheheb, A.; Takakubo, M.; Faure, J.; Belloni, J., *Radiat. Phys. Chem.* **23**: 703-9 (1984)

84A255 Electron-transfer quenching of the luminescence of ruthenium and osmium polypyridine complexes by cobalt(III) complexes. Sandrini, D.; Gandolfi, M.T.; Maestri, M.; Bolletta, F.; Balzani, V., *Inorg. Chem.* **23**: 3017-23 (1984)

84A264 Electron-transfer reactions of a photosensitized water-soluble zinc porphyrin. Le Roux, D.; Mialocq, J.-C.; Anitoff, O.; Folcher, G., *J. Chem. Soc., Faraday Trans. 2* **80**: 909-20 (1984)

84A277 Ligand-metal interrelationships. 2. Effect of the change from square-planar to octahedral coordination on the pK_a of the ligand in unsaturated tetraaza macrocyclic nickel complexes: A pulse-radiolytic study. Cohen, H.; Nutkovich, M.; Meyerstein, D.; Shusterman, A., *Inorg. Chem.* **23**: 2361-3 (1984)

84A284 Some aspects of the radiolysis of cobalt(II) iminodiacetate in aqueous solution. Srisankar, E.V.; Saha, N.C.; Mandal, P.C.; Bhattacharyya, S.N., *J. Chem. Soc., Dalton Trans.* : 1629-34 (1984)

84A293 Ligand decomposition in the photolysis of copper(II)-amino-acid complexes in aqueous solution. Das, S.; Johnson, G.R.A.; Nazhat, N.B.; Saadalla-Nazhat, R., *J. Chem. Soc., Faraday Trans. 1* **80**: 2759-66 (1984)

84A302 Flash photolysis of a photoactive ruthenium complex mixture. Nagle, J.K.; Meyer, T.J., *Inorg. Chem.* **23**: 3663-5 (1984)

84A367 Flash photolysis of phenylacetatopentaminecobalt(III) in aqueous solution. Generation of benzyl radicals and their reversible trapping by cupric ions in homogeneous and micellar solutions. Scaiano, J.C.; Leigh, W.J.; Ferraudi, G., *Can. J. Chem.* **62**: 2355-8 (1984)

84A384 Pulse radiolysis study of the kinetics and mechanisms of the reactions between manganese(II) complexes and HO_2/O_2^- radicals. 2. The phosphate complex and an overview. Cabelli, D.E.; Bielski, B.H.J., *J. Phys. Chem.* **88**: 6291-4 (1984)

84A403 Flash photolysis of $Fe(TIM)CO(X)^{2+}$ complexes. Butler, A.; Linck, R.G., *Inorg. Chem.* **23**: 4545-9 (1984)

84A439 Preparation of copper atoms in aqueous solution. Ershov, B.G.; Sukhov, N.L.; Akinshin, M.A., *Bull. Acad. Sci. USSR, Div. Chem. Sci.* **33**: 1329 (1984) Translated from: *Izv. Akad. Nauk SSSR, Ser. Khim.* : 1440 (1984)

84A446 Pulse radiolysis of aqueous hydrochloric acid solutions of lead ions. Gogolev, A.V.; Makarov, I.E.; Pikaev, A.K., *High Energy Chem.* **18**: 336-9 (1984) Translated from: *Khim. Vys. Energ.* **18**: 429-32 (1984)

84C015 Equilibrium between hydroxyl radicals and thallium(II) and the oxidation potential of OH(aq). Schwarz, H.A.; Dodson, R.W., *J. Phys. Chem.* **88**: 3643-7 (1984)

84E387 Yields of electron transfer reactions in the quenching of the phosphorescent states (^2E) of tris(2,2'-bipyridine)chromium(III) and tris(4,7-diphenyl-1,10-phenanthroline)chromium(III) compounds. Ohno, T.; Kato, S., *Bull. Chem. Soc. Jpn.* **57**: 1528-33 (1984)

84M388 Equilibrium and kinetic studies of substitution reactions of $Fe(TIM)XY^{2+}$ in aqueous solution. Butler, A.; Linck, R.G., *Inorg. Chem.* **23**: 2227-31 (1984)

84N212 Micellar effects on the forward and the back photoelectron transfer from a water-soluble porphyrin to dialkyl viologens. Chevalier, S.; Lerebours, B.; Pileni, M.P., *J. Photochem.* **27**: 301-10 (1984)

85A006 Reactions of iron(II) protoporphyrin with strongly reducing free radicals in aqueous solutions. A pulse-radiolytic study. Sorek, Y.; Cohen, H.; Meyerstein, D., *J. Chem. Soc., Faraday Trans. 1* **81**: 233-9 (1985)

85A032 Stabilization of the monovalent nickel complex with 1,4,8,11-tetraazacyclotetradecane in aqueous solutions by N- and C-methylation. An electrochemical and pulse radiolysis study. Jubran, N.; Ginzburg, G.; Cohen, H.; Koresh, Y.; Meyerstein, D., *Inorg. Chem.* **24**: 251-8 (1985)

85A034 Cobalt(I) polypyridine complexes. Redox and substitutional kinetics and thermodynamics in the aqueous 2,2'-bipyridine and 4,4'-dimethyl-2,2'-bipyridine series studied by the pulse-radiolysis technique. Schwarz, H.A.; Creutz, C.; Sutin, N., *Inorg. Chem.* **24**: 433-9 (1985)

85A038 Zinc porphyrin π-radical cations in aqueous solution. Formation, spectra and decay kinetics. Neta, P.; Harriman, A., *J. Chem. Soc., Faraday Trans. 2* **81**: 123-38 (1985)

85A059 Kinetics of oxidation of cuprous complexes of substituted phenanthroline and 2,2'-bipyridyl by molecular oxygen and by hydrogen peroxide in aqueous solution. Goldstein, S.; Czapski, G., *Inorg. Chem.* **24**: 1087-92 (1985)

85A064 Effects of the polyelectrolyte poly(vinyl sulfate) on the photosensitized electron-transfer reactions of tris(2,2'-bipyridine)ruthenium(II) with a dipolar zwitterionic viologen. Sassoon, R.E.; Aizenshtat, Z.; Rabani, J., *J. Phys. Chem.* **89**: 1182-90 (1985)

85A084 A novel formyl complex $[(H_2O)_5CrCHO]^{2+}$. A pulse radiolysis study. Cohen, H.; Meyerstein, D.; Shusterman, A.J.; Weiss, M., *J. Chem. Soc., Chem. Commun.* : 424-5 (1985)

85A090 The radiation chemistry of some platinum-containing radiosensitizers and related compounds. Butler, J.; Hoey, B.M.; Swallow, A.J., *Radiat. Res.* **102**: 1-13 (1985)

85A145 Ring size effect on the chemical properties of monovalent nickel complexes with tetraazamacrocyclic ligands in aqueous solutions. Jubran, N.; Cohen, H.; Meyerstein, D., *Isr. J. Chem.* **25**: 118-21 (1985)

85A160 Reduction of the [(NH)-2,2'-bipyrid-3-ylium-C^3,N']bis(2,2'-bipyridine-N,N')iridium(III) trication in aqueous solutions: A pulse radiolytic study. Cohen, H.; Slama-Schwok, A.; Rabani, J.; Watts, R.J.; Meyerstein, D., *J. Phys. Chem.* **89**: 2465-7 (1985)

85A161 Energy- and electron-transfer processes of the lowest triplet excited state of tetrakis(diphosphito)diplatinate(II). Peterson, J.R.; Kalyanasundaram, K., *J. Phys. Chem.* **89**: 2486-92 (1985)

85A234 Pulsed radiolysis of perrhenate in neutral aqueous solution: Comparison with pertechnetate. Lawrance, G.A.; Sangster, D.F., *Polyhedron* **4**: 1095-6 (1985)

85A311 Oxidation of Fe^{III} porphyrins by peroxyl radicals derived from 2-propanol and methanol. Evidence for acid-dependent and acid-independent pathways. Brault, D.; Neta, P., *Chem. Phys. Lett.* **121**: 28-32 (1985)

85A331 Cleavage of an ether bond via β-elimination of ethanol from $[(H_2O)_5CrCH_2CH_2OC_2H_5]^{2+}$ in aqueous solutions. A pulse radiolysis study. Cohen, H.; Meyerstein, D., *Angew. Chem., Int. Ed. Engl.* **24**: 779-81 (1985)

85A363 Pulse-radiolysis study of mixed-valence $Mo^{IV,V}$ complexes of EDTA, L-cysteine, and oxalate. Rush, J.D.; Bielski, B.H.J., *Inorg. Chem.* **24**: 3895-8 (1985)

85A430 Photosensitized charge transfer and recombination of the ionic products in micellar solutions. Le Roux, D.; Takakubo, M.; Mialocq, J.C., *J. Chim. Phys. Phys.-Chim. Biol.* **82**: 739-46 (1985)

85B030 Charge separation in photoinitiated electron-transfer systems with polyviologen polyelectrolytes as quenchers. Sassoon, R.E.; Gershuni, S.; Rabani, J., *J. Phys. Chem.* **89**: 1937-45 (1985)

85F007 Photochemical generation of long-living redox pairs by the use of polypyridineruthenium(II) complex, zwitterionic electron mediator, and viologen polymer as an electron pool. Ohsako, T.; Sakamoto, T.; Matsuo, T., *J. Phys. Chem.* **89**: 222-5 (1985)

85F089 Light-induced ligand-substitution reactions. Reaction between the chloropentaamminecobalt(III) ion and ethylenediaminetetraacetate by irradiation with visible light of aqueous solutions containing the tris(2,2'-bipyridine)ruthenium(II) ion. Kimura, M.; Yamashita, M.; Nishida, S., *Inorg. Chem.* **24**: 1527-31 (1985)

85F141 Charge separation and photoreduction of zinc tetrakis(sulfonatophenyl)porphyrin by nitrobenzene and methylviologen in aqueous solutions. Nahor, G.S.; Rabani, J., *J. Phys. Chem.* **89**: 2468-72 (1985)

85F222 Energy transfer vs. electron transfer in the excited-state quenching of tris(2,2'-bipyridine-N,N')ruthenium(II) complexes by cobalt(III) cage complexes: Applications to the photoreduction of water. Creaser, I.I.; Gahan, L.R.; Geue, R.J.; Launikonis, A.; Lay, P.A.; Lydon, J.D.; McCarthy, M.G.; Mau, A.W.-H.; Sargeson, A.M.; Sasse, W.H.F., *Inorg. Chem.* **24**: 2671-80 (1985)

85F435 Efficiency of polymer sensitizer in photosensitized reaction of tris(bipyridine)ruthenium(II) complex-containing polymer. Sumi, K.; Furue, M.; Nozakura, S.-I., *J. Polym. Sci., Polym. Chem. Ed.* **23**: 3059-67 (1985)

85F449 Quantitative generation of singlet dioxygen via the reaction of tris(bipyridine)ruthenium(III) with superoxide ion in aqueous solution. Miller, S.S.; Zahir, K.; Haim, A., *Inorg. Chem.* **24**: 3978-80 (1985)

85G125 Radiation chemistry of Na_3IrCl_6 solutions: Catalysed H_2 formation by radicals and postirradiation reduction of $IrCl_6^{3-}$ by propanol-2. Mills, G.; Henglein, A., *Radiat. Phys. Chem.* **26**: 391-9 (1985)

85G297 Mechanism and reaction products of the oxidation of Cu(I)-phenanthroline by H_2O_2. Goldstein, S.; Czapski, G., *J. Free Radicals Biol. Med.* **1**: 373-80 (1985)

85S022 Homogeneous catalysis of the photoreduction of water. 6. Mediation by polypyridine complexes of ruthenium(II) and cobalt(II) in alkaline media. Krishnan, C.V.; Brunschwig, B.S.; Creutz, C.; Sutin, N., *J. Am. Chem. Soc.* **107**: 2005-15 (1985)

85S167 Photo-oxidation of water using Prussian Blue as catalyst. Christensen, P.A.; Harriman, A.; Neta, P.; Richoux, M.-C., *J. Chem. Soc., Faraday Trans. 1* **81**: 2461-6 (1985)

85Z381 Fast kinetic studies of dioxygen-derived species and their metal complexes. Bielski, B.H.J., *Philos. Trans. R. Soc. London, B* **311**: 473-82 (1985)

86A017 A pulse radiolysis study of tetraammineplatinum(II) complex ion in aqueous chloride media. Khan, H.M.; Waltz, W.L.; Woods, R.J., *Radiat. Phys. Chem.* **27**: 41-5 (1986)

86A018 Pulse radiolysis studies of alkaline Fe(III) and Fe(VI) solutions Observation of transient iron complexes with intermediate oxidation states. Rush, J.D.; Bielski, B.H.J., *J. Am. Chem. Soc.* **108**: 523-5 (1986)

86A034 Radiation-induced reactions of polymer radicals with ruthenium tris(bipyridyl)-OH adducts in aqueous solutions. Neta, P.; Silverman, J.; Markovic, V.; Rabani, J., *J. Phys. Chem.* **90**: 703-7 (1986)

86A057 Photochemical oxidation of $[Ir((C^3,N'\text{-Hbpy})(bpy)_2)]^{3+}$ by redox quenching. Slama-Schwok, A.; Rabani, J., *J. Phys. Chem.* **90**: 1176-9 (1986)

86A063 Selective type I photooxidations in mixtures of porphyrins and electrophilic nitroimidazoles. Bazin, M.; Santus, R., *Photochem. Photobiol.* **43**: 235-42 (1986)

86A115 Kinetics of formation and decomposition of the methylcopper(II) complex in aqueous solutions. A pulse-radiolysis study. Cohen, H.; Meyerstein, D., *Inorg. Chem.* **25**: 1505-6 (1986)

86A120 Photodynamics of the tris(2,2'-bipyrazine)ruthenium(2+)/methylviologen/EDTA system in aqueous solution. Prasad, D.R.; Hoffman, M.Z., *J. Am. Chem. Soc.* **108**: 2568-73 (1986)

86A152 Pulse-radiolysis study of the reduction of VO^{2+} by the hydrated electron. Fourest, B.; Schmidt, K.H.; Sullivan, J.C., *Inorg. Chem.* **25**: 2096-7 (1986)

86A154 Chemical properties of water-soluble porphyrins. 4. The reaction of a 'picket-fence-like' iron(III) complex with the superoxide oxygen couple. Faraggi, M.; Peretz, P.; Weinraub, D., *Int. J. Radiat. Biol. Relat. Stud. Phys., Chem. Med.* **49**: 951-68 (1986)

86A161 Kinetics and mechanism of electron transfer to transition-metal complexes by photochemically roduced tris(bipyridyl)ruthenium(1+)ion. Connolly, P.; Espenson, J.H.; Bakac, A., *Inorg. Chem.* **25**: 2169-75 (1986)

86A208 Aqueous chemistry of tin(III). A flash photolysis study. Shinohara, N.; Mori, K.; Inoue, M., *Chem. Lett.* : 661-4 (1986)

86A210 Reductive addition of OH radicals to macrocyclic complexes. Geiger, D.K.; Ferraudi, G., *Inorg. Chim. Acta* **117**: 139-44 (1986)

86A241 One- and two-electron oxidation of lead(II) tetrakis(N-methylpyridyl)porphyrins in aqueous solution. Richoux, M.-C.; Neta, P.; Harriman, A., *J. Chem. Soc., Faraday Trans. 2* **82**: 201-7 (1986)

86A242 Resonance stabilisation of zinc porphyrin π-radical cations. Neta, P.; Richoux, M.-C.; Harriman, A.; Milgrom, L.R., *J. Chem. Soc., Faraday Trans. 2* **82**: 209-17 (1986)

86A243 Formation and decay of zinc tetrakis(N-methyl-3-pyridyl)porphine π-radical cation in water. Richoux, M.-C.; Neta, P.; Christensen, P.A.; Harriman, A., *J. Chem. Soc., Faraday Trans. 2* **82**: 235-49 (1986)

86A265 Electron transfer between cytochrome c and metalloporphyrins at high exothermicities. Cho, K.C.; Ng, K.M.; Choy, C.L.; Che, C.M., *Chem. Phys. Lett.* **129**: 521-5 (1986)

86A313 Chemical properties of water-soluble porphyrins. 5. Reactions of some manganese(III) porphyrins with the superoxide and other reducing radicals. Weinraub, D.; Levy, P.; Faraggi, M., *Int. J. Radiat. Biol. Relat. Stud. Phys., Chem. Med.* **50**: 649-58 (1986)

86A470 Ring size effects on the chemical properties of tervalent nickel complexes with tetra-aza macrocyclic ligands in aqueous solutions. An electrochemical and pulse radiolytic study. Jubran, N.; Meyerstein, D.; Koresh, J.; Cohen, H., *J. Chem. Soc., Dalton Trans.* : 2509-13 (1986)

86A492 Studies of the reactivity of Trolox with manganese(3+)/iron(3+) complexes by pulse radiolysis. Cabelli, D.E.; Bielski, B.H.J., *J. Free Radicals Biol. Med.* **2**: 71-5 (1986)

86A511 Kinetics of the β-hydroxy elimination reactions from the protoporphyrin iron(III)-$CHRCH_2OH$ complexes in aqueous solutions A pulse-radiolytic study. Sorek, Y.; Cohen, H.; Meyerstein, D., *J Chem. Soc., Faraday Trans 1* **82**: 3431-8 (1986)

86A536 Electron-transfer reactions between pentaaquo(organo)chromium(2+) and tris(bipyridyl)ruthenium(3+) ions. Melton, J.D.; Espenson, J.H.; Bakac, A., *Inorg. Chem.* **25**: 4104-8 (1986)

86A578 Detection and kinetics of formation and disproportionation of the mixed-valence $Pt_2(II,III)$ complex $Pt_2(\mu\text{-}P_2O_5H_2)_4^{3-}$. Roundhill, D.M.; Atherton, S.J., *J. Am. Chem. Soc.* **108**: 6829-31 (1986)

86B151 Effect of nitrilotriacetate on the mechanism of reduction of copper(II) ions by α-hydroxyalkyl free radicals via complexes with copper-carbon bonds as intermediates. A pulse-radiolytic study. Masarwa, M.; Cohen, H.; Meyerstein, D., *Inorg. Chem.* **25**: 4897-900 (1986)

86B153 Redox properties of zinc(II) tetra-N-methyl-2,3-pyridinoporphyrazine in aqueous solution. Richoux, M.-C.; Abou-Gamra, Z.M., *Inorg. Chim. Acta* **118**: 115-8 (1986)

86E195 Photoinduced electron-transfer reactions of poly(pyridine)ruthenium(II) complexes with europium(III/II) cryptates. Sabbatini, N.; Dellonte, S.; Bonazzi, A.; Ciano, M.; Balzani, V., *Inorg. Chem.* **25**: 1738-42 (1986)

86G256 Pulse radiolysis of aqueous solutions of monovalent copper. Sukhov, N.L.; Akinshin, M.A.; Ershov, B.G., *High Energy Chem.* **20**: 303-6 (1986) Translated from: *Khim. Vys. Energ.* **20**: 392-6 (1986)

86N075 Novel effect of man-made molecular assemblies on photoinduced charge separation. 5. Extremely efficient harvesting of electrons photoliberated from water-soluble zinc porphyrin in the presence of an amphipathic viologen bilayer membrane and a zwitterionic electron mediator. Nagamura, T.; Takeyama, N.; Tanaka, K.; Matsuo, T., *J. Phys. Chem.* **90**: 2247-51 (1986)

86N260 Electron transfer through a lipid-bilayer-membrane-aqueous-solution interface and kinetics of the oxidation of viologen radicals in homogeneous and vesicular systems. Shafirovich, V.Ya.; Levin, P.P.; Khannanov, N.K.; Kuz'min, V.A., *Bull. Acad. Sci. USSR, Div. Chem. Sci.* **35**: 728-33 (1986) Translated from: *Izv. Akad. Nauk SSSR, Ser. Khim.*: 801-6 (1986)

86S115 Catalyzed decay of oxidizing radicals in water. Harriman, A.; Neta, P.; Richoux, M.C., *NATO ASI Ser., Ser. C* **174**: 123-45 (1986)

87A041 Pulse radiolytic investigations of aqueous solutions of methoxybenzene cation radicals: The effect of colloidal RuO_2. Brandys, M.; Sassoon, R.E.; Rabani, J., *J. Phys. Chem.* **91**: 953-62 (1987)

87A083 One-electron-transfer reactions of the couple SO_2/SO_2^- in aqueous solutions. Pulse radiolytic and cyclic voltammetric studies. Neta, P.; Huie, R.E.; Harriman, A., *J. Phys. Chem.* **91**: 1606-11 (1987)

87A088 Experimental and theoretical study of the nascent photoredox behavior of the aqueous hexachloroplatinate(IV) ion. Goursot, A.; Kirk, A.D.; Waltz, W.L.; Porter, G.B.; Sharma, D.K., *Inorg. Chem.* **26**: 14-8 (1987)

87A160 Interaction between copper(II)-arginine complexes and HO_2/O_2^- radicals, a pulse radiolysis study. Cabelli, D.E.; Bielski, B.H.J.; Holcman, J., *J. Am. Chem. Soc.* **109**: 3665-9 (1987)

87A165 Pulse radiolysis studies of aqueous $[Ir(C^3,N'Hbpy)(bpy)_2]^{3+}$ and its basic form. Mechanism of H_2 formation. Slama-Schwok, A.; Gershuni, S.; Rabani, J., *J. Phys. Chem.* **91**: 2986-9 (1987)

87A184 Mechanism of reduction of bleomycin-Cu(II) by CO_2^- and oxidation of bleomycin-Cu(I) by H_2O_2 in the absence and presence of DNA. Goldstein, S.; Czapski, G., *Int. J. Radiat. Biol. Relat. Stud. Phys., Chem. Med.* **51**: 693-706 (1987)

87A200 Electron transfer between azurin and metalloporphyrins. Cho, K.C.; Che, C.M.; Ng, K.M.; Choy, C.L., *J. Phys. Chem.* **91**: 3690-3 (1987)

87A232 Reactions of iron porphyrins with $\cdot CF_3$, $CF_3O_2\cdot$, and $CBr_3O_2\cdot$ radicals. Brault, D.; Neta, P., *J. Phys. Chem.* **91**: 4156-60 (1987)

87A261 Sterically-hindered zinc porphyrins for solar-energy conversion. Davila, J.; Harriman, A.; Richoux, M.-C.; Milgrom, L.R., *J. Chem. Soc., Chem. Commun.*: 525-7 (1987)

87A267 The ruthenium tris-(1,4,5,8-tetraazaphenanthrene)-hydroquinone system: A correlation between kinetic studies by flash photolysis and by pulsed laser induced photopotentials at an SnO_2 electrode. Masschelein, A.; Kirsch-De Mesmaeker, A., *New J. Chem.* **11**: 329-35 (1987)

87A309 Reactions of chromium(III) complexes of 1,10-phenanthroline, 2,2'-bipyridyl, and oxalate with the pulse radiolytically generated aquated electron, zinc(I), and cadmium(I). Lawrance, G.A.; Sangster, D.F., *J. Chem. Soc., Dalton Trans.*: 1425-9 (1987)

87A452 Pulse radiolysis study of one-electron oxidation of thionine in aqueous solutions. Kishore, K.; Guha, S.N.; Moorthy, P.N., *Proc. Indian Acad. Sci., Chem. Sci.* **99**: 351-9 (1987)

87A460 Photochemical formation of a strong reducing reagent in the $Rh(dipy)_3^{3+}$-$Ru(dipy)_3^{2+}$-EDTA system. Maier, V.E.; Shafirovich, V.Ya., *Kinet. Catal.* **28**: 728-31 (1987) Translated from: *Kinet. Katal.* **28**: 835-8 (1987)

87A472 The acid-base properties of chloride complexes of platinum(III). Balashev, K.P.; Blinov, I.I.; Shagisultanova, G.A., *Russ. J. Inorg. Chem.* **32**: 1439-42 (1987) Translated from: *Zh. Neorg. Khim.* **32**: 2470-4 (1987)

87A488 Characterization, redox properties and pulse radiolysis study of dichloro-(tetraazacyclotetradecane)manganese(III) complexes, and X-ray crystal structure of the meso-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane complex. Hambley, T.W.; Lawrance, G.A.; Sangster, D.F.; Ward, C.B., *Aust. J. Chem.* **40**: 883-93 (1987)

87B063 A pulse radiolysis study of the reaction of hydroxyl radicals with trans-dihydroxo(1,4,8,11-tetraazacyclotetradecane)chromium(III). Monsted, O.; Nord, G.; Pagsberg, P., *Acta Chem. Scand., Ser. A* **41**: 104-9 (1987)

87E949 Spectroscopic, electrochemical, and kinetic characterization of new ruthenium(II) tris-chelates containing five-membered heterocyclic moieties. Orellana, G.; Quiroga, M.L.; Braun, A.M., *Helv. Chim. Acta* **70**: 2073-86 (1987)

87F040 A water-soluble Wilkinson's complex as homogeneous catalyst for the photochemical reduction of water. Oishi, S., *J. Mol. Catal.* **39**: 225-32 (1987)

87G275 Kinetics and mechanism of the reaction of the bis(1,10-phenanthroline)copper(I) ion with hydrogen peroxide in aqueous solution. Johnson, G.R.A.; Nazhat, N.B., *J. Am. Chem. Soc.* **109**: 1990-4 (1987)

87N149 Organometallic rhodium(III) complexes as catalysts for the photoreduction of protons to hydrogen on colloidal TiO_2. Koelle, U.; Graetzel, M., *Angew. Chem. Int. Ed. Engl.* **26**: 567-70 (1987)

88A025 Salt effects on nearly diffusion controlled electron-transfer reactions. Bimolecular rate constants and cage escape yields in oxidative quenching of tris(2,2'-bipyridine)ruthenium(II). Chiorboli, C.; Indelli, M.T.; Rampi Scandola, M.A.; Scandola, F., *J. Phys. Chem.* **92**: 156-63 (1988)

88A030 Enhancement of the rate of addition of free radicals to dicarboxylacetylene by π acid complexation to ruthenium(II)-pentaamine. A pulse radiolysis study. Simhon, E.; Cohen, H.; Meyerstein, D., *Inorg. Chim. Acta* **142**: 5-6 (1988)

88A065 Electron-transfer reactions of uranium(V): Kinetics of the uranium(V)-uranium(VI) self-exchange reaction. Howes, K.R.; Bakac, A.; Espenson, J.H., *Inorg. Chem.* **27**: 791-4 (1988)

88A066 Kinetics and mechanism of the reduction of protons to hydrogen by cobaltocene. Koelle, U.; Infelta, P.P.; Graetzel, M., *Inorg. Chem.* **27**: 879-83 (1988)

88A091 Interaction of tris(2,2'-bipyrazine)ruthenium(2+) ion with radiolytically-generated radicals in aqueous solution. Reactivity of $Ru(bpz)_3^+$ toward electron relays. Mulazzani, Q.G.; Venturi, M.; Hoffman, M.Z., *Radiat. Phys. Chem.* **32**: 71-8 (1988)

88A104 Reductive quenching of ^2E $Cr(bpy)_3^{3+}$ by Fe^{2+} and $Cr(bpy)_3^{2+}$. Bakac, A.; Zahir, K.; Espenson, J.H., *Inorg. Chem.* **27**: 315-8 (1988)

88A105 Singlet molecular oxygen: Not a major product of the reaction between tris(2,2'-bipyridine)ruthenium(3+) and superoxide radical anions. Mulazzani, Q.G.; Ciano, M.; D'Angelantonio, M.; Venturi, M.; Rodgers, M.A.J., *J. Am. Chem. Soc.* **110**: 2451-7 (1988)

88A124 Reduction des cryptates par l'electron hydrate: Observation de la valence I du cadmium. Lardinois, P.; Rebena, I.; Hickel, B., *New J. Chem.* **12**: 21-5 (1988)

88A184 Formation and decomposition of iron-carbon σ-bonds in the reaction of iron(II)-poly(amino carboxylate) complexes with CO_2^- free radicals. A pulse radiolysis study. Goldstein, S.; Czapski, G.; Cohen, H.; Meyerstein, D., *J. Am. Chem. Soc.* **110**: 3903-7 (1988)

88A233 Reactions of polypyridylchromium(II) ions with oxygen: Determination of the self-exchange rate constant of O_2/O_2^-. Zahir, K.; Espenson, J.H.; Bakac, A., *J. Am. Chem. Soc.* **110**: 5059-63 (1988)

88A277 Formation and decay of zinc tetrakis(N-methyl-4-pyridinio)porphyrin π-radical cation in aqueous solutions containing azide ions and a polyelectrolyte. Nahor, G.S., *J. Phys. Chem.* **92**: 4359-66 (1988)

88A285 Superoxide dismutase as an amplifier of the chemical reactivity of porphyrin radical-cations. Bazin, M.; Patterson, L.K.; Ronfard-Haret, J.C.; Santus, R., *Photochem. Photobiol.* **48**: 177-80 (1988)

88A334 Thermal and photochemical reactions of d^9 metal complexes: The silver(II) macrocycles. Ronco, S.; Van Vlierberge, B.; Ferraudi, G., *Inorg. Chem.* **27**: 3453-8 (1988)

88A343 Properties of complexes with cobalt-carbon bonds formed by reactions of aliphatic free radicals with nitrilotriacetate-cobalt(II) in aqueous solution. A pulse radiolysis study. Meyerstein, D.; Schwarz, H.A., *J. Chem. Soc., Faraday Trans. 1* **84**: 2933-49 (1988)

88A391 Nickel(I) and nickel(III) complexes of substituted tetraaza macrocycles formed by pulse radiolysis and electrochemistry of nickel(II) precursors. Bernhardt, P.V.; Lawrance, G.A.; Sangster, D.F., *Inorg. Chem.* **27**: 4055-9 (1988)

88A392 Formation and decomposition of transient complexes with a copper-carbon σ-bond in the reaction of copper(I) phenanthroline with aliphatic free radicals. A pulse radiolysis study. Goldstein, S.; Czapski, G.; Cohen, H.; Meyerstein, D., *Inorg. Chem.* **27**: 4130-5 (1988)

88A405 Solvent effects on reactions of coordination complexes. Part IV. Acid catalysed aquation of oxygen bonded (αβS)-(sulphito)(tetraethylenepentamine)cobalt(III) in aqueous binary mixtures of protic and dipolar aprotic cosolvents. A flash photolysis study on sulphur bonded (αβS)(sulphito)(tetraethylenepentamine)-cobalt(III) ion. Dash, A.C.; Dash, N.; Aditya, S.; Roy, A., *Indian J. Chem., Sect. A* **27A**: 398-403 (1988)

88A410 Kinetics of β-hydroxyl elimination from $[(H_2O)_mCu^{II}CH_2C(CH_3)_2OH]^+$ in aqueous solution. A pulse-radiolysis study. Cohen, H.; Meyerstein, D., *J. Chem. Soc., Faraday Trans. 1* **84**: 4157-60 (1988)

88A426 Equilibrium constants for the homolysis of the metal-carbon σ bond in $[(nta)(H_2O)M^{III}CH_3]^-$ (M = Mn, Fe, Co, nta = nitrilotriacetate) in aqueous solutions. Cohen, H.; Meyerstein, D., *Inorg. Chem.* **27**: 3429-31 (1988)

88A444 The methyl(cyclam)nickel(III) dication in aqueous solutions: Determination of the equilibrium constant of homolysis, kinetics of O_2 insertion, and methyl transfer to Cr^{2+}_{aq}. Sauer, A.; Cohen, H.; Meyerstein, D., *Inorg. Chem.* **27**: 4578-81 (1988)

88A493 Pulse radiolysis of perchloric acid solutions of Bi(III). Sukhov, N.L.; Akinshin, M.A.; Ershov, B.G., *High Energy Chem.* **22**: 343-5 (1988) Translated from: *Khim. Vys. Energ.* **22**: 409-12 (1988)

88A514 Oxidation of a series of tris(polypyridyl)chromium(II) ions by several cobalt(III) complexes. Zahir, K.; Espenson, J.H.; Bakac, A., *Inorg. Chem.* **27**: 3144-6 (1988)

88F171 Occurrence of a chemically reactive intermediate formed via a doublet-state pathway in the photoaquation of the cis-diammine(1,4,8,11-tetraazacyclotetradecane)chromium(III) ion. Waltz, W.L.; Lee, S.H.; Friesen, D.A.; Lilie, J., *Inorg. Chem.* **27**: 1132-3 (1988)

88G016 Reaction of the aquacopper(I) ion with hydrogen peroxide. Evidence for a Cu^{III} (cupryl) intermediate. Johnson, G.R.A.; Nazhat, N.B.; Saadalla-Nazhat, R.A., *J. Chem. Soc., Faraday Trans. 1* **84**: 501-10 (1988)

88N184 Sensitization and photoredox reactions of zinc(II) and antimony(V) uroporphyrins in aqueous media. Kalyanasundaram, K.; Shelnutt, J.A.; Graetzel, M., *Inorg. Chem.* **27**: 2820-5 (1988)

89A025 Electron transfer from methoxybenzenes to the excited state of an Ir(III) complex studied by the pulsed laser technique. Slama-Schwok, A.; Rabani, J., *J. Phys. Chem.* **93**: 785-91 (1989)

89A050 Reactions of sulfur dioxide with photochemically generated polypyridyl complexes of chromium(II). Calculation of the $SO_2/SO_2^{\cdot-}$ self-exchange rate constant. Simmons, C.A.; Bakac, A.; Espenson, J.H., *Inorg. Chem.* **28**: 581-4 (1989)

89A065 Rate constants for the scavenging of $Ru(bpy)_3^{3+}$ by EDTA in aqueous solution. Hoffman, M.Z., *Inorg. Chem.* **28**: 978-80 (1989)

89A098 A dissociative pathway for equilibration of a hydrido $CoL(H)^{2+}$ complex with CO_2 and CO: Ligand-binding constants in the macrocyclic [14]dienecobalt(I) system. Creutz, C.; Schwarz, H.A.; Wishart, J.F.; Fujita, E.; Sutin, N., *J. Am. Chem. Soc.* **111**: 1153-4 (1989)

89A115 Reduction by $CO_2^{\cdot-}$ of (1-methyl-4,4'-bipyridinium)pentaamminecobalt(III) perchlorate and kinetic behavior of the transient radical in aqueous solution. Tsukahara, K.; Wilkins, R.G., *Inorg. Chem.* **28**: 1605-7 (1989)

89A135 Kinetics of the free-radical-induced reduction of $Fe^{III}DTPA$ to $Fe^{II}DTPA$. A pulse radiolysis study. Cabelli, D.E.; Rush, J.D.; Thomas, M.J.; Bielski, B.H.J., *J. Phys. Chem.* **93**: 3579-86 (1989)

89A150 Mechanistic study of β-hydroxy elimination from [tetra sulphophthalocyanine Co^{III}-$CR_1R_2CR_3R_4OH$] in aqueous solutions. A pulse radiolysis study. Sorek, Y.; Cohen, H.; Meyerstein, D., *J. Chem. Soc., Faraday Trans. 1* **85**: 1169-79 (1989)

89A203 Photolytic and radiolytic study of platinum(III) complex ions containing aquo and chloro ligands. Waltz, W.L.; Lilie, J.; Goursot, A.; Chermette, H., *Inorg. Chem.* **28**: 2247-56 (1989)

89A204 Kinetics of the homolytic dioxygen insertion into the cobalt-carbon bond in $(nta)(H_2O)Co^{III}$-CH_3^-. Sauer, A.; Cohen, H.; Meyerstein, D., *Inorg. Chem.* **28**: 2511-2 (1989)

89A247 The DNA guanyl radical: Kinetics and mechanisms of generation and repair. Jovanovic, S.V.; Simic, M.G., *Biochim. Biophys. Acta* **1008**: 39-44 (1989)

89A250 Platinum(III) in the REOA [reductive elimination/oxidative addition] mechanism of $PtCl_4^{2-}$ and $PtCl_6^{2-}$. A pulse-radiolysis study. Bothe, E.; Broszkiewicz, R.K., *Inorg. Chem.* **28**: 2988-91 (1989)

89A280 One-electron reduction of tris(2,2'-bipyrimidine)ruthenium(2+) ion in aqueous solution. A photochemical, radiation chemical, and electrochemical study. Neshvad, G.; Hoffman, M.Z.; Mulazzani, Q.G.; Venturi, M.; Ciano, M.; D'Angelantonio, M., *J. Phys. Chem.* **93**: 6080-8 (1989)

89A289 Quenching of the doublet excited state of tris(polypyridine)chromium(III) ions by oxalate ions: An example of irreversible electron transfer. Steffan, C.R.; Bakac, A.; Espenson, J.H., *Inorg. Chem.* **28**: 2992-5 (1989), 31(16): 1122 (1992)

89A310 Reduction of $Au(CN)_2^-$ in aqueous solution. Formation of nonmetallic clusters and colloidal gold. Mosseri, S.; Henglein, A.; Janata, E., *J. Phys. Chem.* **93**: 6791-5 (1989)

89A312 The reduction of $Ru(bpy)_2(dipyridophenazine)^{2+}$ in aqueous solution. A radiolytic study. Mulazzani, Q.G.; D'Angelantonio, M.; Venturi, M.; Boillot, M.-L.; Chambron, J.-C.; Amouyal, E., *New J. Chem.* **13**: 441-7 (1989)

89A354 Kinetics of ferrate(V) decay in aqueous solution. A pulse-radiolysis study. Rush, J.D.; Bielski, B.H.J., *Inorg. Chem.* **28**: 3947-51 (1989)

89A362 Photochemical reactivity of xanthene dyes and zinc porphyrins with viologens. Maier, V.E.; Kuz'min, V.A.; Levin, P.P.; Khannanov, N.K.; Shafirovich, V.Ya., *Khim. Fiz.* **8**: 1191-6 (1989)

89A375 Redox reactions of methylene blue: A pulse radiolysis study. Kishore, K.; Guha, S.N.; Mahadevan, J.; Moorthy, P.N.; Mittal, J.P., *Radiat. Phys. Chem.* **34**: 721-7 (1989)

89A422 The dichromate dosimeter: A pulse-radiolysis study. Sharpe, P.H.G.; Sehested, K., *Radiat. Phys. Chem.* **34**: 763-8 (1989)

89A428 Intermediates in the charge-transfer and ligand-labilization photoreactions of molybdenum(V) μ-oxo dimers. Feliz, M.; Ferraudi, G., *Inorg. Chem.* **28**: 4422-5 (1989)

89A465 Radical cations from one-electron oxidation of aliphatic sulphoxides in aqueous solution. A radiation chemical study. Kishore, K.; Asmus, K.-D., *J. Chem. Soc., Perkin Trans. 2* : 2079-84 (1989)

89A492 Production and study of indium atoms in aqueous solution by pulse radiolysis. Sukhov, N.L.; Ershov, B.G., *Bull. Acad. Sci. USSR, Div. Chem. Sci.* **38**: 683-6 (1989) Translated from: *Izv. Akad. Nauk SSSR, Ser. Khim.* : 759-62 (1989)

89A497 Pulsed radiolysis of aqueous solutions of cobalt tetrasulfophthalocyanine. Volod'ko, V.V.; Revina, A.A.; Protasova, E.L.; Vannikov, A.V., *High Energy Chem.* **23**: 381-7 (1989) Translated from: *Khim. Vys. Energ.* **23**: 483-9 (1989)

89B054 Photochemical generation of Sn(III) in hydrochloric acid solutions. Shinohara, N.; Inoue, M., *Bull. Chem. Soc. Jpn.* **62**: 730-3 (1989)

89C001 Reduction potentials of CO_2^- and the alcohol radicals. Schwarz, H.A.; Dodson, R.W., *J. Phys. Chem.* **93**: 409-14 (1989)

89E105 Reductive quenching of the luminescent excited state of tris(2,2'-bipyrazine)ruthenium(2+) ion in aqueous solution. Neshvad, G.; Hoffman, M.Z., *J. Phys. Chem.* **93**: 2445-52 (1989)

89E329 Photoredox reactions of a positively charged water-soluble polymer containing covalently bound tris(2,2'-bipyridyl)ruthenium(II)-like centers: N-ethylated copolymers of 4-vinylpyridine and bis(2,2'-bipyridyl)(4-methyl-4'-vinyl-2,2'-bipyridyl)ruthenium(II). Ennis, P.M.; Kelly, J.M., *J. Phys. Chem.* **93**: 5735-40 (1989)

89G017 Reactions of the hydroxyl free radical with copper(II)-amino-acid complexes in aqueous solution. Johnson, G.R.A.; Nazhat, N.B.; Saadalla-Nazhat, R.A., *J. Chem. Soc., Faraday Trans 1* **85**: 677-89 (1989)

89R092 Photosensitized oxidation of biomaterials and related model compounds. Davila, J.; Harriman, A., *Photochem. Photobiol.* **50**: 29-35 (1989)

90A015 Radiolytic study of the reactions of hydroxyl radical with cobalt(III), iron(II), and ruthenium(II) complexes containing 2,2'-bipyridyl and cyano ligands. Maliyackel, A.C.; Waltz, W.L.; Lilie, J.; Woods, R.J., *Inorg. Chem.* **29**: 340-8 (1990)

90A022 Photoreactions of macrocyclic dyes bound to human serum albumin. Davila, J.; Harriman, A., *Photochem. Photobiol.* **51**: 9-19 (1990)

90A069 Etude par radiolyse pulsee d'un heteropolyanion: L'ion metatungstate. Lerat, O.; Chauveau, F.; Hickel, B., *New J. Chem.* **14**: 37-41 (1990)

90A079 Formation and homolysis of a mononuclear cobalt-oxygen adduct. Bakac, A.; Espenson, J.H., *J. Am. Chem. Soc.* **112**: 2273-8 (1990)

90A095 Trivalent lead as an intermediate in the oxidation of Pb^{II} and the reduction of Pb^{IV} species. Mosseri, S.; Henglein, A.; Janata, E., *J. Phys. Chem.* **94**: 2722-6 (1990)

90A105 Experimental investigation of excited-state electron-transfer reaction: Effects of free energy and solvent on rates. Chen, J.-M.; Ho, T.-I.; Mou, C.-Y., *J. Phys. Chem.* **94**: 2889-96 (1990)

90A116 Mechanism of catalase activity in aqueous solutions of dimanganese(III,IV) ethylenediamine-N,N'-diacetate. Rush, J.D.; Maskos, Z., *Inorg. Chem.* **29**: 897-905 (1990)

90A168 Kinetics of electron transfer between metal hexacyanide complexes. Cho, K.C.; Cham, P.M.; Che, C.M., *Chem. Phys. Lett.* **168**: 361-4 (1990)

90A171 Formation of $Fe(bpy)(CN)_4^{3-}$ and $Fe(DMbpy)-(CN)_4^{3-}$ in the photo-induced redox reaction of $Fe(bpy)(CN)_4^{2-}$ and $Fe(DMbpy)(CN)_4^{2-}$. Horvath, A.; Uzonyi, Z., *Inorg. Chim. Acta* **170**: 1-4 (1990)

90A221 Oxidation of cobalt(II) macrocycles by tris(bipyridyl)ruthenium(III) ions. Lee, S.; Bakac, A.; Espenson, J.H., *Inorg. Chem.* **29**: 2480-2 (1990)

90A238 One-electron oxidation of toluidine blue. A pulse radiolysis study. Mahadevan, J.; Guha, S.N.; Kishore, K.; Moorthy, P.N., *Proc. Indian Acad. Sci., Chem. Sci.* **102**: 147-57 (1990)

90A253 Electrochemistry and redox chemistry of $H_2OFe^{III}SiW_{11}O_{39}^{5-}$ in the presence of H_2O_2 and OH. Toth, J.E.; Melton, J.D.; Cabelli, D.; Bielski, B.H.J.; Anson, F.C., *Inorg. Chem.* **29**: 1952-7 (1990)

90A261 Kinetics of the reactions of the SO_4^- radical with SO_4^-, $S_2O_8^{2-}$, H_2O and Fe^{2+}. McElroy, W.J.; Waygood, S.J., *J. Chem. Soc., Faraday Trans.* **86**: 2557-64 (1990)

90A278 Generation of iron(IV) and iron(V) complexes in aqueous solutions. Bielski, B.H.J., *Methods Enzymol.* **186**: 108-13 (1990)

90A303 Kinetics and mechanism of aquation of cobalt(II)-glycine complexes in aqueous solutions: A pulse radiolytic study. Shinohara, N.; Lilie, J., *Inorg. Chem.* **29**: 3812-5 (1990)

90A321 The methyl(cyclam)nickel(III) dication in aqueous solutions: Determination of the volume of reaction and volume of activation for the homolysis of the nickel-carbon bond. A pulse-radiolysis study. van Eldik, R.; Cohen, H.; Meshulam, A.; Meyerstein, D., *Inorg. Chem.* **29**: 4156-8 (1990)

90A373 Studies of the kinetic, spectral and chemical properties of Fe(IV) pyrophosphate by pulse radiolysis. Melton, J.D.; Bielski, B.H.J., *Radiat. Phys. Chem.* **36**: 725-33 (1990)

90A389 Oxalate ion as a sacrificial electron donor in the $Ru(bpy)_3^{2+}$-methylviologen model photochemical system. Hoffman, M.Z.; Prasad, D.R., *J. Photochem. Photobiol., A* **54**: 197-204 (1990)

90A421 Oxidation of copper(II) bis(glycinate) by methyl free radicals in aqueous solutions. A pulse-radiolysis study. Masarwa, M.; Cohen, H.; Glaser, R.; Meyerstein, D., *Inorg. Chem.* **29**: 5031-5 (1990)

90A422 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane-nickel(II) as a catalyst for oxidations by superoxide in aqueous solutions. A pulse radiolysis study. Meshulam, A.; Cohen, H.; Meyerstein, D., *Inorg. Chim. Acta* **176**: 75-7 (1990)

90A428 Electron-transfer reactivity of the ^2E excited state of trans-diammine(1,4,8,11-tetraazacyclotetradecane)chromium(III). Bakac, A.; Espenson, J.H., *J. Chem. Soc., Chem. Commun.* : 1646-7 (1990)

90A474 Metal induced decarboxylation of aliphatic free radicals. I. Kinetics of the reactions of copper(I) and copper(II) ions with the 2-methyl-2-carboxylic acid-propyl free radical in aqueous solutions. A pulse radiolysis study. Masarwa, M.; Cohen, H.; Saar, J.; Meyerstein, D., *Isr. J. Chem.* **30**: 361-8 (1990)

90A488 Intra- and inter-molecular electron transfer reactions in 3,3'-thiodipropionic acid. Mohan, H., *J. Chem. Soc., Perkin Trans. 2* : 1821-4 (1990)

90A499 Mechanism of redox reactions induced by light and electron pulse in solutions of mixed ligand iron(II) complex cyanides. Horvath, A.; Szoke, J.; Wojnarovits, L., *Proc. Tihany Symp. Radiat. Chem.* **7**: 71-5 (1990, Pub. 1991)

90B077 Reduction reactions of water soluble cyano-cobalt(III)-porphyrins: Metal versus ligand centered processes. Mosseri, S.; Neta, P.; Harriman, A.; Hambright, P., *J. Inorg. Biochem.* **39**: 93-100 (1990)

90C005 Redox potentials of the azide and dithiocyanate radicals. DeFelippis, M.R.; Faraggi, M.; Klapper, M.H., *J. Phys. Chem.* **94**: 2420-4 (1990)

90C007 One-electron reduction potentials of 5-indoxyl radicals. A pulse radiolysis and laser photolysis study. Jovanovic, S.V.; Steenken, S.; Simic, M.G., *J. Phys. Chem.* **94**: 3583-8 (1990)

90N140 Application of Ru-(II)-polypyridine sensitizers in the reduction of CO_2 to CH_4 and H_2-evolution using Ru-colloids. Duerr, H.; Trierweiler, H.-P.; Willner, I.; Maidan, R., *New. J. Chem.* **14**: 317-20 (1990)

90R041 Photochemical and radiolytic oxidation of a zinc porphyrin bound to human serum albumin. Davila, J.; Harriman, A., *J. Am. Chem. Soc.* **112**: 2686-90 (1990)

91A015 Kinetics and energetics of one-electron-transfer reactions involving tryptophan neutral and cation radicals. Jovanovic, S.V.; Steenken, S.; Simic, M.G., *J. Phys. Chem.* **95**: 684-7 (1991)

91A018 Oxidation of $[Au^I(CN)_2]^-$. Formation of dicyanogold(III) oxide and colloidal monocyanogold(III) oxide. Mosseri, S., *J. Phys. Chem.* **95**: 854-8 (1991)

91A065 Photochemistry of the μ-hydroxo-μ-peroxo-bis[triethylenetetraamine)cobalt(III)] complex in basic aqueous solutions. Shinohara, N.; Matsufuji, S.; Okubo, W., *Polyhedron* **10**: 107-12 (1991)

91A067 Mechanism of photoinduced redox reactions in aqueous solutions of $[Fe(bpy)(CN)_4]^{2-}$ Horvath, A.; Szoke, J.; Wojnarovits, L., *Inorg. Chim. Acta* **179**: 97-104 (1991)

91A081 Radiation-induced electron-transfer processes in Ru(II)-diimine complexes in aqueous solution. An application of Marcus electron-transfer theory. Venturi, M.; Mulazzani, Q.G.; D'Angelantonio, M.; Ciano, M.; Hoffman, M.Z., *Radiat. Phys. Chem.* **37**: 449-56 (1991)

91A143 Photoinduced charge separation in polymer pendant $Ru(bpy)_3^{2+}$ complex: Influence of the microstructure of the polymer. Barrie, M.S.; Delaire, J.A.; Kaneko, M., *New J. Chem.* **15**: 65-70 (1991)

91A152 Mechanism of oxidation of the 2-hydroxycyclohexyl radical to cyclopentanecarbaldehyde by copper ions in aqueous solutions. Masarwa, M.; Cohen, H.; Meyerstein, D., *Inorg. Chem.* **30**: 1849-54 (1991)

91A198 One-electron reduction of ruthenium(II)-diimine complexes. Characterization of reduced species containing 2,2'-bipyridine, 2,2'-bipyrimidine, and 2,2'-bipyrazine in aqueous solution. D'Angelantonio, M.; Mulazzani, Q.G.; Venturi, M.; Ciano, M.; Hoffman, M.Z., *J. Phys. Chem.* **95**: 5121-9 (1991)

91A218 Reactivity of $Ru(bpy)_3^+$ towards the radicals originating from the scavenging of hydrogen atoms and hydroxyl radicals by methanol, ethanol, propan-2-ol, tert-butyl alcohol and formate ions in aqueous solution: A pulse radiolytic study. Mulazzani, Q.G.; D'Angelantonio, M.; Camaioni, N.; Venturi, M., *J. Chem. Soc., Faraday Trans.* **87**: 2179-85 (1991)

91A292 Oxidation of nickel(II) ethylenediaminetetraacetate by carbonate radical. Mandal, P.C.; Bardhan, D.K.; Sarkar, S.; Bhattacharyya, S.N., *J. Chem. Soc., Dalton Trans.* : 1457-61 (1991)

91A367 Reduction of $Cu^{2+}_{(aq)}$ by CO_2^-: First steps and the formation of colloidal copper. Ershov, B.G.; Janata, E.; Michaelis, M.; Henglein, A., *J. Phys. Chem.* **95**: 8996-9 (1991)

91A387 Rapid reduction of $[Cu^{II}(sarcophagine)]^{2+}$ ion and elimination of Cu^{I} from the cage: A pulse radiolysis study. Creaser, I.I.; Harrowfield, J.M.; Lawrance, G.A.; Mulac, W.; Sangster, D.; Sargeson, A.M.; Schmidt, K.; Sullivan, J.C., *J. Coord. Chem.* **23**: 389-95 (1991)

91A455 Use of the Hammett correlation and σ^+ for calculation of one-electron redox potentials of antioxidants. Jovanovic, S.V.; Tosic, M.; Simic, M.G., *J. Phys. Chem.* **95**: 10824-7 (1991)

91A477 Stereospecificity of the β-hydroxyl elimination from the (hydroxyalkyl)chromium complex $(H_2O)_5Cr^{III}$-$CH(CH_3)CH(CH_3)OH^{2+}$. Cohen, H.; Feldman, A.; Ish-Shalom, R.; Meyerstein, D., *J. Am. Chem. Soc.* **113**: 5292-9 (1991)

91A511 Oxidative homolysis of organochromium macrocycles. Steffan, C.R.; Espenson, J.H.; Bakac, A., *Inorg. Chem.* **30**: 1134-7 (1991)

91A513 Thermodynamics and kinetics of carbon dioxide binding to two stereoisomers of a cobalt(I) macrocycle in aqueous solution. Creutz, C.; Schwarz, H.A.; Wishart, J.F.; Fujita, E.; Sutin, N., *J. Am. Chem. Soc.* **113**: 3361-71 (1991)

91D177 Unusual spin-trap chemistry for the reaction of hydroxyl radical with the carcinogen N-nitrosodimethylamine. Wink, D.A.; Desrosiers, M.F., *Radiat. Phys. Chem.* **38**: 467-72 (1991)

91N125 Effect of anionic molecular assembly environments on fluorescence quenching by electron transfer. Wolszczak, M.; Thomas, J.K., *Radiat. Phys. Chem.* **38**: 155-64 (1991)

91Z208 Studies of hypervalent iron. Bielski, B.H.J., *Free Radical Res. Commun.* **12-13**: 469-77 (1991)

92A008 Pulse radiolysis study of redox reactions of safranine T in aqueous solutions: One electron oxidation. Guha, S.N.; Moorthy, P.N.; Mittal, J.P., *Radiat. Phys. Chem.* **39**: 183-90 (1992)

92A059 Pulse radiolysis investigations on electron-transfer reactions in aqueous solutions of substituted alkyl sulfides. Mohan, H.; Mittal, J.P., *J. Chem. Soc., Perkin Trans. 2* : 207-12 (1992)

92A073 Deamination of 2-methyl-2-propanamine induced by hydroxyl radicals and metal ions: A comparison between the rates of β elimination of ammonia and water. Goldstein, S.; Czapski, G.; Cohen, H.; Meyerstein, D.; Cho, J.-K.; Shaik, S.S., *Inorg. Chem.* **31**: 798-803 (1992)

92A134 Deamination of β-alanine induced by hydroxyl radicals and monovalent copper ions. A pulse radiolysis study. Goldstein, S.; Czapski, G.; Cohen, H.; Meyerstein, D., *Inorg. Chim. Acta* **192**: 87-93 (1992)

92A148 Kinetics of formation, dissociation, and redox reactions of the benzyl radical-Cu(II) ion complex in a 10% acetonitrile-90% water mixture. Mayouf, A.; Lemmetyinen, H.; Sychttchikova, I.; Koskikallio, J., *Int. J. Chem. Kinet.* **24**: 579-85 (1992)

92A165 Mechanism of oxidation of (meso-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane)nickel(II) by HO_2 free radicals in aqueous solutions. A pulse radiolysis study. Meshulam, A.; Cohen, H.; Van Eldik, R.; Meyerstein, D., *Inorg. Chem.* **31**: 2151-6 (1992)

92A182 Buxton, G.V., Unpublished data (Letter, 23 May 1992), 1992

92A191 A new approach to the study of the oxygenation reactions of transition-metal complexes. Formation of the μ-superoxo cobalt(III) complexes in the oxygenation reactions of cobalt(II) amines. Dhanasekaran, T.; Natarajan, P., *J. Am. Chem. Soc.* **114**: 4621-4 (1992)

92A206 Reduction of Pb^{2+} in aqueous solution: Early steps and colloid formation, and the atom ⟶ metal transition. Henglein, A.; Janata, E.; Fojtik, A., *J. Phys. Chem.* **96**: 4734-6 (1992)

92A215 Hydroxyl radical induced decarboxylation and deamination of 2-methylalanine catalyzed by copper ions. Goldstein, S.; Czapski, G.; Cohen, H.; Meyerstein, D., *Inorg. Chem.* **31**: 2439-44 (1992)

92A259 Redox reactions in aqueous solutions of $PtBr_4^{2-}$ and $PtBr_6^{2-}$. Broszkiewicz, R.K.; Vojnovic, B., *Radiat. Phys. Chem.* **40**: 11-6 (1992)

92A348 Electrochemistry of mixed metal clusters in aqueous solution: Reduction of Ag^+ by the lead atom. Fojtik, A.; Henglein, A.; Janata, E., *J. Phys. Chem.* **96**: 8203-6 (1992)

92A363 Electron-transfer reactions of alkyl peroxy radicals. Jovanovic, S.V.; Jankovic, I.; Josimovic, L., *J. Am. Chem. Soc.* **114**: 9018-21 (1992)

92A390 One-electron reduction and demetallation of copper porphyrins. Kumar, M.; Neta, P.; Sutter, T.P.G.; Hambright, P., *J. Phys. Chem.* **96**: 9571-5 (1992)

92A466 Formation of mercury clusters during pulsed radiolysis of aqueous Hg_2^{2+} solutions. Sukhov, N.L.; Ershov, B.G., *Bull. Russ. Acad. Sci., Div. Chem. Sci.* **41**: 1-4 (1992) Translated from: *Izv. Akad. Nauk, Ser. Khim.* : 9-12 (1992)

92A471 Outer-sphere electron transfer reactions involving the $[Pt(NH_3)_4F_2]^{2+}$ ion. Rogovoi, A.V.; Puzyk, M.V.; Balashev, K.P.; Ponyaev, A.I., *Russ. J. Phys. Chem.* **66**: 293-5 (1992) Translated from: *Zh. Fiz. Khim.* **66**: 559-61 (1992)

92G183 Ring reduction of [N-methyltetrakis(4-sulfonatophenyl)porphinato]cobalt(II), -nickel(II), and -copper(II) and subsequent methyl group migration. Reversible reaction between methyl radicals and Ni^{II}TSPP. Guldi, D.M.; Neta, P.; Hambright, P.; Rahimi, R., *Inorg. Chem.* **31**: 4849-53 (1992)

92N098 Absorption spectrum and chemical reactions of colloidal cadmium in aqueous solution. Henglein, A.; Gutierrez, M.; Janata, E.; Ershov, B.G., *J. Phys. Chem.* **96**: 4598-602 (1992)

92R075 Photo-induced electron transfer from nucleotides to ruthenium-tris-1,4,5,8-tetraazaphenanthrene: Model for photosensitized DNA oxidation. Lecomte, J.P.; Kirsch-De Mesmaeker, A.; Kelly, J.M.; Tossi, A.B.; Goerner, H., *Photochem. Photobiol.* **55**: 681-9 (1992)

93A100 Redox reactions of neutral red. A pulse radiolysis study. Guha, S.N.; Moorthy, P.N.; Mittal, J.P., *J. Chem. Soc., Perkin Trans. 2* : 409-15 (1993)

93A118 Electron transfer in di(deoxy)nucleoside phosphates in aqueous solution: Rapid migration of oxidative damage (via adenine) to guanine. Candeias, L.P.; Steenken, S., *J. Am. Chem. Soc.* **115**: 2437-40 (1993)

93A166 Silver atoms and clusters in aqueous solution: Absorption spectra and the particle growth in the absence of stabilizing Ag^+ ions. Ershov, B.G.; Janata, E.; Henglein, A.; Fojtik, A., *J. Phys. Chem.* **97**: 4589-94 (1993)

93A224 Steady-state and pulse radiolysis of some palladium(II) complexes. Patel, R.P.; Kulshreshtha, S.K.; Mohan, H., *J. Chem. Soc., Dalton Trans.* : 1245-51 (1993)

93A292 One-electron oxidation of the iron(II) complex of 1,10-phenanthroline-5,6-quinone. A pulse radiolysis study. Bao, H.; Navaratnam, S.; Parsons, B.J.; Phillips, G.O., *Radiat. Phys. Chem.* **42**: 989-92 (1993)

93A299 Redox reactions of thallium clusters in aqueous solution. Mulvaney, P., *Isr. J. Chem.* **33**: 89-94 (1993)

93A346 Oxidation-reduction reaction of photoinduced benzyl radicals in water: Para substituent effect. Mayouf, A.M.; Lemmetyinen, H., *J. Photochem. Photobiol., A* **73**: 205-11 (1993), 77(2-3): 285 (1994)

93A362 Transfert d'electron du cadmium en valence I. Lerat-Parizot, O.; Potier, J.; Hickel, B., *J. Chim. Phys. Phys.-Chim. Biol.* **90**: 789-800 (1993)

93A404 Pulse radiolysis of aqueous solutions of 6-aminophenalenone. II. Intermediate products of the reactions of the dye with OH radicals. Semenova, G.V.; Ponomarev, A.V.; Kartasheva, L.I.; Pikaev, A.K., *High Energy Chem.* **27**: 23-7 (1993) Translated from: *Khim. Vys. Energ.* **27**: 26-9 (1993)

93A434 Distance dependence of intramolecular electron transfer across oligoprolines in $[(bpy)_2Ru^{II}L^{\cdot}\text{-}(Pro)_n\text{-}Co^{III}(NH_3)_5]^{3+}$, n = 1-6: Different effects for helical and nonhelical polyproline II structures. Ogawa, M.Y.; Wishart, J.F.; Young, Z.; Miller, J.R.; Isied, S.S., *J. Phys. Chem.* **97**: 11456-63 (1993)

93A473 Effect of N-alkylation on the rate of β-amine elimination from transients with Cu^{II}-carbon σ bonds. Goldstein, S.; Czapski, G.; Cohen, H.; Meyerstein, D.; Shaik, S., *J. Chem. Soc., Faraday Trans.* **89**: 4045-51 (1993)

93A517 The use of conjugated scavengers to determine the rate constants of fast reactions in aqueous solutions by pulse radiolysis. Gogolev, A.V.; Shilov, V.P.; Fedoseev, A.M.; Pikaev, A.K., *Mendeleev Commun.* : 155-6 (1993)

94A002 Kinetic and spectral characteristics of transients formed in the pulse radiolysis of phenylthiourea in aqueous solution. Dey, G.R.; Naik, D.B.; Kishore, K.; Moorthy, P.N., *Radiat. Phys. Chem.* **43**: 365-9 (1994)

94A098 Redox properties of diaryl chalcogenides and their oxides. Engman, L.; Lind, J.; Merenyi, G., *J. Phys. Chem.* **98**: 3174-82 (1994)

94A179 Characterization of transients produced in aqueous medium by pulse radiolytic oxidation of 3,5-diiodotyrosine. Das, T.N Priyadarsini, K.I., *J. Phys. Chem.* **98**: 5272-8 (1994)

94A208 Pulse radiolysis study of oxidation reactions of sulphacetamide in aqueous solutions. Sabharwal, S.; Kishore, K.; Moorthy, P.N., *Radiat. Phys. Chem.* **44**: 499-506 (1994)

94A210 A pulse radiolysis study of Pd^{+} and Pd^{3+} ions obtained in aqueous acid solutions. Troitskii, D.A.; Ershov, B.G.; Sukhov, N.L., *High Energy Chem.* **28**: 190-2 (1994) Translated from: *Khim. Vys. Energ.* **28**: 221-3 (1994)

8. Molecular Formula Index

Ag	Silver atom *1.1*
Ag^+	Silver(I) ion *1.1.2, 17.1.2, 25.1.1, 25.2.2*
Ag^{2+}	Silver(II) ion *1.5, 7.39.1*
$AgHO^+$	Hydroxysilver(II) ion *1.6*
AgH_2O_2	Dihydroxysilver(II) *1.8*
$AgH_6N_2^+$	Diamminesilver(I) ion *1.1.3, 1.3.1*
$AgH_7N_2O^+$	Diammine(hydroxy)silver(II) *1.10*
$AgH_{10}N_3O^+$	Triammine(hydroxy)silver(II) ion *1.11*
$AgH_{12}N_4^{2+}$	Tetraamminesilver(II) ion *1.9*
Ag_2^+	Silver(I) ion, complex with Ag(0) *1.2 22.50.1*
$Au(CN)_2H^-$	Hydrogen dicyanoaurate(0) ion *3.2*
BH_3O_3	Boric acid *6.6.2*
Bi^{2+}	Bismuth(II) ion *4.1*
Br^-	Bromide ion *15.29.1, 15.48.2, 15.65.3*
$BrCoH_{15}N_5^{2+}$	Pentaammine(bromo)cobalt(III) ion *5.1.18, 6.1.9, 15.1.18, 17.3.4, 28.2.21*
BrHg	Mercury(I) bromide *10.6*
$BrHgO_2$	Bromomercury(I)peroxyl *10.7*
BrO_3^-	Bromate ion *5.1.8, 5.7.2, 5.8.1, 5.9.1, 5.10.2, 6.1.2, 15.1.8, 28.2.8*
Br_2^-	Dibromine radical ion *6.1.1, 12.2.2, 12.3.1, 15.69.1*
$Br_2H_{12}N_4Rh^+$	Tetraamminedibromorhodium(III) ion *21.8.3*
Br_2Mn^+	Dibromomanganese(III) ion *13.24*
Br_4HOPt^{2-}	Tetrabromo(hydroxy)platinate(III) ion *19.32*
Br_4Pt^{3-}	Tetrabromoplatinate(I) ion *19.4*
Br_6Pt^{3-}	Hexabromoplatinate(III) ion *19.33*
CCl_3	Trichloromethyl *9.12.1*
CCl_3Cu^{2+}	Trichloromethylcopper(III) ion *8.66*
CCl_4	Carbon tetrachloride *1.1.9, 1.2.9, 1.3.6*
$CCuO_2$	Carboxylatocopper(II) *8.29*
$CHBiO_2^{3+}$	Carboxylatobismuth(IV) ion *4.6*
$CHBr_3$	Bromoform *1.1.8, 1.2.8, 1.3.5*
$CHCl_3$	Chloroform *1.1.11, 1.3.8*
CHO_3^-	Bicarbonate ion *6.6.5*
CH_2O	Formaldehyde *25.1.18, 25.5.14*
CH_2O_2	Formic acid *6.5.6, 6.6.25*
CH_3	Methyl *6.101.2, 8.82.1, 9.28.2, 13.28.2*
CH_3BiO^{3+}	Hydroxymethylbismuth(IV) ion *4.2*
CH_3CrO^{2+}	Hydroxymethylchromium(III) ion *7.27a*
$CH_3CrO_2^{2+}$	Dihydroxymethylchromium(III) ion *7.28*
CH_3Cu^+	Methylcopper(II) ion *8.28, 8.28.2*
CH_3Cu^{2+}	Methylcopper(III) ion *8.65*
CH_3I	Iodomethane *6.6.27, 6.17.2, 8.15.11, 15.8.19, 15.10.24*
CH_3NO_2	Nitromethane *1.1.13, 1.2.11, 1.3.10*
CH_3NiO^+	Hydroxymethylnickel(II) ion *15.19*
CH_3O	Hydroxymethyl *5.1.3, 6.102.2, 8.5.23, 10.10.4, 11.2.4, 15.1.2, 22.3.54*
CH_4O	Methanol *8.45.3, 25.4.35, 25.5.17*
$CH_{10}CrF_3O_5^{2+}$	Pentaaqua(trifluoromethyl)chromium(III) ion *22.3.13*
$CH_{11}Cl_2CrO_6^{2+}$	Pentaaqua(dichloromethyl)chromium(III) ion *22.3.15*
$CH_{13}CrO_5^{2+}$	Pentaaquamethylchromium(III) ion *22.50.20*
$CH_{15}CoN_6^{2+}$	Pentaammine(cyano)cobalt(III) ion *5.1.20, 15.1.20, 28.2.23*
$CH_{15}CoN_6S^{2+}$	Pentaammine(thiocyanato-*N*)cobalt(III) ion *5.1.26, 15.1.25, 28.2.29*
CHgN	Mercury(I) cyanide *10.10*
$CHgNO_2S$	Thiocyanatomercury(I)peroxyl *10.13*
CHgNS	Mercury(I) thiocyanate *10.12*
CNS^-	Thiocyanate ion *15.63.2, 15.67.1*
CN_4O_8	Tetranitromethane *7.2.6, 7.4.15, 8.5.26, 10.6.4, 10.8.5, 10.10.9, 10.11.4, 10.12.4, 15.1.44, 25.6.3*
$CNiO_2$	Carboxylatonickel(II) *15.20*
CO	Carbon monoxide *6.5.4, 6.6.3, 9.8.1, 9.9.1, 9.10.1, 9.11.1*
CO_2	Carbon dioxide *6.5.3, 6.6.4, 25.1.2*
CO_2^-	Carbon dioxide radical anion *5.1.7, 6.80.1, 15.1.3, 22.3.45*
CO_3^{2-}	Carbonate ion *15.70.2*
$C_2AuN_2^{2-}$	Dicyanoaurate(0) ion *3.1*
C_2FeO_4	Iron(II) oxalate *9.5*
$C_2FeO_4^+$	Iron(III) oxalate *9.5.1*
$C_2HAuN_2O^-$	Dicyanohydroxyaurate(II) ion *3.4*
$C_2H_2AuN_2$	Dihydrogen dicyanoaurate(0) *3.3*
$C_2H_2AuN_2O$	Dicyano(hydroxy)aurate(II) ion, protonated *3.5, 3.5.1*
$C_2H_2ClO_2^-$	Chloroacetate ion *1.1.10, 1.3.7*
$C_2H_2CuO_2^+$	Carboxymethylcopper(III) ion *8.68*
$C_2H_2MnO_6$	Peroxidomanganese(III) formate *13.14*
$C_2H_3MnO_6$	Hydroperoxidomanganese(III) formate complex *13.15*
$C_2H_4CdNO_2$	Glycinatocadmium(I) ion *5.9*

$C_2H_4CoNO_2^+$ Glycinatocobalt(II) ion *6.47*

$C_2H_4CuNO_2^+$ Glycinatocopper(II) ion *8.47.3*

$C_2H_4NO_2^-$ Glycine, negative ion *1.7.8, 1.9.5*

C_2H_4O Acetaldehyde *25.1.15*

$C_2H_4O_2$ Acetic acid *6.4.5, 6.5.7, 6.6.21, 15.8.14, 15.10.18*

$C_2H_5BiO^{3+}$ 1-Hydroxyethylbismuth(IV) ion *4.3*

$C_2H_5CdO^+$ 1-Hydroxyethylcadmium(II) ion *5.11*

$C_2H_5CrO^{2+}$ 1-Hydroxyethylchromium(III) ion *7.28a*
2-Hydroxyethylchromium(III) ion *7.29*

$C_2H_5CuO^{2+}$ 2-Hydroxyethylcopper(III) ion *8.67*

$C_2H_5NO_2$ Glycine *1.5.19*

$C_2H_5NO_2.Ni$ Glycinatonickel(III) ion *15.33*

$C_2H_5NiO^+$ 1-Hydroxyethylnickel(II) ion *15.21*

C_2H_5O 1-Hydroxyethyl *5.1.4, 6.103.1, 10.10.5, 15.1.4, 22.3.53*
2-Hydroxyethyl *8.5.24*

$C_2H_6N_2O$ *N*-Nitrosodimethylamine *25.4.42*

C_2H_6O Ethanol *25.4.34, 25.5.13*

C_2H_6OS Dimethyl sulfoxide *25.4.28*

$C_2H_6O_2$ Ethylene glycol *1.5.18, 1.7.7*

$C_2H_6S_2$ Dimethyl disulfide *1.5.17, 1.7.6, 25.4.27, 25.5.12*

$C_2H_7Cu^{2+}$ 2-Ammonioethylcopper(II) ion *8.31*

C_2H_7NO 2-Aminoethanol *1.7.1*

$C_2H_8CoN_2^+$ Ethylenediaminecobalt(II) ion *6.29*

$C_2H_8N_2.Ni$ Ethylenediaminenickel(III) ions *15.32*

$C_2H_{15}CrO_5^{2+}$ Pentaaqua(ethyl)chromium(III) ion *22.50.21*

$C_2H_{15}CrO_6^{2+}$ Pentaaqua(methoxymethyl)chromium(III) ion *22.3.14, 22.50.23*

$C_2H_{18}CoN_5O_2^{2+}$
(Acetato)pentaamminecobalt(III) ion *5.1.27, 15.1.26, 28.2.30*

$C_2H_{20}Co_2F_3N_6O_2^{3+}$
Hexaamminebis(μ-hydroxy)-μ-(trifluoroacetato)dicobalt(III) ion *5.1.29, 15.9.2, 28.2.31*

$C_2H_{21}Co_2F_2N_6O_2^{3+}$
Hexaammine-μ-(difluoroacetato)bis(μ-hydroxy)dicobalt(III) ion *5.1.30, 15.9.3, 28.2.32*

$C_2H_{22}Co_2FN_6O_2^{3+}$
Hexaammine-μ-(fluoroacetato)bis(μ-hydroxy)dicobalt(III) ion *5.1.31, 15.9.4, 28.2.33*

$C_2H_{23}Co_2N_6O_2^{3+}$
μ-Acetatohexaamminebis(μ-hydroxy)dicobalt(III) ion *5.1.32, 15.9.5, 28.2.34*

$C_2O_4^{2-}$ Oxalate ion *22.50.79*

$C_3H_3CuNO_2^+$ 2-Ammonio-1-carboxyethylcopper(II) ion *8.30*

$C_3H_4CuO_2^+$ 1-Carboxyethylcopper(III) ion *8.69*

$C_3H_5CrO_3^{2+}$ 1-Carboxy-1-hydroxyethylchromium(III) ion *7.34*

C_3H_5NO Acrylamide *8.5.21*

$C_3H_6NO_2^-$ Alanine, negative ion *1.9.2*

C_3H_6O Acetone *25.1.16, 28.2.58*
Allyl alcohol *6.1.25, 15.1.40, 28.2.59*

$C_3H_7BiO^{3+}$ 1-Hydroxy-1-methylethylbismuth(IV) ion *4.4*

$C_3H_7CdO^+$ 1-Hydroxy-1-methylethylcadmium(II) ion *5.12*

$C_3H_7CrO^{2+}$ 1-Hydroxy-1-methylethylchromium(III) ion *7.29a*
2-Hydroxy-1-methylethylchromium(III) ion *7.30*

$C_3H_7NO_2S$ Cysteine *22.50.71*

$C_3H_7NiO^+$ 1-Hydroxy-1-methylethylnickel(II) ion *15.22*

C_3H_7O 1-Hydroxy-1-methylethyl *5.1.5, 6.106.2, 10.10.6, 11.2.5, 15.1.5, 19.37.5, 22.3.55*

C_3H_8O 2-Propanol *6.75.1, 8.14.2, 25.4.45, 25.5.22*

$C_3H_9CuN_2O_2$ Aminomethyl(glycinato)copper(II) *8.43a*

$C_3H_{11}CuN_2^{3+}$ 1,3-Diammonio-2-propylcopper(II) ion *8.34*

$C_3H_{17}CrO_5^{2+}$ Pentaaqua(isopropyl)chromium(III) ion *22.50.22*

$C_3N_3Ni^{2-}$ Tris(cyano)nickelate(I) ion *15.3*

$C_4CoN_4^{2-}$ Tetracyanocobaltate(II) ion *6.44*

$C_4H_3CuO_5$ 1,2-Dicarboxy-2-hydroxyethylcopper(III) ion *8.71*

$C_4H_4AgO_4$ Silver(II)-succinate complex *1.14*

$C_4H_4CoNO_4$ Iminodiacetatocobalt(II), H-abstraction product *6.59*

$C_4H_4CuO_8^{3-}$ Tetraformatocuprate(I) ion *8.7, 22.50.44*

$C_4H_4Mo_2O_{14}^{3-}$
Bis(μ-oxo)bis[aqua(oxalato)-oxomolybdate(IV)(V) ion *14.3*

$C_4H_4NNiO_4$ Iminodiacetatonickelate(II), H-abstraction product *15.27*

$C_4H_4O_4$ Fumaric acid *8.5.22*
Maleic acid *8.5.25*

$C_4H_5BrCoNO_4$
Bromo(iminodiacetato)cobalt(III) *6.77*

$C_4H_5Br_2CoNO_4^-$
Dibromo(iminodiacetato)cobaltate(III) ion *6.76*

$C_4H_5CoNO_4$ Iminodiacetatocobalt(II) *6.57.1, 6.59.1*

$C_4H_5CoNO_6^-$ Iminodiacetatocobaltate(II) ion, superoxide adduct *6.57*

$C_4H_5CuNO_2^+$ 2-Ammonio-2-carboxypropylcopper(II) ion *8.38*

$C_4H_5CuNO_2^{2+}$ 2-Ammonio-2-carboxypropylcopper(III) ion *8.73*

$C_4H_6CoNO_5$ Hydroxy(iminodiacetato)cobalt(III) *6.78*

$C_4H_6NO_4^-$ Aspartate monoanion *1.9.4*

$C_4H_6O_3^-$ 2-Carboxy-2-hydroxy-2-methylethyl, anion *9.7.5, 22.37.6*

$C_4H_8CoN_2O_4$ Bis(glycinato)cobalt(II) *6.46*

$C_4H_8CuN_2O_4^+$ Bis(glycine)copper(III) complex *8.57*

C_4H_8NO (*N*-Acetyl-*N*-methylamino)methyl *9.7.3, 22.37.4*

$C_4H_8NO_2$ 2-Amino-2-carboxy-2-methylethyl *9.7.2, 22.37.3*

$C_4H_8NO_2^-$ α-Aminoisobutyrate negative ion *1.9.3*

$C_4H_8N_2O_4Pt$ *cis*-Bis(glycinato)platinum(II), H reaction product *19.14*
trans-Bis(glycinato)platinum(II), H reaction product *19.15*

$C_4H_8N_2O_4Pt^+$ *cis*-Bis(glycinato)platinum(II), OH reaction product *19.45*
trans-Bis(glycinato)platinum(II), OH reaction product *19.46*

$C_4H_8N_2O_4Pt^-$ *cis*-Bis(glycinato)platinate(I) ion *19.9, 19.9.1*
trans-Bis(glycinato)platinate(I) ion *19.10, 19.10.1*

$C_4H_9BiO^{3+}$ 2-Hydroxy-2-dimethylethylbismuth(IV) ion *4.5*

$C_4H_9CrO^{2+}$ 2-Ethoxyethylchromium(III) ion *7.33*
2-Hydroxy-1,2-dimethylethylchromium(III) ion *7.31*
2-Hydroxy-2,2-dimethylethylchromium(III) ion *7.32*

$C_4H_9CuO^+$ 2-Hydroxy-2,2-dimethylethylcopper(II) ion *8.32*

$C_4H_9CuO^{2+}$ 2-Hydroxy-2,2-dimethylethylcopper(III) ion *8.70*

$C_4H_9NO_2$ α-Aminoisobutyric acid *1.5.5, 1.7.2*

$C_4H_9NiO^+$ 1-Ethoxyethylnickel(II) ion *15.23*

C_4H_9O 1-Hydroxybutyl *8.9.1*
2-Hydroxy-2,2-dimethylethyl *5.1.6, 6.6.26, 6.81.1, 9.7.1, 10.10.7, 15.1.6, 19.37.6, 22.3.52, 22.37.2*

$C_4H_9O_3$ 2-Hydroxy-2,2-dimethylethylperoxyl *22.37.9*

$C_4H_{10}O$ 2-Methyl-2-propanol *17.9.2*

$C_4H_{10}OS$ Diethyl sulfoxide *25.4.16*

$C_4H_{10}O_2$ *tert*-Butyl hydroperoxide *7.3.3*

$C_4H_{10}S_2$ Diethyl disulfide *1.5.8, 1.7.5, 25.4.15, 25.5.9*

$C_4H_{11}CrN^{3+}$ 2-Ammonio-2,2-dimethylethylchromium(III) ion *7.36*

$C_4H_{11}CuN^{2+}$ 2-Ammonio-2,2-dimethylethylcopper(II) ion *8.33*

$C_4H_{11}N^+$ 2-Amino-2-methylpropyl, conjugate acid *9.7.4, 22.37.5*

$C_4H_{13}ClN_3Pt$ Chloro(diethylenetriamine)platinum(II), H reaction product *19.12, 19.12.1*
Chloro(diethylenetriamine)platinum(II), OH reaction product *19.40*
Chloro(diethylenetriamine)platinum(I) *19.8*

$C_4H_{13}CoN_3^{2+}$ Diethylenetriaminecobalt(II) ion *6.31*

$C_4H_{15}Cl_2N_3OPt^+$ Chloro(diethylenetriamine)platinum(II), $Cl_2^{\cdot-}$ reaction product *19.39*

$C_4H_{15}N_4Pt^{2+}$ Bis(ethylenediamine)platinum(III) ion, deprotonated *19.37*

$C_4H_{16}ClN_4Pt^{2+}$ Chlorobis(ethylenediamine)platinum(III) ion *19.35*

$C_4H_{16}Cl_2CoN_4^+$ *cis*-Dichlorobis(ethylenediamine)cobalt(III) ion *5.1.10, 28.2.13*
trans-Dichlorobis(ethylenediamine)-cobalt(III) ion *5.1.11, 28.2.14*

$C_4H_{16}CoF_2N_4^+$ *cis*-Bis(ethylenediamine)difluorocobalt(III) ion *5.1.13, 28.2.16*

$C_4H_{16}CoN_4^{2+}$ Bis(ethylenediamine)cobalt(II) ion *6.28*

$C_4H_{16}N_4Pt^+$ Bis(ethylenediamine)platinum(I) ion *19.7*

$C_4H_{16}N_4Pt^{2+}$ Bis(ethylenediamine)platinum(II), H reaction product *19.11*

$C_4H_{16}N_5O_5Ru$ Pentaammine(acetylenedicarboxylato)-ruthenium(III), OH-adduct *22.70*

$C_4H_{18}ClN_4OPt^{2+}$ Bis(ethylenediamine)platinum(II), $Cl_2^{\cdot-}$ reaction product *19.34*

$C_4H_{18}CoFN_4O^{2+}$ Aquabis(ethylenediamine)fluorocobalt(III) ion *5.1.14, 28.2.17*

$C_4H_{18}CoN_5O_4^+$ Pentaammine(fumarato)cobalt(III) ion *5.1.22, 28.2.25*

$C_4H_{19}ClCoN_5^{2+}$ *cis*-Amminechlorobis(ethylenediamine)-cobalt(III) ion *5.1.15, 28.2.18*

$C_4H_{19}CoN_6O_2^{2+}$ *cis*-Nitroamminebis(ethylenediamine)cobalt(III) ion *5.1.16, 28.2.19*

$C_4H_{19}N_4O_2Pt^{2+}$ Aquabis(ethylenediamine)hydroxoplatinum(III) ion *19.36*

$C_4H_{20}N_4O_2Pt^{3+}$ Diaquabis(ethylenediamine)platinum(III) ion *19.38*

$C_4N_4Ni^{2-}$ Tetracyanonickelate(II) ion *22.3.29*

$C_4N_4Ni^{3-}$ Tetracyanonickelate(I) ion *15.2*

$C_4N_4Pt^{3-}$ Tetracyanoplatinate(I) ion *19.6*

$C_5ClCoN_5^{4-}$ Chloro(pentacyano)cobaltate(II) ion *6.42*

$C_5CoN_5^{3-}$ Pentacyanocobaltate(II) ion *6.43*

$C_5CoN_5^{4-}$ Pentakis(cyano-*C*)cobaltate(I) ion *6.2*

$C_5FeN_5^{3-}$ Pentacyanoferrate(II) ion *9.6*

$C_5FeN_6O^{3-}$ Pentacyanonitrosylferrate(II) ion *9.7*

$C_5H_3N_2O_2^-$ 4-Pyrimidinecarboxylate ion *15.1.43*

$C_5H_6N_2$ 2-Methylpyrazine *9.6.1*

$C_5H_7CoO_2^+$ Acetylacetonatocobalt(II) ion *6.38*

$C_5H_7CrO_2^+$ Acetonylacetonatochromium(II) ion *7.26*

$C_5H_7N_3O$ 1-Methylcytosine *25.5.18*

$C_5H_8O_2^-$ 2-Carboxy-2,2-dimethylethyl anion *9.7.6, 22.37.7*

C_5H_9 Cyclopentyl *15.1.7*

$C_5H_9CrO_2^{2+}$ 2-Carboxy-2,2-dimethylethylchromium(III) ion *7.35*

$C_5H_9CuO_2^+$ 2-Carboxy-2,2-dimethylethylcopper(II) ion *8.37*

$C_5H_9CuO_2^{2+}$ 2-Carboxy-2,2-dimethylethylcopper(III) ion *8.72*

$C_5H_9Ni^+$ Cyclopentylnickel(II) ion *15.24*

$C_5H_9O_2^-$ Trimethylacetate ion *1.5.31, 1.7.9*

$C_5H_{11}NO_2S$ Methionine *1.5.20, 25.4.36*

$C_5H_{13}CuN_2O_2$ β-Alaninato(2-aminoethyl)copper(III) *8.83*

$C_5H_{13}CuN_2O_4^+$ Bis(glycinato)methylcopper(III) ion *8.82*

$C_5H_{14}ClCrNO_5^{3+}$ Pentaaqua(3-chloropyridine)chromium(III) ion *22.3.20*

$C_5H_{15}CrNO_5^{3+}$ Pentaaqua(pyridine)chromium(III) ion *22.3.19*

$C_5H_{16}CoN_4O_3^+$ Carbonatobis(ethylenediamine)cobalt(III) ion *5.1.12, 28.2.15*

$C_5H_{21}CoN_6O^{3+}$ Pentaammine(pyridine)cobalt(III) ion, OH adduct *6.95*

$C_5H_{23}Co_2N_8O_4^{3+}$ μ-4-Pyrimidinecarboxylatobis[hydroxotris(ammine)cobalt(III)] ion *15.1.28*
μ-5-Pyrimidinecarboxylatobis[hydroxotris(ammine)cobalt(III)] ion *15.1.27*

$C_6CoO_{12}^{3-}$ Trioxalatocobaltate(III) ion *6.1.11, 17.3.8*

$C_6FeN_6^{3-}$ Ferricyanide ion *3.1.3, 6.98.1, 8.84.3, 9.13.2, 9.34, 15.28.2, 22.24.2, 25.1.6, 25.2.6, 28.6.4*

$C_6FeN_6^{4-}$ Ferrocyanide ion *9.49.8, 19.31.1, 19.37.3, 19.45.3, 19.46.4, 22.46.1, 22.50.53, 28.13.3, 28.15.4*

C_6H_4BrO 4-Bromophenoxyl *22.3.44*

C_6H_4ClO 4-Chlorophenoxyl *22.3.47*

$C_6H_4CuO_2$ 4-Hydroxyphenoxycopper(II) ion, conjugate base *8.40*

$C_6H_4CuO_2^+$ 4-Hydroxyphenoxycopper(III) ion, conjugate base *8.78*

C_6H_4IO 4-Iodophenoxyl *22.3.56*

$C_6H_4O_2$ 1,4-Benzoquinone *1.2.7, 5.1.60, 6.1.28, 7.2.5, 8.15.10, 10.6.3, 10.7.1, 10.8.4, 10.9.1, 10.10.8, 10.11.3, 10.12.3, 10.13.1, 15.1.41, 15.8.16, 15.10.20, 17.2.3, 22.3.41, 22.35.3, 25.1.17, 28.2.61*

$C_6H_4O_2^-$ 1,4-Benzosemiquinone, radical ion *28.22.2*

$C_6H_5CoNO_6^-$ Nitrilotriacetatocobaltate(II) ion, H-abstraction product *6.60*

$C_6H_5CuO_2^{2+}$ 2-Hydroxyphenoxycopper(III) ion *8.76*
3-Hydroxyphenoxycopper(III) ion *8.77*

$C_6H_5MnNO_6^-$ Nitrilotriacetatomanganate(II) ion, H-abstraction product *13.9*

$C_6H_5NNiO_6^-$ Nitrilotriacetatonickelate(II), H-abstraction product *15.29*

$C_6H_5NO_2$ Nitrobenzene *1.1.12, 1.2.10, 1.3.9*

$C_6H_5NO_2^-$ Nitrobenzene radical anion *28.15.12*

$C_6H_5NO_6Zn^-$ Nitrilotriacetatozinc(II) H-abstraction product *28.10*

C_6H_5O Phenoxyl *22.3.63*

$C_6H_6AgNO_6^-$ Nitrilotriacetatoargentate(II) *1.12*

$C_6H_6CdNO_6^{2-}$ Nitrilotriacetatocadmium(I) ion *5.10*

$C_6H_6CoNO_6^{2-}$ Nitrilotriacetatocobaltate(I) ion *6.3*

$C_6H_6CuNO_6^-$ Nitrilotriacetatocuprate(II) ion *8.46.2*

$C_6H_6NNiO_6^{2-}$ Nitrilotriacetatonickelate(I) ion *15.17*

$C_6H_6O_2$ 1,2-Benzenediol *13.15.3, 13.18.3*
1,3-Benzenediol *13.15.4, 13.18.7*
1,4-Benzenediol *22.50.76, 28.22.4*

$C_6H_6O_6^-$ Ascorbate radical anion *6.13.1, 6.14.1*

$C_6H_7O_6^-$ Ascorbate ion *13.14.1, 13.17.1, 13.19.1, 13.20.1, 15.45.1*

$C_6H_8BrCoNO_7^-$
Aqua(bromo)nitrilotriacetatocobaltate(III) ion *6.107*

$C_6H_8N_2O_2$ 1-Methylthymine *25.5.20*

$C_6H_{10}Cu^+$ Copper(II) ion, complex with cyclohexene *8.39*

$C_6H_{10}CuNO_8^-$
cis-Diaqua(nitrilotriacetato)copper(II) ion *8.84.4, 8.85.1, 8.86.1*

$C_6H_{10}MnN_2O_6^-$
Peroxido(ethylenediaminediacetato)-manganate(III) ion *13.27*

$C_6H_{10}Mo_2N_2O_8S_2^{2-}$
Bis(μ-oxo)bis[(cysteinato)-oxomolybdate(V)] ion *28.2.48*

$C_6H_{10}O_4S$ 3,3′-Thiodipropionic acid *25.4.50*

$C_6H_{11}O$ 2-Hydroxycyclohexyl *8.39.1*

$C_6H_{12}CoN_3O_6$
Tris(glycinato)cobaltate(II) ion *6.45*

$C_6H_{12}O_2$ *cis*-1,2-Cyclohexanediol *1.7.3*
trans-1,2-Cyclohexanediol *1.7.4*

$C_6H_{14}CrN_2O_5^{3+}$
Pentaaqua(3-cyanopyridine)chromium(III) ion *22.3.21*

$C_6H_{14}CuN_2O_4^+$
Bis(alanine)copper(III) complex *8.58*

$C_6H_{14}CuN_2O_4^-$
Bis(alaninato)cupratc(I) *8.10*

$C_6H_{14}CuN_4O_4^+$
Bis(β-alanine)copper(III) complex *8.59*

$C_6H_{14}OS$ Dipropyl sulfoxide *25.4.33*

$C_6H_{14}O_2S$ 3,3′-Thiodipropanol *25.4.49*

$C_6H_{15}CuN^{2+}$ 2-(Dimethylammonio)ethylcopper(II) ion *8.36*

$C_6H_{15}CuN_2O_5$
Bis(alaninato)hydroxycopper(II) *8.10.1*

$C_6H_{15}NO_3$ Triethanolamine *22.50.83, 22.59.9*

$C_6H_{16}CrNO_5^{3+}$
Pentaaqua(4-pyridiniomethyl)chromium(III) ion *22.3.17*

$C_6H_{17}CrNO_5^{3+}$
Pentaaqua(4-methylpyridine)chromium(III) ion *22.3.18*

$C_6H_{18}CoN_4^{2+}$ Triethylenetetraminecobalt(II) ion *6.32*

$C_6H_{18}CoN_5O_2^+$
Nitrito(triethylenetetramine)cobalt(II) ion *6.34*

$C_6H_{19}CoN_4O^+$
Hydroxytriethylenetetraminecobalt(II) ion *6.33*

$C_6H_{20}Cl_2N_2O_2Pt$
cis-Dichlorobis(isopropylamine)-*trans*-dihydroxyplatinum(IV), OH reaction product *19.49*

$C_6H_{20}Cl_2N_2O_2Pt^-$
cis-Dichlorobis(isopropylamine)-*trans*-dihydroxyplatinate(III) ion *19.24*

$C_6H_{22}CoN_7O_2^{3+}$
Pentaammine(isonicotinamide)cobalt(III) ion, OH adduct *6.97*
Pentaammine(nicotinamide)cobalt(III) ion, OH adduct *6.96*

$C_6H_{24}CoN_6^{2+}$ Tris(ethylenediamine)cobalt(II) ion *6.27*

$C_6H_{24}CoN_6^{3+}$ Tris(ethylenediamine)cobalt(III) ion *5.1.9, 6.1.4, 6.6.7, 7.6.1, 7.15.1, 7.16.1, 8.16.2, 15.1.9, 15.8.2, 15.10.3, 17.3.7, 22.3.4, 28.2.12*

$C_6N_6Os^{4-}$ Hexacyanoosmate(II) ion *22.46.2*

$C_6N_6Ru^{3-}$ Hexacyanoruthenate(III) ion *22.46*

$C_7H_4O_3^-$ 4-Carboxyphenoxyl, conjugate base *22.3.46*

$C_7H_5O_3^-$ Sesamol, conjugate base *9.34.5*

$C_7H_6ClCu^{2+}$ (4-Chlorophenyl)methylcopper(III) ion *8.75*

$C_7H_6FeNO_9^{2-}$ Carboxylato(nitrilotriacetato)ferrate(III) ion *9.29*

C_7H_7Br Benzyl bromide *7.3.2*

$C_7H_7Cu^{2+}$ Benzylcopper(III) ion *8.74*

$C_7H_7CuO_2^{2+}$ 3-Hydroxy-5-methylphenoxycopper(III) ion *8.79*

C_7H_7O 3-Methylphenoxyl *22.3.61*
4-Methylphenoxyl *22.3.62*

$C_7H_7O_2$ 3-Methoxyphenoxyl *22.3.59*
4-Methoxyphenoxyl *22.3.60*

$C_7H_8N_2S$ Phenylthiourea *25.4.43*

C_7H_8O Anisole *1.5.7, 25.4.13*

$C_7H_{11}CoNO_7^-$
Aqua(methyl)nitrilotriacetatocobaltate(III) ion *6.101*

$C_7H_{11}CoNO_8^-$
Aqua(hydroxymethyl)nitrilotriacetato-cobaltate(III) ion *6.102*

$C_7H_{11}CuNO_8^-$
cis-Aqua(hydroxymethyl)(nitrilotriacetato)-cuprate(III) ion *8.84*

$C_7H_{11}FeNO_7^-$ Aqua(methyl)nitrilotriacetatoferrate(III) ion *9.28*

$C_7H_{11}MnNO_7^-$ Aqua(methyl)nitrilotriacetatomanganate(III) ion *13.28*

$C_7H_{17}CrO_5^{2+}$ Pentaaqua(benzyl)chromium(III) ion *22.3.16, 22.50.26*

$C_7H_{19}CoN_6O_4^+$ Pentaammine(4-nitrobenzoato)cobalt(III) ion, electron adduct *6.67*

$C_7H_{19}CuN_2^{3+}$ 2-(Dimethylammonio)-1-(dimethylammoniomethyl)ethylcopper(II) ion *8.35*

$C_8H_4N_2$ 1,4-Dicyanobenzene *25.2.14*

$C_8H_6NO^-$ 5-Hydroxyindole, conjugate base *9.34.2*

C_8H_7NO 5-Hydroxyindole *12.5.1*

$C_8H_7O_3^-$ 2-Methoxybenzoate ion *1.6.7*
3-Methoxybenzoate ion *1.6.8*
4-Methoxybenzoate ion *1.6.9*

C_8H_8O Acetophenone *5.1.56, 5.3.1*

$C_8H_8O_2^-$ 2,6-Dimethylbenzosemiquinone, radical ion *28.22.3*

$C_8H_8O_3$ 2-Methoxybenzoic acid *1.5.21, 25.4.37*
3-Methoxybenzoic acid *1.5.22, 25.4.38*
4-Methoxybenzoic acid *1.5.23, 25.4.39*

$C_8H_9Cu^{2+}$ (4-Methylphenyl)methylcopper(III) ion *8.81*

$C_8H_9CuO^{2+}$ (4-Methoxyphenyl)methylcopper(III) ion *8.80*

$C_8H_9N_2NiO_8^{2-}$ Bis(iminodiacetato)nickelate(II), H-abstraction product *15.28*

C_8H_9O 4-Ethylphenoxyl *22.3.51*

$C_8H_9O_2$ 4-Ethoxyphenoxyl *22.3.50*

$C_8H_9O_3^-$ 2,6-Dimethoxyphenoxide ion *9.36.2*
3,4-Dimethoxyphenoxide ion *9.34.1*
3,5-Dimethoxyphenoxide ion *9.36.1*

$C_8H_{10}CoNO_9^{2-}$ Aqua(carboxymethyl)nitrilotriacetatocobaltate(III) ion *6.104*

$C_8H_{10}N_2O$ *N,N*-Dimethyl-4-nitrosoaniline *5.1.68*

$C_8H_{10}N_2O_3S$ Sulfacetamide *25.4.47*

$C_8H_{10}O_2$ 1,2-Dimethoxybenzene *1.5.9, 25.4.18, 25.5.10*
1,3-Dimethoxybenzene *1.5.10, 25.4.19*
1,4-Dimethoxybenzene *1.5.11, 25.4.20, 25.5.11*

$C_8H_{10}O_2^+$ 1,4-Dimethoxybenzene radical cation *12.3.3, 25.4.21*

$C_8H_{10}O_3$ 3,4-Dimethoxyphenol *9.38.2*

$C_8H_{12}CuO_8^{3-}$ Tetraacetatocuprate(I) ion *8.8, 22.50.45*

$C_8H_{13}CoNO_8^-$ Aqua(1-hydroxyethyl)nitrilotriacetatocobaltate(III) ion *6.103*

$C_8H_{13}CuNO_8^-$ *cis*-Aqua(1-hydroxyethyl)(nitrilotriacetato)-cuprate(III) ion *8.85*

$C_8H_{16}CrF_3O_5^{2+}$ Pentaaqua[4-(trifluoromethyl)benzyl]-chromium(III) ion *22.50.25*

$C_8H_{16}CrNO_5^{3+}$ Pentaaqua(4-cyanobenzyl)chromium(III) ion *22.50.24*

$C_8H_{18}CuN_2O_4^+$ Bis(α-aminobutyric acid)copper(III) complex *8.60*
Bis(α-aminoisobutyric acid)copper(III) complex *8.63*
Bis(β-aminobutyric acid)copper(III) complex *8.61*
Bis(γ-aminobutyric acid)copper(III) complex *8.62*

$C_8H_{19}CrO_5^{2+}$ Pentaaqua(4-methylbenzyl)chromium(III) ion *22.50.27*

$C_8H_{23}CoN_5O_3S^+$ *O*-Sulfito(tetraethylenepentamine)-cobalt(III) ion *6.109*

$C_8H_{23}CoN_7O_3^{2+}$ Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) radical anion *6.68*

$C_8H_{23}CoN_7O_3^{3+}$ Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) ion *6.68.1*

$C_8H_{24}CoN_7O_3^{3+}$ Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) radical, protonated *6.69*

$C_8H_{26}CoN_6^{2+}$ Bis(diethylenetriamine)cobalt(II) ion *6.30*

$C_8H_{34}Co_2N_9O_2^{3+}$ μ-Amido-μ-peroxidotetrakis-(ethylenediamine)dicobalt(III) ion *6.112, 22.50.16*

$C_8H_{34}Co_2N_9O_2^{4+}$ μ-Amido-μ-superoxidotetrakis-(ethylenediamine)dicobalt(III) ion *5.1.28*

$C_8MoN_8^{3-}$ Octacyanomolybdate(V) ion *14.4*

$C_9H_9I_2NO_3$ 3,5-Diiodotyrosine *25.4.17*

$C_9H_9O_4^-$ 2,3-Dimethoxybenzoate ion *1.6.2*
2,4-Dimethoxybenzoate ion *1.6.4*
2,6-Dimethoxybenzoate ion *1.6.5*
3,4-Dimethoxybenzoate ion *1.6.3*
3,5-Dimethoxybenzoate ion *1.6.6*

$C_9H_{10}O_4$ 2,3-Dimethoxybenzoic acid *1.5.12, 25.4.22*
2,4-Dimethoxybenzoic acid *1.5.14, 25.4.24*
2,6-Dimethoxybenzoic acid *1.5.15, 25.4.25*
3,4-Dimethoxybenzoic acid *1.5.13, 25.4.23*
3,5-Dimethoxybenzoic acid *1.5.16, 25.4.26*

$C_9H_{11}NO_3$ Tyrosine *28.15.14*

$C_9H_{11}O$ 2,4,6-Trimethylphenoxyl *22.3.65*
4-Isopropylphenoxyl *22.3.57*

$C_9H_{12}O_2$ Trimethylhydroquinone *22.50.84*

$C_9H_{12}O_3$ 1,2,3-Trimethoxybenzene *1.5.24, 25.4.53*
1,2,4-Trimethoxybenzene *1.5.25, 25.4.54*
1,3,5-Trimethoxybenzene *1.5.26, 25.4.55*

$C_9H_{13}NO^+$ 4-Methoxy-*N,N*-dimethylaniline radical cation *22.3.58*

$C_9H_{13}N_2O_9P$ Uridine 5′-monophosphate radical *22.35.4*

$C_9H_{15}B_2CoF_4$ Bis(dimethylglyoximato)methylcobalt(III) difluoroborate *22.3.11*

$C_9H_{15}CoNO_8^-$
Aqua(1-hydroxy-1-methylethyl)nitrilotriacetatocobaltate(III) ion *6.106*

$C_9H_{15}CuNO_8^-$
cis-Aqua(1-hydroxy-1-methylethyl)-(nitrilotriacetato)cuprate(III) ion *8.86*

$C_9H_{18}N_4Pt^{2+}$ Diethylenetriamine(pyridine)platinum(II) ion *19.41.2*

$C_9H_{20}N_4OPt^{2+}$
Diethylenetriamine(pyridine)platinum(II) ion OH-adduct *19.41*

$C_9H_{22}N_4Ni^+$ 1,4,7,10-Tetraazacyclotridecanenickel(I) ion *15.4*

$C_9H_{22}N_4Ni^{3+}$ 1,4,7,10-Tetraazacyclotridecanenickel(III) ion *15.35*

$C_9H_{22}N_6Ni^+$ 3,7-Bis(2-aminoethyl)-1,3,5,7-tetraazabicyclo[3.3.1]nonanenickel(I) ion *15.16*

$C_9H_{22}N_6Ni^{3+}$ 3,7-Bis(2-aminoethyl)-1,3,5,7-tetraazabicyclo[3.3.1]nonanenickel(III) ion *15.55*

$C_9H_{25}CoN_7O_3^{2+}$
Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) radical anion *6.71*

$C_9H_{25}CoN_7O_3^{3+}$
Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) ion *6.70.1, 6.71.1*

$C_9H_{26}CoN_7O_3^{3+}$
Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) radical, protonated *6.71*

$C_{10}H_5O_5S^-$ 1,4-Naphthoquinone-2-sulfonate ion *5.1.67, 6.1.30*

$C_{10}H_6O_3$ 2-Hydroxy-1,4-naphthoquinone *5.1.64*

$C_{10}H_7NO_3^{2-}$ 5-Hydroxyindole-3-acetate ion, conjugate base *9.34.3*

$C_{10}H_8CoN_2^+$ 2,2′-Bipyridinecobalt(I) ion *6.9*

$C_{10}H_8CoN_2^{2+}$ 2,2′-Bipyridinecobalt(II) ion *6.1.13, 22.3.5*

$C_{10}H_9N_2^+$ 2,2′-Bipyridine, conjugate acid *6.11.1, 22.3.42*

$C_{10}H_{10}Co$ Cobaltocene *6.65*

$C_{10}H_{11}CoN_2O_8^{2-}$
Ethylenediaminetetraacetatocobaltate(II) ion, H-abstraction product *6.61*

$C_{10}H_{11}MnN_2O_8^{2-}$
Ethylenediaminetetraacetatomanganate(II) ion, H-abstraction product *13.10*

$C_{10}H_{11}N_2NiO_6^{2-}$
Ethylenediaminetetraacetatonickelate(II), H-abstraction product *15.30*

$C_{10}H_{11}N_2O^-$ Serotonin, conjugate base *9.34.6*

$C_{10}H_{11}N_2O_8Zn^{2-}$
Ethylenediaminetetraacetatozinc(II) H-abstraction product *28.11*

$C_{10}H_{11}O_5^-$ 2,3,4-Trimethoxybenzoate ion *1.6.10*
2,4,5-Trimethoxybenzoate ion *1.6.12*
2,4,6-Trimethoxybenzoate ion *1.6.13*
3,4,5-Trimethoxybenzoate ion *1.6.11*

$C_{10}H_{12}AgN_2O_8^{2-}$
Ethylenediaminetetraacetatoargentate(II) *1.13*

$C_{10}H_{12}CdN_2O_8^{3-}$
Ethylenediaminetetraacetatocadmate(I) ion *5.7*

$C_{10}H_{12}CoN_2O_8^{2-}$
Ethylenediaminetetraacetatocobaltate(II) ion *6.48, 22.50.2, 28.14.2*

$C_{10}H_{12}CoN_2O_{10}^{2-}$
Ethylenediaminetetraacetatocobaltate(III) ion, superoxide adduct *6.79*

$C_{10}H_{12}CoN_2O_{10}^{3-}$
Ethylenediaminetetraacetatocobaltate(II) ion, superoxide adduct *6.58*

$C_{10}H_{12}CuN_2O_8^{3-}$
Ethylenediaminetetraacetatocuprate(I) ion *8.9*

$C_{10}H_{12}Mo_2N_2O_{12}^{2-}$
Bis(μ-oxo)(ethylenediaminetetraacetato)-bis[oxomolybdate(V)] ion *28.2.47*

$C_{10}H_{12}Mo_2N_2O_{12}^{3-}$
Bis(μ-oxo)(ethylenediaminetetraacetato)-bis[oxomolybdate(IV)(V)] ion *14.2*

$C_{10}H_{12}N_2NiO_8^{-}$
Ethylenediaminetetraacetatonickelate(III) ion *15.70*

$C_{10}H_{12}N_2NiO_8^{2-}$
Ethylenediaminetetraacetatonickelate(II) ion *15.30.1*

$C_{10}H_{12}N_2O_8Os^{-}$
Ethylenediaminetetraacetatoosmate(III) ion *22.3.32*

$C_{10}H_{12}N_2O_8Pb^{2-}$
Ethylenediaminetetraacetatoplumbate(II) ion *5.7.7*

$C_{10}H_{12}O_2$ Duroquinone *5.1.62, 5.2.4, 5.3.5, 5.4.3, 5.5.2, 22.3.49*

$C_{10}H_{12}O_5$ 2,3,4-Trimethoxybenzoic acid *1.5.27, 25.4.56*
2,4,5-Trimethoxybenzoic acid *1.5.29, 25.4.58*
2,4,6-Trimethoxybenzoic acid *1.5.30, 25.4.59*
3,4,5-Trimethoxybenzoic acid *1.5.28, 25.4.57*

$C_{10}H_{13}N_2NiO_9^{2-}$
Hydroxy(ethylenediaminetetraacetato)-nickelate(III) ion *15.71*

$C_{10}H_{13}N_5O_4$ Adenosine *25.5.4*

$C_{10}H_{13}N_5O_5$ Guanosine *25.5.15*

$C_{10}H_{14}CoO_4$ Bis(acetylacetonato)cobalt(II) *6.37*

$C_{10}H_{14}CrO_4$ Bis(acetylacetonato)chromate(II) *7.25*

$C_{10}H_{14}N_2NiO_9^{-}$
Aqua(ethylenediaminetetraacetato)-nickelate(III) ion *15.72*

$C_{10}H_{14}N_5O_6P$ 2′-Deoxyadenosine 5′-monophosphate *25.5.7*

$C_{10}H_{14}N_5O_7P$ 2′-Deoxyguanosine 5′-monophosphate *25.5.8*

$C_{10}H_{14}O_2$ *tert*-Butylhydroquinone *13.15.2, 13.18.2*

$C_{10}H_{14}O_4$ 1,2,4,5-Tetramethoxybenzene *25.4.48*

$C_{10}H_{16}CrN_2O_4^{3+}$
Tetraaqua(2,2′-bipyridine)chromium(III) ion *22.3.23*

$C_{10}H_{16}N_2$ *N,N,N′,N′*-Tetramethyl-*p*-phenylenediamine *9.34.7, 9.35.1, 9.36.3, 9.37.1, 9.38.1*

$C_{10}H_{16}N_2O_6Pd^{-}$
Bis(hydroxyprolinato)palladate(I) ion *18.2*

$C_{10}H_{16}N_2O_8$ Ethylenediaminetetraacetate ions *22.50.74, 22.63.1, 22.65.2, 22.66.1, 22.67.1, 28.14.15*

$C_{10}H_{17}CoNO_8^{-}$
Aqua(1-ethoxyethyl)nitrilotriacetato-cobaltate(III) ion *6.105*

$C_{10}H_{18}CrN_2O_4^{3+}$
Tetraaquabis(pyridine)chromium(III) ion *22.3.22*

$C_{10}H_{22}CdN_2O_3^{+}$
1,4,10-Trioxa-7,13-diazacyclopentadecane-cadmium(I) ion *5.2*

$C_{10}H_{23}N_5NiO_2^{+}$
9-Methyl-9-nitro-1,4,7,11-tetraazacyclotridecanenickel(II) ion, electron adduct *15.5*

$C_{10}H_{23}N_5NiO_2^{3+}$
9-Methyl-9-nitro-1,4,7,11-tetraazacyclotridecanenickel(III) ion *15.36*

$C_{10}H_{24}CdN_4^{+}$ 1,4,8,11-Tetrazacyclotetradecanecadmium(I) ion *5.6*

$C_{10}H_{24}CoN_4^{2+}$
1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion *6.49, 22.50.5*

$C_{10}H_{24}CoN_4^{3+}$
1,4,8,11-Tetraazacyclotetradecane-cobalt(III) ion *7.4.5, 7.6.4, 7.8.3, 7.11.3, 7.15.2, 7.16.4, 7.17.1*

$C_{10}H_{24}CoN_4O_2^{2+}$
1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion, dioxygen adduct *6.63*

$C_{10}H_{24}CuN_4^{+}$ 1,4,8,11-Tetraazacyclotetradecanecopper(I) ion *8.13*

$C_{10}H_{24}N_4Ni^{+}$ 1,4,8,11-Tetraazacyclotetradecanenickel(I) ion *15.6*

$C_{10}H_{24}N_4Ni^{3+}$
1,4,8,11-Tetraazacyclotetradecane-nickel(III) ion *15.42*

$C_{10}H_{24}N_4Zn^{+}$ 1,4,8,11-Tetrazacyclotetradecanezinc(I) ion *28.3*

$C_{10}H_{25}Cl_2MnN_4O^{+}$
Dichlorohydroxy(1,4,7,11-tetraazacyclo-tetradecane)manganese(IV) ion *13.33*

$C_{10}H_{25}CuN_4^{2+}$
1,4,8,11-Tetraazacyclotetradecane-(hydrido)copper(III) ion *8.53*

$C_{10}H_{26}CrN_4O_2$
trans-Dihydroxy-1,4,8,11-tetraazacyclotetradecanechromium(III), OH reaction product *7.38*

$C_{10}H_{27}CoN_7O_3^{2+}$
Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) radical anion *6.72*

$C_{10}H_{27}CoN_7O_3^{3+}$
Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) ion *6.72.1, 6.73.1*

$C_{10}H_{28}CoN_7O_3^{3+}$
Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) radical, protonated *6.73*

$C_{10}H_{28}CrN_4O_2^{2+}$
trans-Diaqua-1,4,8,11-tetraazacyclotetradecanechromium(II) ion *7.3*

$C_{10}H_{30}CoN_7O_3^{2+}$
Pentaammine(1-L-prolyl-L-prolinato)-cobalt(III) ion *22.4.1*

$C_{10}H_{32}CrN_6O^{3+}$
cis-Diammine(aqua)(1,4,8,11-tetraazacyclotetradecane)chromium(III) ion *7.37*

$C_{11}H_8O_2$ 2-Methyl-1,4-naphthoquinone *5.1.65, 6.1.29, 6.6.28, 6.67.2, 8.47.4, 15.1.42, 17.2.4, 28.2.62*

$C_{11}H_9FeO_2$ Carboxyferricenium *9.35*

$C_{11}H_{11}N_2$ 1-Methyl-4,4′-bipyridinyl *22.50.77*

$C_{11}H_{11}N_2O_3^-$ 5-Hydroxytryptophan, conjugate base *9.34.4*

$C_{11}H_{12}Fe^+$ Hydroxymethylferricenium *9.37*

$C_{11}H_{12}N_2O_2$ Tryptophan *15.34.1, 28.15.13*

$C_{11}H_{15}FeN_2O_9^{2-}$
Carboxylato(2-hydroxyethyl-ethylenediaminetriacetato)ferrate(III) ion *9.30*

$C_{11}H_{20}CoN_2O_9^-$
Aqua(hydroxymethyl)[*N*-(2-hydroxyethyl)-*N*,*N*′,*N*′-ethylenediaminetriacetato]-cobaltate(III) ion *6.108*

$C_{11}H_{21}BrF_3N_4NiO^{2+}$
Aquabromo-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraaza-cyclotrideca-10,13-dienenickel(III) ion *15.39*

$C_{11}H_{21}N_4Ni^{2+}$
11,13-Dimethyl-1,4,7,10-tetraaza-cyclotrideca-10,13-dienenickel(III) ion, conjugate base *15.38*

$C_{11}H_{22}F_3N_4NiO_2^{2+}$
Diaqua-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion, conjugate base *15.40*

$C_{11}H_{22}N_4Ni^{3+}$
11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion *15.37*

$C_{11}H_{26}CoN_4^{2+}$
1,4,8,12-Tetraazacyclopentadecane-cobalt(II) ion *22.50.9*

$C_{11}H_{26}CoN_7^{3+}$
Pentaammine(1-methyl-4,4′-bipyridinium)cobalt(III) ion, electron adduct *6.66*

$C_{11}H_{26}CoN_7^{4+}$
Pentaammine(1-methyl-4,4′-bipyridinium)cobalt(III) ion *6.66.1*

$C_{11}H_{26}N_4Ni^{3+}$
1,4,8,12-Tetraazacyclopentadecane-nickel(III) ion *15.51*

$C_{11}H_{27}N_5Ni^{3+}$
1,4,7,10,13-Pentaazacyclohexadecane-nickel(III) ion *15.52*

$C_{11}H_{29}N_4NiO^{2+}$
Aquamethyl(1,4,8,11-tetraaza-cyclotetradecane)nickel(III) ion *15.41*

$C_{12}H_6N_2O_2$ 1,10-Phenanthroline-5,6-dione *25.5.21*

$C_{12}H_8FeO_4^-$ 1,1′-Dicarboxyferricenium *9.36*

$C_{12}H_9NO$ 3-Benzoylpyridine *6.6.23, 15.8.17, 15.10.21*

$C_{12}H_9O$ 4-Phenylphenoxyl *22.3.64*

$C_{12}H_{10}S$ Diphenyl sulfide *25.4.31*

$C_{12}H_{10}Se$ Diphenyl selenide *25.4.30*

$C_{12}H_{10}Te$ Diphenyl telluride *25.4.32*

$C_{12}H_{11}N_3S^+$ Thionine semiquinone, conjugate monoacid *6.99.1, 13.11.1*

$C_{12}H_{12}CoN_2^+$ 4,4′-Dimethyl-2,2′-bipyridinecobalt(I) ion *6.12*

$C_{12}H_{12}CoN_2^{2+}$
4,4′-Dimethyl-2,2′-bipyridinecobalt(II) ion *6.1.14, 22.3.6*

$C_{12}H_{12}N_2.Co$ 4,4′-Dimethyl-2,2′-bipyridinecobalt(I) ions *6.13*

$C_{12}H_{13}N_2^+$ 4,4′-Dimethyl-2,2′-bipyridine, conjugate monoacid *6.16.2*

$C_{12}H_{14}N_2^+$ 1,1′-Dimethyl-4,4′-bipyridinium radical cation *9.32.1, 12.4.1, 22.47.2, 22.50.73, 22.63.2, 22.64.1, 22.65.1, 28.14.8, 28.15.9*

$C_{12}H_{14}N_2^{2+}$ 1,1′-Dimethyl-4,4′-bipyridinium *7.3.1, 9.3.2, 9.4.2, 21.11.5, 22.3.48, 22.6.1, 22.7.1, 22.8.1, 22.9.1, 22.10.1, 22.11.1, 22.12.2, 22.13.1, 22.14.1, 22.15.1, 22.16.1, 22.17.1, 22.18.4, 22.19.1, 22.20.1, 22.21.1, 22.22.1, 22.23.1, 22.28.2, 23.1.1*

$C_{12}H_{18}Cl_2N_6O_6Pt^+$
cis-[Dichlorobis(1-(2-hydroxyethyl)-2-methyl-5-nitroimidazole-N^3)]platinum(III) ion *19.48*

$C_{12}H_{24}N_4Ni^{2+}$ 5,7-Dimethyl-1,4,8,11-tetraazacyclotetradeca-4,7-dienenickel(II) ion *6.100.5*

$C_{12}H_{26}CdN_2O_4^{+}$ 1,4,10,13-Tetraoxa-7,16-diazacycloctadecanecadmium(I) ion *5.3*

$C_{12}H_{29}ClN_3Pt^{+}$ Chloro(tetraethyldiethylenetriamine)platinum(II), H reaction product *19.13*

$C_{12}H_{29}CoN_3^{2+}$ Tetraethyldiethylenetriaminecobalt(II) ion *6.35*

$C_{12}H_{29}CrN_4^{2+}$ (Methyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.28*

$C_{12}H_{30}CoN_8^{2+}$ 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]-eicosanecobalt(II) ion *6.54, 22.50.4, 22.55.3, 22.57.1, 22.59.3*

$C_{12}H_{30}CoN_8^{3+}$ 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]-eicosanecobalt(III) ion *22.3.9, 22.18.1, 22.19.2*

$C_{12}H_{30}N_6Ni^{3+}$ Bis(1,4,7-triazacyclononane)nickel(III) ion *15.34*

$C_{12}H_{30}N_8Rh^{2+}$ 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]-eicosanerhodium(II) ion *21.9*

$C_{12}H_{32}Cl_2N_3OPt^{+}$ Chloro(tetraethyldiethylenetriamine)-platinum(II), $Cl_2^{\bullet-}$ reaction product *19.42*

$C_{12}H_{33}ClN_3O_2Pt^{+}$ Chloro(tetraethyldiethylenetriamine)-platinum(II), OH reaction product *19.43*

$C_{13}H_8O$ 9-Fluorenone *5.1.63, 5.3.6, 5.4.4, 5.5.3, 6.6.24*

$C_{13}H_9NO$ 6-Aminophenalenone *1.5.6, 25.4.12*

$C_{13}H_{10}O$ Benzophenone *5.1.59, 5.2.2, 5.3.3, 5.4.1, 5.5.1, 6.1.27, 28.2.60*

$C_{13}H_{11}NS$ 10-Methylphenothiazine *14.4.1*

$C_{13}H_{13}N_2O$ *N*-Benzyl-3-carbamylpyridinyl *28.23.2*

$C_{13}H_{14}N_2^{+}$ 1,1′-Trimethylene-2,2′-bipyridinium radical cation *22.50.82*

$C_{13}H_{15}N_2O_3S$ 1-Methyl-1′-(2-sulfonato)ethyl-4,4′-bipyridinium radical cation *28.14.17, 28.15.10*

$C_{13}H_{15}N_3O_3$ Glycyltryptophan *25.5.16*

$C_{13}H_{17}FeN^{+}$ (Dimethylaminomethyl)ferricenium *9.38*

$C_{13}H_{27}N_7NiO_2^{+}$ 8-Methyl-8-nitro-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1^{13,15}]octadecane-nickel(II) ion, electron adduct *15.14*

$C_{13}H_{27}N_7NiO_2^{3+}$ 8-Methyl-8-nitro-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1^{13,15}]octadecane-nickel(III) ion *15.53*

$C_{13}H_{29}N_7Ni^{+}$ 8-Amino-8-methyl-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1^{13,15}]octadecane-nickel(I) ion *15.15*

$C_{13}H_{29}N_7Ni^{3+}$ 8-Amino-8-methyl-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1^{13,15}]octadecane-nickel(III) ion *15.54*

$C_{13}H_{31}CrN_4^{2+}$ (Ethyl)-1,4,8,12-tetraazacyclopentadecane-chromium(III) ion *22.50.29*

$C_{14}H_6O_8S_2^{2-}$ 9,10-Anthraquinone-2,6-disulfonate ion *6.4.6, 7.2.4, 8.15.8, 15.8.15, 15.10.19*

$C_{14}H_7O_5S^{-}$ 9,10-Anthraquinone-2-sulfonate ion *6.6.22, 8.15.9*

$C_{14}H_8CrN_2O_8^{-}$ 2,2′-Bipyridinebis(oxalato)chromate(III) ion *5.1.37, 28.2.39*

$C_{14}H_8CrN_2O_8^{2-}$ 2,2′-Bipyridinebis(oxalato)chromate(II) ion *7.21*

$C_{14}H_8FeN_6^{-}$ Tetracyano(2,2′-bipyridine)ferrate(III) ion *9.3.1, 9.32*

$C_{14}H_8FeN_6^{3-}$ 2,2′-Bipyridinetetracyanoferrate(II) ion, electron adduct *9.3*

$C_{14}H_8O_2$ 9,10-Anthraquinone *5.1.57, 6.1.26*

$C_{14}H_{10}O_2$ Benzil *5.1.58, 5.2.1, 5.3.2*

$C_{14}H_{14}N_2O_4^{+}$ 1,1′-Bis(carboxymethyl)-4,4′-bipyridinium radical cation *22.50.64*

$C_{14}H_{16}N_2^{+}$ 1,1′-Tetramethylene-2,2′-bipyridinium radical cation *22.50.80*

$C_{14}H_{16}N_2O_6S_2^{-}$ 1,1′-Bis(2-sulfonatoethyl)-4,4′-bipyridinium radical anion *19.47.2, 22.50.67, 28.14.5, 28.15.7*

$C_{14}H_{17}O_4^{-}$ 6-Hydroxy-2,5,7,8-tetramethylchroman-2-carboxylate ion *13.17.2, 13.18.4*

$C_{14}H_{18}N_2^{+}$ 1,1′,2,2′-Tetramethyl-4,4′-bipyridinium radical cation *22.50.81*

$C_{14}H_{18}N_2O_2^{-}$ 1,1′-Bis(2-hydroxyethyl)-4,4′-bipyridinium radical cation *22.50.65*

$C_{14}H_{21}CuN_2O_{10}^{3-}$ (1-Hydroxybutyl)ethylenediamine-tetraacetatocuprate(II) ion *8.41*

$C_{14}H_{24}CoN_4^+$ 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(I) ion *6.4*

$C_{14}H_{24}CoN_4^{2+}$ 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion *6.55, 6.100.1, 13.25.1, 22.50.8*

$C_{14}H_{24}CoN_4O_2^+$ 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion, superoxide adduct *6.56*

$C_{14}H_{24}CuN_4^+$ 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecopper(I) ion *8.16*

$C_{14}H_{24}N_4Ni^{3+}$ 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenenickel(II) ion *6.100.8*

$C_{14}H_{26}CoN_4O_2^+$ Dihydroxy(2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene)cobalt(III) ion *6.6.10, 15.8.4, 15.10.7*

$C_{14}H_{28}CoN_4O_2^{3+}$ 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(III) ion *15.10.6*

$C_{14}H_{28}FeN_4O_2^{2+}$ Diaqua(2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraeneiron(II) ion *9.9*

$C_{14}H_{30}CoN_4S_3^{2+}$ 8-Methyl-1,3,13,16-tetraaza-6,10,19-trithiabicyclo[6.6.6]eicosanecobalt(II) ion *6.53, 22.50.3*

$C_{14}H_{32}CoN_4^{2+}$ 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradecanecobalt(II) ion *22.50.6, 22.55.2, 22.59.2*

$C_{14}H_{32}CuN_6^+$ 3,6,10,13,16,19-Hexaazabicyclo[6.6.6]eicosanecopper(I) ion *8.12*

$C_{14}H_{32}N_4Ni^+$ 1,4,8,11-Tetramethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion *15.7*

$C_{14}H_{32}N_4Ni^{2+}$ 1,4,8,11-Tetramethyl-1,4,8,11-tetraazacyclotetradecanenickel(II) ion *22.3.28*

$C_{14}H_{33}CrN_4^{2+}$ (1-Methylethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.31*
(Propyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.30*

$C_{14}H_{34}CoN_8^{2+}$ 1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosanecobalt(II) ion *6.52, 22.55.5, 22.57.2, 22.59.4*

$C_{14}H_{34}N_8Pt^{3+}$ 1,8-Diamino-3,6,10,13,16,19 hexaazabicyclo[6.6.6]eicosaneplatinum(III) ion *19.44*

$C_{14}H_{36}CoN_8^{4+}$ 1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosanecobalt(II) ion, conjugate diacid *6.51, 22.55.4*

$C_{15}H_{12}NO_2S^-$ Metiazinic acid, conjugate base *25.6.2*

$C_{15}H_{14}O_3$ 4,4′-Dimethoxybenzophenone *5.1.61, 5.2.3, 5.3.4, 5.4.2*

$C_{15}H_{16}N_3S^+$ Toluidine Blue cation *25.5.25*

$C_{15}H_{19}BrN_4Ni^{2+}$ Bromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenickel(III) ion *15.69*

$C_{15}H_{19}Br_2N_4Ni^+$ Dibromo-α,2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenickel(III) ion *15.66*

$C_{15}H_{21}BrN_4NiO^{2+}$ Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenickel(III) ion *15.65*

$C_{15}H_{21}CoO_6^-$ Tris(acetylacetonato)cobaltate(II) ion *6.36*

$C_{15}H_{21}CrO_6^-$ Tris(acetylacetonato)chromate(II) ion *7.24*

$C_{15}H_{21}O_6Ru^-$ Tris(acetylacetonato)ruthenate(II) ion *22.41*

$C_{15}H_{22}CuN_4^+$ α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenecopper(I) ion *8.17*

$C_{15}H_{22}CuN_4^{2+}$ α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenecopper(II) ion *15.10.9*

$C_{15}H_{22}N_4Ni^+$ α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenenickel(I) ion *15.13*

$C_{15}H_{22}N_4Ni^{2+}$ α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenenickel(II) ion *15.10.13*

$C_{15}H_{22}N_4NiO^{2+}$
α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene(hydroxo)nickel(III) ion *15.60*

$C_{15}H_{23}BrN_4NiO^{2+}$
Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenenickel(III) ion *15.62*

$C_{15}H_{23}CuN_4O^{2+}$
α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenecopper(II) ion OH-adduct *8.44*

$C_{15}H_{23}N_4NiO_2^{+}$
α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenebis(hydroxo)nickel(III) ion *15.61*

$C_{15}H_{26}N_4Ni^{+}$ α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(I) ion *15.12*

$C_{15}H_{27}N_4NiO^{2+}$
Hydroxy-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion *15.57*

$C_{15}H_{28}BrN_4NiO^{2+}$
Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion *15.58*

$C_{15}H_{30}N_4NiO_2^{3+}$
Diaqua-α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion *15.56*

$C_{15}H_{35}CrN_4^{2+}$
(2-Butyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.33*
(Butyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.32*

$C_{16}H_8CrN_2O_8^{-}$
Bis(oxalato)phenanthrolinechromate(III) ion *5.1.38, 28.2.40*

$C_{16}H_8CrN_2O_8^{2-}$
Bis(oxalato)phenanthrolinechromate(II) ion *7.23*

$C_{16}H_9N_2O_5S^{-}$ Indigomonosulfonate ion *6.4.7*

$C_{16}H_{12}FeN_6^{-}$ Tetracyano(4,4′-dimethyl-2,2′-bipyridine)ferrate(III) ion *9.4.1*

$C_{16}H_{12}FeN_6^{3-}$ Tetracyano(4,4′-dimethyl-2,2′-bipyridine)ferrate(II) ion, electron adduct *9.4*

$C_{16}H_{18}N_2O_4^{+}$ 1,1′-Bis(carboxyethyl)-4,4′-bipyridinium radical ion (1+) *28.15.6*

$C_{16}H_{18}N_3S^{+}$ Methylene Blue cation *25.5.19*

$C_{16}H_{18}N_3S^{2+}$ $C_{16}H_{18}N_3S^{+}$ Methylene Blue radical cation *6.40.2*

$C_{16}H_{20}N_2O_6S_2^{-}$
1,1′-Bis(3-sulfonatopropyl)-4,4′-bipyridinium radical anion *19.47.3, 22.50.68, 28.14.6*

$C_{16}H_{21}N_5NiOS^{2+}$
Aqua-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaene(thiocyanato)nickel(III) ion *15.67*

$C_{16}H_{22}N_2^{+}$ 1,1′,2,2′,6,6′-Hexamethyl-4,4′-bipyridinium radical cation *22.50.75*
1,1′-Dipropyl-4,4′-bipyridinium radical cation *28.14.9*

$C_{16}H_{23}N_5NiOS^{2+}$
Aqua-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene(thiocyanato)nickel(III) ion *15.63*

$C_{16}H_{28}N_4Ni^{+}$ 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-1,4,8,11-tetraenenickel(I) ion *15.11*

$C_{16}H_{28}N_4Ni^{3+}$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-1,4,8,11-tetraenenickel(III) ion *15.50*

$C_{16}H_{28}N_5NiOS^{2+}$
Aqua-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-triene(thiocyanato)nickel(III) ion *15.59*

$C_{16}H_{29}FeN_5O^{2+}$
Acetonitrile(aqua)-2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraeneiron(II) ion *9.8*

$C_{16}H_{31}N_4Ni^{2+}$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(II) ion, OH reaction product *15.26*

$C_{16}H_{32}BrN_4Ni^{2+}$
Bromo(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)nickel(III) ion *15.48*

$C_{16}H_{32}CdN_2O_5^{+}$
4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]tricosanecadmium(I) ion *5.4*

$C_{16}H_{32}ClCuN_4^{2+}$
Chloro-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(III) ion *8.51*

$C_{16}H_{32}Cl_2N_4Ni^{+}$
Dichloro(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)nickel(III) ion *15.49*

$C_{16}H_{32}CoN_4^{+}$ 5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,14-dienecobalt(I) ion *6.7*
N-meso-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion *6.5*
N-rac-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion *6.6*

$C_{16}H_{32}CoN_4^{2+}$
5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,14-dienecobalt(II) ion *22.3.8*
N-rac-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(II) ion *6.5.2, 6.100.2, 13.25.2*

$C_{16}H_{32}CuN_4^{+}$ 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(I) ion *8.15*

$C_{16}H_{32}CuN_4^{3+}$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(III) ion *8.52*

$C_{16}H_{32}EuN_2O_5^{2+}$
4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]tricosaneeuropium(II) ion *22.50.46*

$C_{16}H_{32}EuN_2O_5^{3+}$
4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]tricosaneeuropium(III) ion *22.3.26, 22.29.1*

$C_{16}H_{32}N_4Ni^{+}$ 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(I) ion *15.10, 15.46.1*

$C_{16}H_{32}N_4Ni^{2+}$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(II) ion *6.100.7*

$C_{16}H_{32}N_4Ni^{3+}$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(III) ion *15.46*

$C_{16}H_{33}CoN_4^{2+}$
Hydrido-*prim-N-rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(III) ion *6.81*
Hydrido-*N-rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(III) ion *6.80*

$C_{16}H_{33}CoN_4O^{+}$
5,7,7,12,14,14-Hexamethyl-1,4,7,11-tetraazacyclotetradeca-4,11-diene(hydroxo)nickel(III) ion *15.47*

$C_{16}H_{33}CuN_4^{2+}$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene(hydrido)copper(III) ion *8.55*

$C_{16}H_{34}CoN_4O_2^{+}$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienedihydroxycobalt(III) ion *6.6.9*

$C_{16}H_{35}CoN_4O_2^{2+}$
Aqua(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)hydroxycobalt(III) ion *15.8.3, 15.10.5*

$C_{16}H_{35}N_4Ni^{2+}$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(II) ion, OH reaction product *15.25*

$C_{16}H_{36}AgN_4^{2+}$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanesilver(II) ion *7.4.1, 15.10.1, 15.49.1, 21.11.3*

$C_{16}H_{36}CoN_4^{2+}$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecobalt(II) ion *6.50, 22.50.7*

$C_{16}H_{36}CuN_4^{+}$ 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecopper(I) ion *8.14*

$C_{16}H_{36}CuN_4^{2+}$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecopper(II) ion *6.100.3*

$C_{16}H_{36}CuN_4^{3+}$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecopper(III) ion *8.50*

$C_{16}H_{36}N_4Ni^{+}$ 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion *15.8*

$C_{16}H_{36}N_4Ni^{2+}$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(II) ion *6.100.6*

$C_{16}H_{36}N_4Ni^{3+}$
β-*rac*-(5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane)nickel(III) ion *15.43*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(III) ion *15.44*

$C_{16}H_{37}Cl_2MnN_4O^+$
Dichloro-*meso*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydroxy)manganese(IV) ion *13.34*
Dichloro-*rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydroxy)manganese(IV) ion *13.35*

$C_{16}H_{37}CuN_4^{2+}$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydrido)copper(III) ion *8.54*

$C_{16}H_{38}N_4NiO_8P_2^-$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanedi(phosphato)nickel(III) ion *15.45*

$C_{17}H_{19}N_6NiS_2^+$
α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenebis(thiocyanato)nickel(III) ion *15.68*

$C_{17}H_{20}ClN_2S^+$
Chlorpromazine, conjugate acid *25.4.14, 25.5.6*

$C_{17}H_{20}N_4O_6$ Riboflavine *5.1.69, 6.1.31, 6.4.8*

$C_{17}H_{21}N_2S^+$ Promethazine, conjugate acid *25.4.44*

$C_{17}H_{21}N_6NiS_2^+$
α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenebis(thiocyanato)nickel(III) ion *15.64*

$C_{17}H_{26}N_3^{2+}$ 1-Methyl-1′-[3-(trimethylammonio)propyl]-4,4′-bipyridinium radical cation *28.14.18, 28.15.11*

$C_{17}H_{35}CoN_4O^{2+}$
Hydroxymethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion *6.82*

$C_{17}H_{37}CrN_4^{2+}$
(Cyclohexyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.34*

$C_{18}H_{12}N_6RuS_6^{3+}$
Tris(2,2′-bithiazole)ruthenium(III) ion *22.66*

$C_{18}H_{24}N_2O_6S_2^-$
1,1′-Bis(3-sulfonatopropyl)-3,3′-dimethyl-4,4′-bipyridinium radical anion *22.50.69, 22.55.11*

$C_{18}H_{32}ClCrN_4^{2+}$
(4-Chlorophenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.37*

$C_{18}H_{32}CrFN_4^{2+}$
(4-Fluorophenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.38*

$C_{18}H_{32}CrN_4^{2+}$
(4-Bromobenzyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.36*

$C_{18}H_{33}CrN_4^{2+}$
(Phenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.35*

$C_{18}H_{34}CoF_3N_4O^{2+}$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene(2,2,2-trifluoro-1-hydroxyethyl)cobalt(III) ion *6.84*

$C_{18}H_{36}CdN_2O_6^{2+}$
4,7,13,16,21,24-Hexaoxa-1,10-diazabicyclo[8.8.8]hexacosanecadmium(I) ion *5.5*

$C_{18}H_{36}N_4Ni^+$ 1,4,5,7,7,8,11,12,14,14-Decamethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion *15.9*

$C_{18}H_{37}CoN_4O^{2+}$
1-Hydroxyethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion *6.83*

$C_{18}H_{37}CoN_4O_2^{2+}$
1,2-Dihydroxyethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion *6.85*

$C_{19}H_{32}CrF_3N_4^{2+}$
(4-Trifluoromethyl)phenylmethyl-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.40*

$C_{19}H_{35}CrN_4^{2+}$ (4-Methylbenzyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.39*

$C_{19}H_{35}CrN_4O^{2+}$ (4-Methoxyphenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.41*

$C_{20}H_6Br_4O_5^{2-}$ Eosin dianion *15.10.22*

$C_{20}H_{10}O_5^{2-}$ Fluorescein dianion *15.8.18, 15.10.23*

$C_{20}H_{16}CoN_4^{+}$ Bis(2,2′-bipyridine)cobalt(I) ion *6.10*

$C_{20}H_{16}CoN_4^{2+}$ Bis(2,2′-bipyridine)cobalt(II) ion *6.9.1*

$C_{20}H_{16}CuN_4^{+}$ Bis(2,2′-bipyridine)copper(I) ion *8.18*

$C_{20}H_{19}N_4^{+}$ Safranine cation *25.5.23*

$C_{20}H_{20}N_4^{2+}$ Safranine cation, conjugate monoacid *25.4.46*

$C_{20}H_{20}N_4Rh^{2+}$ Bis(2,2′-bipyridine)rhodium(II) ion *21.10, 21.11.2*

$C_{20}H_{23}IN_2Rh$ η^5-Pentamethylcyclopentadienyl(2,2′-bipyridine)(iodo)rhodium(II) ion *21.6*

$C_{20}H_{23}N_2Rh$ η^5-Pentamethylcyclopentadienyl(2,2′-bipyridine)rhodium(I) ion *21.2*

$C_{20}H_{24}N_2ORh$ η^5-Pentamethylcyclopentadienyl(2,2′-bipyridine)(hydroxy)rhodium(II) ion *21.5*

$C_{20}H_{24}N_2Rh^{+}$ η^5-Pentamethylcyclopentadienyl(2,2′-bipyridine)hydridorhodium(III) ion *21.12*

$C_{20}H_{24}N_8Rh_2^{3+}$ Tetrakis[μ-(1,3-diisocyanopropane)]-dirhodium(I)(II) ion *21.4*

$C_{20}H_{25}N_{10}O_{11}P$ Adenylyl-(3′→5′)-guanosine *25.5.5*

$C_{20}H_{26}N_7O_{11}P$ Thymidylyl-(3′→5′)-2′-deoxyguanosine *25.5.24*

$C_{20}H_{41}CuN_4^{2+}$ 2,2,4,11,11,13-Hexamethyl-1,5,10,14-tetraazacyclooctadeca-4,13-diene(hydrido)copper(III) ion *8.56*

$C_{21}H_{15}N_9RuS_3^{3+}$ Tris[2-(1,2,4-thiadiazol-5-yl)pyridine]-ruthenium(III) ion *22.67*

$C_{21}H_{26}N_7O_{13}P_2^{+}$ Nicotinamide adenine dinucleotide *5.1.66*

$C_{21}H_{27}N_7O_{14}P_2$ Nicotinamide adenine dinucleotide, hydroxide, inner salt *28.23.1*

$C_{21}H_{29}N_7O_{14}P_2$ Nicotinamide adenine dinucleotide, reduced *13.18.5*

$C_{21}H_{30}N_7O_{17}P_3$ Nicotinamide-adenine dinucleotide phosphate, reduced *13.18.6, 13.20.2*

$C_{22}H_{16}CrN_4O_4$ Bis(2,2′-bipyridine(oxalato)chromate(II) *7.20*

$C_{22}H_{16}CrN_4O_4^{+}$ Bis(2,2′-bipyridine)oxalato-chromium(III)ion *5.1.35, 28.2.37*

$C_{22}H_{16}FeN_6^{+}$ Dicyanobis(2,2′-bipyridine)iron(III) ion *9.1.1*

$C_{22}H_{16}FeN_6^{-}$ Bis(2,2′-bipyridine)dicyanoferrate(II), electron adduct *9.1*

$C_{22}H_{16}N_6Ru^{+}$ Bis(2,2′-bipyridine)bis(cyano)ruthenium(III) ion *22.2.1, 22.47*

$C_{22}H_{16}N_6Ru^{-}$ Bis(2,2′-bipyridine)bis(cyano)ruthenate(II) ion, electron adduct *22.2*

$C_{22}H_{17}FeN_6O$ Bis(2,2′-bipyridine)dicyanoferrate(II), OH reaction product *9.14*

$C_{22}H_{34}N_2^{+}$ 1,1′-Dihexyl-4,4′-bipyridinium radical cation *28.14.10*

$C_{22}H_{38}N_4^{3+}$ 1,1′-Bis[3-(trimethylammonio)propyl]-4,4′-bipyridinium radical cation *22.50.70, 28.14.7, 28.15.8*

$C_{23}H_{36}N_2^{+}$ 1-Dodecyl-1′-methyl-4,4′-bipyridinium radical cation *28.14.14*

$C_{24}H_{14}Cl_2CuN_4^{+}$ Bis(5-chloro-1,10-phenanthroline)copper(I) ion *8.20*

$C_{24}H_{14}CuN_6O_4^{+}$ Bis(5-nitro-1,10-phenanthroline)copper(I) ion *8.21*

$C_{24}H_{16}CuN_4^{+}$ Bis(1,10-phenanthroline)copper(I) ion *8.19*

$C_{24}H_{18}N_6RuS_3^{3+}$ Tris[2-(2-thiazolyl)pyridine]ruthenium(III) ion *22.65*

$C_{24}H_{18}N_{12}Ru^{+}$
(2,2′-Bipyrazine)(2,2′-bipyridine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct *22.10*
(2,2′-Bipyrazine)bis(2,2′-bipyrimidine)-ruthenium(II) ion, electron adduct *22.16*
(2,2′-Bipyrazine)bis(2,2′-bipyridine)-ruthenium(II) ion, electron adduct *22.8*
(2,2′-Bipyridine)bis(2,2′-bipyrimidine)-ruthenium(II) ion, electron adduct *22.14*
Bis(2,2′-bipyrazine)(2,2′-bipyrimidine)-ruthenium(II) ion, electron adduct *22.22*
Bis(2,2′-bipyrazine)(2,2′-bipyridine)-ruthenium(II) ion, electron adduct *22.20*
Bis(2,2′-bipyridine)(2,2′-bipyrimidine)-ruthenium(II) ion, electron adduct *22.6*
Tris(2,2′-bipyrazine)ruthenium(II) ion, electron adduct *22.18*
Tris(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct *22.12*

$C_{24}H_{19}N_{12}ORu^{2+}$
Tris(2,2′-bipyrazine)ruthenium(II) ion, OH-adduct *22.25*

$C_{24}H_{19}N_{12}Ru^{2+}$
(2,2′-Bipyrazine)(2,2′-bipyridine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated *22.1*
(2,2′-Bipyrazine)bis(2,2′-bipyridine)-ruthenium(II) ion, electron adduct, protonated *22.9*
(2,2′-Bipyrazine)bis(2,2′-bipyrimidine)-ruthenium(II) ion, electron adduct, protonated *22.17*
(2,2′-Bipyridine)bis(2,2′-bipyrimidine)-ruthenium(II) ion, electron adduct, protonated *22.15*
Bis(2,2′-bipyrazine)(2,2′-bipyridine)-ruthenium(II) ion, electron adduct, protonated *22.21*
Bis(2,2′-bipyrazine)(2,2′-bipyrimidine)-ruthenium(II) ion, electron adduct, protonated *22.23*
Bis(2,2′-bipyridine)(2,2′-bipyrimidine)-ruthenium(II) ion, electron adduct, protonated *22.7*
Tris(2,2′-bipyrazine)ruthenium(II) ion, electron adduct, protonated *22.19*
Tris(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated *22.13*

$C_{24}H_{22}N_2^{+}$ 1,1′-Dibenzyl-4,4′-bipyridinium radical cation *22.50.72*

$C_{24}H_{22}N_2O_6S_2$
1,1′-Bis(4-sulfonatobenzyl)-4,4′-bipyridinium zwitterion *22.3.43*

$C_{24}H_{22}N_2O_6S_2^{-}$
1,1′-Bis(4-sulfonatobenzyl)-4,4′-bipyridinium zwitterion, radical anion *22.50.66*

$C_{24}H_{24}CoN_2^{2+}$
Bis(4,4′-dimethyl-2,2′-bipyridine)cobalt(II) ion *6.12.1*

$C_{24}H_{24}CoN_4^{+}$ Bis(4,4′-dimethyl-2,2′-bipyridine)cobalt(I) ion *6.15*

$C_{24}H_{38}N_2^{+}$ 1,1′-Diheptyl-4,4′-bipyridinium radical cation *28.14.11*

$C_{25}H_{19}CuN_4O^{+}$
Bis(1,10-phenanthroline)(2-hydroxyethyl)-copper(II) ion *8.42*

$C_{25}H_{22}N_6Ru^{2+}$
Ammine(2,2′-bipyridine)(2,2′:6′,2″-terpyridine)ruthenium(II) ion *22.50.60*

$C_{25}H_{22}N_6Ru^{3+}$
Ammine(2,2′-bipyridine)(2,2′:6′,2″-terpyridine)ruthenium(III) ion *22.53*

$C_{25}H_{38}N_2^{+}$ 1-Methyl-1′-tetradecyl-4,4′-bipyridinium radical cation *22.50.78, 28.14.16*

$C_{26}H_{16}CrN_4O_4$
Bis(1,10-phenanthroline)(oxalato)-chromate(II) *7.22*

$C_{26}H_{16}CrN_4O_4^{+}$
Bis(1,10-phenanthroline)(oxalato)-chromium(III) ion *5.1.36, 28.2.38*

$C_{26}H_{20}CuN_4^{+}$ Bis(5-methyl-1,10-phenanthroline)copper(I) ion *8.22*

$C_{26}H_{20}N_6RuS_2^{3+}$
2,2′-Bipyridinebis[2-(2-thiazolyl)pyridine]-ruthenium(III) ion *22.64*

$C_{26}H_{23}N_6Ru^{2+}$
2-(Aminomethyl)pyridinebis(2,2′-bipyridine)ruthenium(III) ion, deprotonated *22.48.1, 22.49*

$C_{26}H_{24}FeN_6^{+}$ Dicyanobis(4,4′-dimethyl-2,2′-bipyridine)iron(III) ion *9.2.1*

$C_{26}H_{24}FeN_6^{-}$ Dicyanobis(4,4′-dimethyl-2,2′-bipyridine)ferrate(II), electron adduct *9.2*

$C_{26}H_{24}N_6Ru^{3+}$
2-(Aminomethyl)pyridinebis(2,2′-bipyridine)ruthenium(III) ion *22.48*

$C_{26}H_{42}N_2^{+}$ 1,1′-Dioctyl-4,4′-bipyridinium radical cation *28.14.12*

$C_{28}H_{22}N_6RuS^{3+}$
Bis(2,2′-bipyridine)[2-(2-thiazolyl]pyridine]ruthenium(III) ion *22.63*

$C_{28}H_{24}CuN_4^{+}$ Bis(2,9-dimethyl-1,10-phenanthroline)copper(I) ion *8.23*

$C_{28}H_{25}CuN_4O^+$
Bis(1,10-phenanthroline)(2-hydroxy-2,2-dimethylethyl)copper(II) ion *8.43*

$C_{28}H_{35}FeN_6O_{20}^{4-}$
Diethylenetriaminepentaacetatoferrate(III), DTPA radical adduct *9.31*

$C_{30}H_{18}N_{12}Ru^+$
Tris(1,4,5,8-tetraazaphenanthrene)-ruthenium(II) ion, electron adduct *22.35*

$C_{30}H_{18}N_{12}Ru^{2+}$
Tris(1,4,5,8-tetraazaphenanthrene)-ruthenium(II) ion, electron adduct, protonated *22.34*

$C_{30}H_{23}IrN_6^+$ Bis(2,2′-bipyridine)([2,2′-bipyridin]-3-yl-*C,N′*)iridium(III) ion, electron adduct *12.3*

$C_{30}H_{24}AgN_6^{2+}$
Tris(2,2′-bipyridine)silver(II) ion *7.4.2*

$C_{30}H_{24}CoN_6^+$ Tris(2,2′-bipyridine)cobalt(I) ion *6.11*

$C_{30}H_{24}CoN_6^{2+}$
Tris(2,2′-bipyridine)cobalt(II) ion *6.10.1, 6.39, 22.50.10, 22.54.1, 22.55.1, 22.59.1, 22.62.1*

$C_{30}H_{24}CoN_6^{3+}$
Tris(2,2′-bipyridine)cobalt(III) ion *6.4.1, 6.6.6, 7.4.3, 7.6.2, 7.8.1, 7.11.1, 7.16.2, 8.15.2, 8.16.1, 8.17.1, 15.8.5, 15.10.4, 22.3.10, 28.2.11*

$C_{30}H_{24}CrN_6^{2+}$
Tris(2,2′-bipyridine)chromium(II) ion *7.4*

$C_{30}H_{24}CrN_6^{3+}$
Tris(2,2′-bipyridine)chromium(III) ion *5.1.33, 6.4.2, 6.6.11, 7.5.1, 8.15.3, 15.8.6, 15.10.8, 15.11.1, 15.13.1, 28.2.35*

$C_{30}H_{24}FeN_6^{3+}$
Tris(2,2′-bipyridine)iron(III) ion *6.6.12, 15.8.7, 15.10.10*

$C_{30}H_{24}IrN_6^{2+}$ Bis(2,2′-bipyridine)([2,2′-bipyridin]-3-yl-*C,N′*)iridium(III) ion, conjugate acid, electron adduct *12.2*

$C_{30}H_{24}IrN_6^{4+}$ Bis(2,2′-bipyridine)([2,2′-bipyridin]-3-yl-*C,N′*)iridium(IV) ion, conjugate monoacid *12.4*

$C_{30}H_{24}N_6Os^{3+}$
Tris(2,2′-bipyridine)osmium(III) ion *16.1*

$C_{30}H_{24}N_6Rh^+$ Tris(2,2′-bipyridine)rhodium(I) ion *21.3*

$C_{30}H_{24}N_6Ru^+$ Tris(2,2′-bipyridine)ruthenium(II) ion, electron adduct *22.3, 25.3.2*

$C_{30}H_{24}N_6Ru^{2+}$
Tris(2,2′-bipyridine)ruthenium(II) ion *5.1.51, 6.1.24, 22.55.10, 25.1.12, 25.2.12, 28.2.55*

$C_{30}H_{24}N_6Ru^{3+}$
Tris(2,2′-bipyridine)ruthenium(III) ion *1.2.6, 5.1.52, 6.19.2, 6.39.2, 6.40.1, 6.41.2, 6.48.1, 6.53.1, 6.54.1, 6.55.1, 6.110.1, 6.111.1, 6.112.1, 6.113.1, 6.114.1, 7.4.12, 8.5.11, 8.6.1, 8.7.1, 8.8.1, 10.3.2, 22.3.36, 22.50, 25.10.2*

$C_{30}H_{25}CoN_6O^{3+}$
Tris(2,2′-bipyridine)cobalt(III) ion, OH adduct *6.98*

$C_{30}H_{25}FeN_6^{3+}$
Tris(2,2′-bipyridine)iron(III) ion, H-adduct *9.40*

$C_{30}H_{25}FeN_6O^{2+}$
Tris(2,2′-bipyridine)iron(II) ion, OH-adduct *9.13*

$C_{30}H_{25}FeN_6O^{3+}$
Tris(2,2′-bipyridine)iron(III) ion, OH-adduct *9.39*

$C_{30}H_{25}N_6ORu^{2+}$
Tris(2,2′-bipyridine)ruthenium(II) ion, OH-adduct *22.24*

$C_{30}H_{25}N_6Ru^{2+}$
Tris(2,2′-bipyridine)ruthenium(II) ion, H-adduct *22.44*

$C_{30}H_{30}N_6Rh^{2+}$
Tris(2,2′-bipyridine)rhodium(II) ion *8.17.3, 21.11, 22.50.58*

$C_{32}H_{12}AlN_8O_9S_3^-$
Aluminum(III) sulfophthalocyanine radical anion *2.1*

$C_{32}H_{12}CoN_8O_{12}S_4^{2-}$
3,10,17,24-Tetrasulfophthalocyanine-cobaltate(III) radical anion (oxidized ligand) *6.75*

$C_{32}H_{12}CoN_8O_{12}S_4^{3-}$
3,10,17,24-Tetrasulfophthalocyanine-cobaltate(II) radical cation *7.4.6*

$C_{32}H_{12}CoN_8O_{12}S_4^{4-}$
3,10,17,24-Tetrasulfophthalocyanine-cobaltate(III) radical anion (reduced ligand) *6.74*
3,10,17,24-Tetrasulfophthalocyanine-cobaltate(II) ion *6.41, 22.50.12*

$C_{32}H_{12}CoN_8O_{12}S_4^{5-}$
3,10,17,24-Tetrasulfophthalocyanine-cobaltate(I) ion *6.19, 22.50.13*

$C_{32}H_{12}CoN_8O_{14}S_4^{5-}$
3,10,17,24-Tetrasulfophthalocyanine-cobaltate(II) ion, superoxide adduct *6.62*

$C_{32}H_{13}N_8O_9S_3Zn^{4-}$
Trisulfophthalocyaninezincate(II) radical anion *28.9*

$C_{32}H_{24}N_{12}Zn^{3+}$
Tetrakis-*N*-methyl-2,3-pyridinoporphyrazinezinc(II) radical anion *28.6*

$C_{32}H_{25}N_6O_2Ru^+$
Bis(2,2′-bipyridine)(4-carboxy-4′-methyl-2,2′-bipyridine)ruthenium(II) ion *22.5.1*

$C_{32}H_{26}N_6O_2Ru$
Bis(2,2′-bipyridine)(4-carboxy-4′-methyl-2,2′-bipyridine)ruthenium(II) ion, electron adduct *22.4*

$C_{33}H_{15}CoN_8O_{12}S_4^{4-}$
(Methyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion *6.89*

$C_{34}H_{17}CoN_8O_{13}S_4^{4-}$
(2-Hydroxyethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion *6.92*

$C_{34}H_{35}FeN_4O_4$
Hydridoiron(III) protoporphyrin *9.20*

$C_{34}H_{36}N_4O_6Zn^-$
Zinc(II) hematoporphyrin radical anion *28.24*

$C_{34}H_{58}N_4^+$ 1,1′-Didodecyl-4,4′-bipyridinium radical cation *28.14.13*

$C_{35}H_{19}CoN_8O_{13}S_4^{4-}$
(2-Hydroxy-1-methylethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion *6.93*

$C_{35}H_{37}FeN_4O_5$
Hydroxymethyliron(III) protoporphyrin *9.21*

$C_{36}H_{18}FeN_6O_6^{2+}$
Iron(II) tris(1,10-phenanthroline-5,6-dione) *25.4.5, 25.5.1*

$C_{36}H_{21}Br_3CrN_6^{2+}$
Tris(5-bromo-1,10-phenanthroline)-chromium(II) ion *7.14*

$C_{36}H_{21}Br_3N_6Ru^{3+}$
Tris(5-bromo-1,10-phenanthroline)-ruthenium(III) ion *8.5.14, 22.56*

$C_{36}H_{21}Cl_3CrN_6^{2+}$
Tris(5-chloro-1,10-phenanthroline)-chromium(II) ion *7.11*

$C_{36}H_{21}Cl_3CrN_6^{3+}$
Tris(5-chloro-1,10-phenanthroline)-chromium(III) ion *7.12.1, 7.13.1*

$C_{36}H_{21}Cl_3N_6Os^{3+}$
Tris(5-chloro-1,10-phenanthroline)-osmium(III) ion *16.4*

$C_{36}H_{21}Cl_3N_6Ru^+$
Tris(5-chloro-1,10-phenanthroline)-ruthenium(II) ion, electron adduct *22.33*

$C_{36}H_{21}Cl_3N_6Ru^{3+}$
Tris(5-chloro-1,10-phenanthroline)-ruthenium(III) ion *6.52.2, 6.54.3, 8.5.15, 10.3.4, 22.57*

$C_{36}H_{21}CoN_8O_{13}S_4^{4-}$
(2-Hydroxy-1-methylpropyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion *6.91*
(2-Hydroxy-2,2-dimethylethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion *6.90*

$C_{36}H_{24}CoN_6^{2+}$
Tris(1,10-phenanthroline)cobalt(II) ion *6.40, 22.50.11*

$C_{36}H_{24}CoN_6^{3+}$
Tris(1,10-phenanthroline)cobalt(III) ion *7.4.4, 7.6.3, 7.8.2, 7.11.2, 7.16.3*

$C_{36}H_{24}CrN_6^{2+}$
Tris(1,10-phenanthroline)chromium(II) ion *7.8*

$C_{36}H_{24}CrN_6^{3+}$
Tris(1,10-phenanthroline)chromium(III) ion *5.1.34, 7.9.1, 7.10.1. 28.2.36*

$C_{36}H_{24}FeN_6^{2+}$
Tris(1,10-phenanthroline)iron(II) ion *22.50.52*

$C_{36}H_{24}FeN_6^{3+}$
Tris(1,10-phenanthroline)iron(III) ion *9.27*

$C_{36}H_{24}N_6Os^{3+}$
Tris(1,10-phenanthroline)osmium(III) ion *16.3*

$C_{36}H_{24}N_6Ru^+$ Tris(1,10-phenanthroline)ruthenium(II) ion, electron adduct *22.31*

$C_{36}H_{24}N_6Ru^{3+}$
Tris(1,10-phenanthroline)ruthenium(III) ion *6.39.4, 6.51.1, 6.52.1, 6.52.2, 8.5.13, 10.3.3, 22.55*

$C_{36}H_{36}CoN_6^+$ Tris(4,4′-dimethyl-2,2′-bispyridine)cobalt(I) ion *6.16*

$C_{36}H_{36}CoN_6^{2+}$
Tris(4,4′-dimethyl-2,2′-bipyridine)cobalt(II) ion *6.15.1, 22.3.7*

$C_{36}H_{36}CoN_6^{3+}$
Tris(4,4′-dimethyl-2,2′-bipyridine)-cobalt(III) ion *6.16.1*

$C_{36}H_{36}CrN_6^{2+}$
Tris(4,4′-dimethyl-2,2′-bipyridine)-chromium(II) ion *7.6*

$C_{36}H_{36}N_6Os^{3+}$
Tris(5,5′-dimethyl-2,2′-bipyridine)-osmium(III) ion *16.2*

$C_{36}H_{36}N_6Rh^{3+}$
Tris(4,4′-dimethyl-2,2′-bipyridine)-rhodium(III) ion *22.3.34*

$C_{36}H_{36}N_6Ru^{+}$ Tris(4,4′-dimethyl-2,2′-bipyridine)-ruthenium(II) ion, electron adduct *22.30*

$C_{36}H_{36}N_6Ru^{3+}$
Tris(4,4′-dimethyl-2,2′-bipyridine)-ruthenium(III) ion *8.5.12, 22.51*

$C_{36}H_{36}Ru^{3+}$ Tris(5,5′-dimethyl-2,2′-bipyridine)-ruthenium(III) ion *22.52*

$C_{36}H_{37}FeN_4O_5$
1-Hydroxyethyliron(III) protoporphyrin *9.22*
2-Hydroxyethyliron(III) protoporphyrin *9.24*

$C_{36}H_{43}FeN_4O_4$
Iron(II) deuteroporphyrin (2-propoxy)(2-propanol) *9.26.1*

$C_{36}H_{44}FeN_4O_4$
Iron(II) deuteroporphyrin (2-propanol)$_2$ *9.12, 9.42.1*

$C_{37}H_{21}Cl_3CrN_6O_2^{2+}$
Tris(5-chloro-1,10-phenanthroline)-chromium(III), carboxyl radical addn. product *7.13*

$C_{37}H_{24}CrN_6O_2^{2+}$
Tris(1,10-phenanthroline)chromium(III), carboxyl radical addn. product *7.10*

$C_{37}H_{39}FeN_4O_5$
1-Hydroxy-1-methylethyliron(III) protoporphyrin *9.23*
2-Hydroxy-1-methylethyliron(III) protoporphyrin *9.25*

$C_{37}H_{43}F_3FeN_4O_4^{+}$
Iron(III) deuteroporphyrin (2-propoxy)(2-propanol), ·CF_3 reaction product *9.44*

$C_{37}H_{44}F_3FeN_4O_4$
Trifluoromethyliron(III) deuteroporphyrin (2-propoxy)(2-propanol) *9.26*

$C_{37}H_{45}Cl_2FeN_4O_4^{+}$
Iron(III) deuteroporphyrin (2-propanol)$_2$, ·$CHCl_2$ radical adduct *9.43*

$C_{37}H_{47}FeN_4O_4^{+}$
Iron(III) deuteroporphyrin (2-propanol)$_2$, methyl radical adduct *9.42*

$C_{38}H_{30}N_8Ru^{+}$ Bis(2,2′-bipyridine)(dipyrido[3,2-*a*:2′,3′-*c*]phenazine)ruthenium(II) ion, electron adduct *22.28*

$C_{38}H_{31}N_8Ru^{2+}$
Bis(2,2′-bipyridine)(dipyrido[3,2-*a*:2′,3′-*c*]phenazine)ruthenium(II) ion, electron adduct, protonated *22.27*

$C_{38}H_{32}N_8Ru^{3+}$
Bis(2,2′-bipyridine)(dipyrido[3,2-*a*:2′,3′-*c*]phenazine)ruthenium(II) ion, electron adduct, diprotonated *22.26*

$C_{39}H_{30}CrN_6^{2+}$
Tris(5-methyl-1,10-phenanthroline)-chromium(II) ion *7.15*

$C_{39}H_{30}N_6Ru^{3+}$
Tris(5-methyl-1,10-phenanthroline)-ruthenium(III) ion *8.5.16, 10.3.7, 22.60*

$C_{40}H_{24}MnN_8$ 5,10,15,20-Tetrakis(4-pyridyl)porphinatomanganese(II) *13.5*

$C_{40}H_{34}Co_2N_9O_2^{3+}$
μ-Amido-μ-peroxidotetrakis(2,2′-bipyridine)dicobalt(III) ion *6.113, 22.50.17*

$C_{40}H_{36}ClN_4O_{17}Sb^{+}$
Chloro(oxo)antimony(V) uroporphyrin I radical anion *23.1*

$C_{40}H_{36}N_4O_{16}Zn^{+}$
Zinc(II) uroporphyrin radical cation *28.23*

$C_{40}H_{37}CrN_8O_8^{-}$
Tris(2,2′-bipyridine)chromium(III), EDTA radical addn. product *7.5*

$C_{41}H_{57}FeN_4O_7$
Iron(III) deuteroporphyrin dimethyl ester (2-propanol)$_2$, 1-hydroxy-1-methylethylperoxyl adduct *9.45*

$C_{42}H_{32}N_6Ru^{+}$ Bis(2,2′-bipyridine)(6,7-dihydro-5,8-dimethyldibenzo[*b*,*j*][1,10]phenanthroline)ruthenium(II) ion, electron adduct *22.29*

$C_{42}H_{36}CrN_6^{2+}$
Tris(4,7-dimethyl-1,10-phenanthroline)-chromium(II) ion *7.16*
Tris(5,6-dimethyl-1,10-phenanthroline)-chromium(II) ion *7.17*

$C_{42}H_{36}N_6Ru^{+}$ Tris(4,7-dimethyl-1,10-phenanthroline)-ruthenium(II) ion, electron adduct *22.32*

$C_{42}H_{36}N_6Ru^{3+}$
Tris(4,7-dimethyl-1,10-phenanthroline)-ruthenium(III) ion *6.39.5, 6.52.3, 6.54.4, 8.5.17, 10.3.6, 22.59*
Tris(5,6-dimethyl-1,10-phenanthroline)-ruthenium(III) ion *8.5.18, 10.3.5, 22.58*

$C_{42}H_{54}CoN_{13}O_4Ru^{3+}$
Bis(2,2′-bipyridine)ruthenium(II)(4-carboxy-4′-methyl-2,2′-bipyridine)-(prolylprolinato)pentaamminecobalt(III) ion, electron adduct *22.5*

$C_{44}H_{16}Cl_8N_4O_{12}S_4Zn^{3-}$
5,10,15,20-Tetrakis(2,6-dichloro-3-sulfonatophenyl)porphinatozincate(II) radical cation *28.22*

$C_{44}H_{24}BrMnN_4O_{12}S_4^{4-}$
Bromo[5,10,15,20-tetrakis(4-sulfonatophenyl)porphinatomanganate(III) ion *13.29*

$C_{44}H_{24}CdN_4O_{12}S_4^{5-}$
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocadmate(II) radical anion *5.13*

$C_{44}H_{24}Cl_2N_4O_{12}S_4Sn^{5-}$
Dichloro[5,10,15,20-tetrakis(4-sulfonatophenyl)porphinatostannate(IV) radical anion *24.2*

$C_{44}H_{24}CoN_4O_2S_4^{4-}$
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocobaltate(II) ion *28.14.3, 28.15.3*

$C_{44}H_{24}CoN_4O_2S_4^{5-}$
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocobaltate(I) ion *6.17*

$C_{44}H_{24}CoN_4O_{12}S_4^{2-}$
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocobaltate(III) radical cation *6.115*

$C_{44}H_{24}CuN_4O_{12}S_4^{5-}$
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocuprate(II) radical anion *8.25*

$C_{44}H_{24}FeN_4O_{12}S_4^{2-}$
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoferrate(III) radical cation *9.47*

$C_{44}H_{24}InN_4O_{12}S_4^{2-}$
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoindate(III) radical cation *11.4*

$C_{44}H_{24}MnN_4O_{12}S_4^{4-}$
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatomanganate(II) ion *13.3*

$C_{44}H_{24}MnN_4O_{12}S_4^{5-}$
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatomanganate(II) radical anion *13.1*

$C_{44}H_{24}N_4O_{12}PbS_4^{3-}$
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoplumbate(II) radical cation *17.6*

$C_{44}H_{24}N_4O_{12}PdS_4^{5-}$
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatopalladate(II) radical anion *18.2*

$C_{44}H_{24}N_4O_{12}S_4Zn^{3-}$
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) radical cation *28.15*

$C_{44}H_{24}N_4O_{12}S_4Zn^{4-}$
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) ion *5.1.54*
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) ion, triplet state *5.1.55*

$C_{44}H_{24}N_4O_{12}S_4Zn^{5-}$
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) radical anion *28.6*

$C_{44}H_{25}N_4O_5Zn^{+}$
Hydroxy(tetrakis(2-hydroxyphenyl)porphinato)zinc(II) radical cation, deprotonated *28.16*
Hydroxy(tetrakis(3-hydroxyphenyl)porphinato)zinc(II) radical cation, deprotonated *28.17*

$C_{44}H_{26}CoN_4O_{14}S_4^{6-}$
Dihydroxytetrakis(4-sulfonatophenyl)porphinatocobaltate(II) ion *28.4.1, 28.5.1, 28.6.1*

$C_{44}H_{36}BrMnN_8^{4+}$
Bromo[5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(III) ion *13.31*

$C_{44}H_{36}CuN_8^{3+}$
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatocopper(II) radical anion *8.24*

$C_{44}H_{36}FeN_8^{4+}$
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatoiron(II) ion *9.10*

$C_{44}H_{36}FeN_8O_2^{4+}$
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphineiron(III)-superoxide complex *9.41*

$C_{44}H_{36}InN_8^{4+}$ Tetrakis(4-*N*-methylpyridyl)-porphineindium(III) radical anion *11.3*

$C_{44}H_{36}MnN_8^{3+}$
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatomanganese(II) radical anion *13.2*

$C_{44}H_{36}MnN_8^{4+}$
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatomanganese(II) ion *13.4*

$C_{44}H_{36}N_8Pb^{5+}$
Tetrakis(1-methylpyridinium-4-yl)porphinatolead(II) radical cation *17.5*
Tetrakis(1-methylpyridinium-4-yl)porphinatolead(II) radical cation *17.4*

$C_{44}H_{36}N_8Sn^{5+}$
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatotin(IV) radical anion *24.3*

$C_{44}H_{36}N_8Zn^{3+}$
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinezinc(II) radical anion *28.5*

$C_{44}H_{36}N_8Zn^{4+}$
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) ion *1.5.4, 25.4.11*

$C_{44}H_{36}N_8Zn^{5+}$
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) radical cation *6.48.2, 28.14*
5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)porphinatozinc(II) radical cation *28.13*

$C_{44}H_{37}N_8Zn^{4+}$
5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)porphinatozinc(II) H-adduct *28.12*

$C_{44}H_{38}CoN_8O_2^{2+}$
Dihydroxytetrakis(1-methylpyridinium-4-yl)porphinecobalt(II) ion *28.4.3, 28.5.3, 28.6.3*

$C_{44}N_{24}AgN_4O_{12}S_4^{5-}$
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoargentate(I) ion *1.4*

$C_{45}H_{27}CoN_4O_2S_4^{4-}$
N-Methyltetrakis(4-sulfonatophenyl)porphinatocobaltate(II) radical anion *6.21*

$C_{45}H_{27}CoN_4O_{13}S_4^{4-}$
Hydroxymethyltetrakis(4-sulfonatophenyl)porphinatocobaltate(III) ion *6.87*

$C_{45}H_{28}N_4NiO_{12}S_4^{4-}$
N-Methyl-5,10,15,20-tetrakis(4-sulfonatophenyl)porphinatonickelate(II) radical anion *15.18*

$C_{45}H_{36}CoN_9S^{3+}$
5,10,15,10-Tetrakis(1-methylpyridyl)-porphinato(thiocyanato)cobalt(II) ion *6.64*

$C_{46}H_{34}Cl_3CrN_8O_8^{+}$
Tris(5-chloro-1,10-phenanthroline)-chromium(III), EDTA radical addn. product *7.12*

$C_{46}H_{37}CrN_8O_8^{+}$
Tris(1,10-phenanthroline)chromium(III), EDTA radical addn. product *7.9*

$C_{47}H_{31}CoN_4O_2S_4^{4-}$
1-Methylethyltetrakis(4-sulfonatophenyl)porphinatocobaltate(III) ion *6.86*

$C_{47}H_{31}CoN_4O_3S_4^{4-}$
1-Hydroxy-1-methylethyltetrakis(4-sulfonatophenyl)porphinatocobaltate(III) ion *6.88*

$C_{48}H_{24}MnN_4O_8^{4-}$
5,10,15,20-Tetrakis(4-carboxyphenyl)porphinatomanganate(II) ion *13.8*

$C_{48}H_{33}MnN_4O_{13}S_4^{4-}$
2-Hydroxy-2,2-dimethylethyltetrakis(4-sulfonatophenyl)porphinatomanganate(III) ion *13.30*

$C_{48}H_{34}Co_2N_9O_2^{3+}$
μ-Amido-μ-peroxidotetrakis(1,10-phenanthroline)dicobalt(III) ion *6.114, 22.50.18*

$C_{48}H_{40}FeN_{12}O_4^{4+}$
α,α,α,β-Tetrakis(*N*-methylisonicotinamidophenyl)porphinatoiron(II) ion *9.11*

$C_{48}H_{45}MnN_8O^{4+}$
2-Hydroxy-2,2-dimethylethyl[5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(III) ion *13.32*

$C_{48}H_{48}N_6Ru^{3+}$
Tris(3,4,7,8-tetramethyl-1,10-phenanthroline)ruthenium(III) ion *6.39.6, 8.5.19, 22.62*

$C_{48}H_{66}N_6P_3Ru^{6+}$
Tris(4-triethylphosphonio-2,2′-bipyridine)-ruthenium(III) ion *6.39.3, 22.54*

$C_{51}H_{48}N_8O_{12}S_4Zn^{+}$
5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-2-yl]porphinatozinc(II) radical cation *28.19*

$C_{52}H_{48}N_8O_{12}S_4Zn^{+}$
5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-4-yl]porphinatozinc(II) radical cation *28.18*

$C_{52}H_{48}N_8O_{12}S_4Zn^{-}$
5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-4-yl]porphinatozinc(II) radical anion *28.7*

$C_{54}H_{36}CrN_6^{2+}$
Tris(5-phenyl-1,10-phenanthroline)-chromium(II) ion *7.18*

$C_{54}H_{36}N_6Ru^{3+}$
Tris(5-phenyl-1,10-phenanthroline)-ruthenium(III) ion *8.5.20, 22.61*

$C_{54}H_{42}ClO_9P_3RhS_3^{3-}$
Chlorotris[3-(diphenylphosphino)-benzenesulfonato]rhodate(I) ion *22.3.33*

$C_{54}H_{42}ClO_9P_3RhS_3^{4-}$
Chlorotris[3-(diphenylphosphino)-benzenesulfonato]rhodate(0) ion *21.1*

$C_{56}H_{60}CuN_8^{3+}$
Tetrakis-4-(*N,N,N*-trimethylammonio)-phenylporphinecopper(II) radical anion *8.26*

$C_{56}H_{60}MnN_8^{4+}$
5,10,15,20-Tetrakis[4-(*N,N,N*-trimethylammonio)phenyl]porphinato-manganese(II) ion *13.6*

$C_{56}H_{60}N_8Zn^{3+}$ Tetrakis-4-(*N,N,N*-trimethylammonio)phenylporphinezinc(II) radical anion *28.4*

$C_{56}H_{60}N_8Zn^{5+}$ Tetrakis-4-(*N,N,N*-trimethylammonio)phenylporphinezinc(II) radical cation *28.21*

$C_{56}H_{62}CoN_8O_2^{2+}$ Dihydroxytetrakis[4-(*N,N,N*-trimethylammonio)phenyl]porphinecobalt(II) ion *28.4.2, 28.5.2, 28.6.2*

$C_{62}H_{89}CoN_{13}O_{14}P$ Cobal(I)amin *6.18*

$C_{62}H_{89}CoN_{13}O_{15}P$ Hydroxocob(III)alamin *6.18.2*

$C_{62}H_{90}BrCoN_{13}O_{14}P$ Bromocob(III)alamin *6.94*

$C_{64}H_{24}Co_2N_{16}O_{24}S_8^{10-}$ 3,10,17,24-Tetrasulfophthalocyanine-cobaltate(I) ion dimer *6.20*

$C_{64}H_{76}N_8Zn^{5+}$ 5,10,15,20-Tetrakis(2-*N*-hexylpyridyl)-porphinatozinc(II) radical cation *28.20*

$C_{66}H_{48}CrN_6^{2+}$ Tris(4,4′-diphenyl-2,2′-bipyridine)-chromium(II) ion *7.7*

$C_{72}H_{48}CrN_6^{2+}$ Tris(4,7-diphenyl-1,10-phenanthroline)-chromium(II) ion *7.19*

$C_{72}H_{56}MnN_{12}O_4^{4+}$ α,α,α,β-Tetrakis[2-(*N*-methylisonicotinamido)phenyl]-porphinatomanganese(II) ion *13.7*

Cd^+ Cadmium(I) ion *5.1, 5.1.1*

Cd^{2+} Cadmium(II) ion *25.1.3, 25.2.3*

$CeO_{12}S_3^{2-}$ Cerium(IV) sulfate complex *8.5.1*

Cl^- Chloride ion *8.51.1, 8.52.2, 12.4.2, 19.20.2, 19.38.1, 25.4.1*

$ClCo^{2+}$ Chlorocobalt(III) ion *6.100*

$ClCoH_{15}N_5^{2+}$ Pentaammine(chloro)cobalt(III) ion *5.1.19, 6.1.8, 15.1.19, 17.3.3, 28.2.22*

ClCu Copper(I) chloride *8.6, 22.50.43*

$ClFe^{2+}$ Chloroiron(III) ion *25.7.2*

$ClH_{15}N_5Os^{2+}$ Pentaammine(chloro)osmium(III) ion *22.3.31*

$ClH_{15}N_5Ru^+$ Pentaammine(chloro)ruthenium(II) ion *22.42*

$ClH_{15}N_5Ru^{2+}$ Pentaammine(chloro)ruthenium(III) ion *22.43.1*

ClHg Mercury(I) chloride *10.8*

$ClHgO_2$ Chloromercury(I)peroxyl *10.9*

$ClMn^{2+}$ Chloromanganese(III) ion *13.25*

ClO_3^- Chlorate ion *28.2.9*

$ClTl^+$ Chlorothallium(II) ion *25.7*

Cl_2Cu^- Copper(I) chloride complex *8.2.1, 8.4.1*

$Cl_2H_2O_2Pt^-$ Dichlorobis(hydroxy)platinate(III) ion *19.31*

$Cl_2H_6N_2Pt^-$ *cis*-Diamminedichloroplatinate(I) ion *19.2*
trans-Diamminedichloroplatinate(I) ion *19.3*

$Cl_2H_7N_2OPt$ *cis*-Diamminedichloroplatinum(II), OH reaction product *19.22*
trans-Diamminedichloroplatinum(II), OH reaction product *19.23*

$Cl_2H_8N_4Pt^+$ Tetraammineplatinum(II), $Cl_2^{\cdot-}$ reaction product *19.21*

Cl_2Hg^- Dichloromercurate(I) ion *22.50.56, 22.51.3, 22.56.2, 22.62.3*

Cl_2Mn^+ Dichloromanganese(III) ion *13.26*

Cl_2Tl Dichlorothallium(II) *25.8*

Cl_3Cu^{3-} Copper(0) chloride complex *8.1*

Cl_3Tl^- Trichlorothallate(II) ion *25.9*

Cl_4Fe^{2-} Tetrachloroferrate(II) ion *22.50.49*

Cl_4HOPt^{2-} Tetrachlorohydroxyplatinate(III) *19.30*

$Cl_4H_3O_2Pt^{2-}$ Aquatetrachlorohydroxyplatinate(III) ion *19.29*

Cl_4Pt^{3-} Tetrachloroplatinate(I) ion *19.5*

Cl_4Tl^{2-} Tetrachlorothallate(II) ion *25.10*

$Cl_5H_2OPt^{2-}$ Aquapentachloroplatinate(III) ion *19.28*

Cl_5Pt^{2-} Pentachloroplatinate(III) ion *19.27*

Cl_6Ir^{2-} Hexachloroiridate(IV) ion *12.5, 15.29.4*

Cl_6Pt^{3-} Hexachloroplatinate(III) ion *19.26*
Tetrachloroplatinate(II), $Cl_2^{\cdot-}$ reaction product *19.25*

Co^+ Cobalt(I) ion *6.1, 6.1.3*

Co^{2+} Cobalt(II) ion *22.3.2, 25.4.2, 28.2.10*

Co^{3+} Cobalt(III) ion *6.99, 25.4.3*

$CoFH_{15}N_5^{2+}$ Pentaammine(fluoro)cobalt(III) ion *5.1.21, 6.1.7, 15.1.21, 28.2.24*

CoH_3N^{2+} Amminecobalt(II) ion *6.26*

$CoH_6N_2^{2+}$ Bis(ammine)cobalt(II) ion *6.25*

$CoH_9N_3^{2+}$ Tris(ammine)cobalt(II) ion *6.24*

$CoH_9N_6O_6$ Trinitrotrisamminecobalt(III) *6.1.12, 17.3.6*

$CoH_{12}N_4^{2+}$ Tetraamminecobalt(II) ion *6.23*

$CoH_{15}N_5^{2+}$ Pentaamminecobalt(II) ion *6.22*

$CoH_{15}N_8^{2+}$ Pentaammine(azido)cobalt(III) ion *5.1.25, 15.1.24, 28.2.28*

$CoH_{16}N_4O_2^{3+}$ Tetraamminediaquacobalt(III) ion *6.1.10, 17.3.5*

$CoH_{16}N_5O^{2+}$ Pentaammine(hydroxy)cobalt(III) ion *5.1.24, 15.1.23, 28.2.27*

$CoH_{17}N_5O^{3+}$ Pentaammine(aqua)cobalt(III) ion *5.1.23, 6.1.6, 15.1.22, 17.3.2, 28.2.26*

$CoH_{18}N_6^{3+}$ Hexaamminecobalt(III) ion *5.1.17, 6.1.5, 6.6.8, 8.84.1, 15.1.17, 15.6.1, 15.7.1, 15.8.1, 15.9.1, 15.10.2, 17.3.1, 22.3.3, 28.2.20*

$CoO_{14}P_2^{6-}$ Cobalt(II) pyrophosphate *9.49.5*

$Co_2H_{26}N_9O_2^{3+}$ μ-Amido-μ-peroxido-octakisamminedicobalt(III) ion *6.111, 22.50.15*

$Co_2H_{30}N_{10}O_2^{4+}$ Decaammine-μ-peroxidodicobalt(III) ion *6.110, 22.50.14*

Cr^+ Chromium(I) ion *7.1*

Cr^{2+} Chromium(II) ion *7.2, 22.50.19*

Cr^{3+} Chromium(III) ion *22.3.12, 25.1.4, 25.2.4*

CrH^{2+} Hydridochromium(III) ion *7.27*

$CrH_{12}O_6^{2+}$ Hexaaquachromium(II) ion *15.41.2*

CrO_4^{2-} Chromate(VI) ion *5.1.39*

CrO_4^{3-} Chromate(V) ion *7.40*

$Cr_2O_7^{2-}$ Dichromate(VI) ion *5.1.40, 28.2.41*

Cu Copper atom *8.2*

Cu^+ Copper(I) ion *8.5, 8.29.1, 22.50.42, 22.51.1, 22.55.6, 22.56.1, 22.57.3, 22.58.1, 22.59.5, 22.60.1, 22.61.1, 22.62.2*

Cu^{2+} Copper(II) ion *1.1.4, 5.1.41, 6.1.15, 8.29.2, 15.1.29, 15.29.2, 19.35.2, 19.37.2, 19.45.2, 19.46.2, 22.3.24, 22.30.1, 22.31.1, 22.33.1, 25.1.5, 25.2.5, 28.2.42*

CuH^+ Hydridocopper(II) ion *8.27*

$CuHO_2^{2+}$ Hydroperoxocopper(III) ion *8.64*

$CuH_2O_2^+$ Dihydroxycopper(III) ion *8.5.3, 8.46*

CuH_3O_3 Trihydroxycopper(III) *8.47, 8.47.1*

$CuNO_2^+$ Nitritocopper(II) ion *8.47.2*

$CuO_{14}P_2^{6-}$ Copper(II) pyrophosphate *9.49.7*

Cu_2^+ Copper(I) ion complex with copper(0) *8.4*

Eu^{2+} Europium(II) ion *22.59.6*

Eu^{3+} Europium(III) ion *22.3.25, 22.30.2, 22.31.2, 22.32.1, 22.33.2*

$F_2H_{12}N_4Pt^{2+}$ Tetraammine(difluoro)platinum(IV) ion *7.4.11, 7.6.8, 7.11.6*

Fe^{2+} Iron(II) ion *6.63.1, 6.100.4, 8.45.1, 9.27.1, 15.44.3, 15.46.4, 15.50.3, 15.52.2 16.1.1, 16.2.1, 16.3.1, 16.4.1, 22.50.47, 22.53.1, 22.55.7, 25.4.4, 25.7.1, 25.8.1, 25.9.1, 25.10.1, 28.13.2, 28.14.4*

Fe^{3+} Iron(III) ion *1.1.5, 1.2.2, 7.4.7, 8.5.4, 9.5.2, 25.4.6*

FeH^{2+} Hydridoiron(III) ion *9.16*

$FeHO_2^{2+}$ Hydroperoxide-iron(III) complex *9.17*

$FeHO_6S$ Hydroperoxide-sulfatoiron(III) complex *9.18*

FeO_4^{3-} Ferrate(V) ion *9.52.2, 9.53*

FeO_4S Iron(II) sulfate *22.47.1, 22.50.51, 22.51.2, 22.52.1, 22.54.2, 22.57.4*

FeO_4S^+ Sulfatoiron(III) ion *7.4.9, 7.6.6, 7.16.5, 7.17.3, 9.33, 21.4.2*

$FeO_{12}P_3^{7-}$ Triphosphatoferrate(II) ion *22.50.50*

$FeO_{14}P_2^{6-}$ Iron(II) pyrophosphate *9.49.4*

$FeO_{15}P_2^{6-}$ Iron(IV) pyrophosphate *9.49*

$FeO_{41}SiW_{11}^{5-}$ Iron(IV) (hydroxo)undecatungstosilicate ion *9.50*

$Fe_2HO_2^{4+}$ Hydroperoxide-iron(III) iron(II) complex *9.15*

$Fe_2HO_6S^{2+}$ Hydroperoxide-sulfatoiron(III) iron(II) complex *9.19*

H Hydrogen atom *8.5.6, 28.2.2*

H^+ Hydrogen ion *1.6.1, 3.2.1, 3.4.2, 6.4.3, 6.5.5, 6.6.13, 6.7.2, 6.10.2, 6.15.2, 6.27.2, 6.28.2, 6.29.2, 6.36.2, 6.37.2, 6.38.2, 6.45.2, 6.46.2, 6.47.2, 6.65.1, 7.25.1, 7.26.1, 7.27.1, 7.29.1, 7.30.1, 7.31.1, 7.32.1, 7.33.1, 7.34.1, 7.35.1, 8.12.1, 8.15.4, 8.24.2, 8.25.1, 8.26.1, 8.28.1, 8.53.1, 8.54.1, 8.55.1, 8.56.1, 9.16.1, 12.2.1, 13.3.1, 13.30.1, 13.32.1, 15.1.31, 15.8.8, 15.10.11, 15.26.2, 19.18.2, 19.36.3, 21.1.1, 21.2.1, 21.12.1, 22.41.1, 22.49.1, 25.5.2, 26.1.1, 28.2.44*

HHgO Mercury(I) hydroxide *10.4*

$HHgO^+$ Hydroxymercury(II) ion *10.1.2*

$HMnO^{2+}$ Hydroxymanganese(III) ion *13.12, 28.2.46*

$HMo_{18}O_{62}P_2^{6-}$ 18-Molybdodiphosphate ion(7-), conjugate acid *14.1*

$HNiO_2^{2+}$ Dioxonickel(IV) ion, protonated *15.74*

HO Hydroxyl *4.1.2, 5.1.2, 6.1.22, 7.40.1, 10.8.3, 10.10.3, 11.2.2, 15.1.1, 28.2.3*

HO^- Hydroxide ion *8.83.2, 15.42.2, 15.43.2, 15.44.4, 15.46.7, 15.57.1, 15.58.1, 15.60.1, 15.61.1, 15.65.2, 17.10.1, 19.18.3, 19.36.2*

$HOTl^+$ Hydroxythallium(II) ion *25.5, 25.5.3*

HO_2 Perhydroxyl *1.5.2, 15.44.1, 15.46.2, 15.50.1, 25.4.7*

HO_2Pb^+ Hydroxy(oxo)lead(IV) ion *17.10*

HO_4P^{2-} Hydrogen phosphate ion *6.6.17*

H_2HgO_2 Mercury(II) dihydroxide *10.1.3*

H_2O_2 Hydrogen peroxide *1.1.7, 1.2.4, 1.3.3, 1.5.3, 5.1.42, 5.7.4, 6.1.16, 6.19.1, 7.2.2, 8.5.7, 8.11.1, 8.18.1, 8.19.1, 8.21.1, 8.22.1, 8.45.2, 8.52.3, 9.49.2, 11.2.3, 15.1.30, 15.19.2, 15.21.2, 15.22.2, 15.23.2, 15.24.2, 15.25.1, 15.26.3, 15.46.5, 15.50.4, 25.1.9, 25.2.9, 25.4.8, 28.2.43*

$H_2O_2Pb^+$ Dihydroxylead(III) ion *17.8*

H_2O_2Tl Dihydroxythallium(II) *25.6*

$H_2O_4P^-$ Dihydrogen phosphate ion *6.5.8, 6.6.18, 6.7.5, 15.8.9, 15.10.15*

$H_2O_{40}W_{12}^{7-}$ 12-Tungstate ion(7-), dihydrogen *27.1*

$H_3N.Ni$ Amminenickel(III) ions *15.31*

H_4N^+ Ammonium ion *6.6.14*

H_4N_2 Hydrazine *15.31.1*

$H_4O_4Pb^-$ Tetrahydroxyplumbate(III) ion *17.9*

$H_8N_3ORh^{2+}$ Aquatriamminerhodium(II) ion *21.7*

$H_8O_{20}P_8Pt_2^{4-}$ Octahydrogen tetrakis(μ-diphosphito)-diplatinate(II)(III) ion *19.47*

$H_8O_{20}P_8Pt_2^{5-}$ Octahydrogen tetrakis(μ-diphosphito)-diplatinate(I)(II) ion *19.16*

$H_{11}N_3OPt^+$ Triammineaquaplatinum(I) ion *19.1*

$H_{12}Mo_2O_{10}^{3+}$ Hexaaquadi-μ-oxodioxodimolybdenum(V,VI) ion *14.6*

$H_{12}N_4O_2Rh^{2+}$ Tetraammine(superoxido)rhodium(III) ion *21.13*

$H_{12}N_4Rh^{2+}$ Tetraamminerhodium(II) ion *21.8, 21.8.4*

$H_{13}N_4Pt^{2+}$ Tetraamminehydridoplatinum(III) ion *19.17*

$H_{13}N_4Rh^{2+}$ Tetraammine(hydrido)rhodium(III) ion *21.13.1*

$H_{14}N_4O_2Pt^+$ Tetraamminebis(hydroxy)platinum(III) ion *19.19*

$H_{14}N_5O_2Ru^{2+}$ *trans*-Tetraammine(aqua)nitrosylruthenium(II) ion, electron adduct *22.36*

$H_{15}N_4O_2Pt^{2+}$ Tetraammine(aqua)hydroxyplatinum(III) ion *19.18*

$H_{15}N_6ORu^{2+}$ Pentaamminenitrosylruthenium(II) ion *22.37*

$H_{15}N_6ORu^{3+}$ Pentaammine(nitroso)ruthenium(III) ion *6.6.20, 15.8.13, 15.10.17, 22.36.1*

$H_{15}N_7Ru^+$ Pentaammine(dinitrogen)ruthenium(I) ion *22.1*

$H_{15}N_7Ru^{3+}$ Pentaammine(dinitrogen)ruthenium(III) ion *22.45*

$H_{16}Mo_2O_{11}^{2+}$ *cis*-Octaaqua-μ-oxo-bis(oxo)dimolybdenum(IV) ion *14.5*

$H_{16}N_4O_2Pt^{3+}$ Tetraamminebis(aqua)platinum(III) ion *19.20*

$H_{17}N_5ORu^{2+}$ Pentaammine(aquo)ruthenium(II) ion *22.43*

$H_{18}N_6Ru^{2+}$ Hexaammineruthenium(II) ion *6.6.19, 22.50.59*

$H_{18}N_6Ru^{3+}$ Hexaammineruthenium(III) ion *5.1.50, 8.15.7, 8.16.3, 8.17.2, 8.84.2, 15.1.38, 15.6.4, 15.7.4, 15.8.12, 15.9.8, 15.10.16, 15.11.2, 15.13.2, 22.3.35, 28.2.56*

$H_{30}N_{12}Ru_2^{3+}$ Decaammine(dinitrogen)diruthenium(I-II) ion *22.38*

$H_{30}N_{12}Ru_2^{5+}$ Decaammine(dinitrogen)diruthenium(II-III) ion *22.40*

$H_{31}N_{12}ORu_2^{4+}$ Decaammine(dinitrogen)diruthenium(II) ion, OH-adduct *22.39*

Hg Mercury atom *10.1*

Hg^+ Mercury(I) ion *10.3, 22.50.54, 22.55.8, 22.57.5, 22.58.2, 22.59.7, 22.60.2*

Hg^{2+} Mercury(II) ion *10.1.1*

HgI Mercury(I) iodide *10.11*

Hg_2^+ Mercury(I) ion, complex with mercury(0) *10.2*

Hg_2^{2+} Mercury(I) dimer ion *10.2.2, 22.50.55, 22.55.9, 22.57.6, 22.58.3, 22.59.8, 22.60.3*

I^- Iodide ion *15.29.3, 15.46.6, 15.72.1*

IO_3^- Iodate ion *5.1.43, 5.7.3, 5.8.2, 5.9.2, 5.10.3, 6.1.17, 15.1.32, 28.2.45*

I_2^- Diiodine radical ion *6.41.1*

In Indium atom *11.1*

In^+ Indium(I) ion *11.1.1*

In^{2+} Indium(II) ion *11.2*

Mn^{2+} Manganese(II) ion *15.50.5, 25.4.9*

Mn^{3+} Manganese(III) ion *13.11*

MnO_2^+ Peroxidomanganese(III) ion *13.13*

MnO_4^- Permanganate ion *1.2.3, 5.1.44, 6.1.18, 7.2.1, 8.5.5, 15.1.33*

MnO_4^{2-} Manganate(VI) ion *13.36.1*

$Mn_2O_7P_2$ Manganese(II) pyrophosphate *9.49.3*

NH_3 Ammonia *1.10.1, 1.11.1*

NO_2^- Nitrite ion *5.1.45, 5.7.5, 5.8.3, 5.9.3, 5.10.4, 8.41.1, 15.1.34, 22.3.27, 28.2.49*

NO_3^- Nitrate ion *5.1.46, 5.7.6, 5.8.4, 5.9.4, 5.10.5, 6.1.20, 15.1.35, 28.2.50*

N_2O Nitrous oxide *3.1.4, 5.1.47, 5.6.1, 6.1.19, 6.5.9, 6.6.15, 6.7.3, 6.17.1, 6.18.1, 8.15.5, 15.1.36, 15.8.10, 15.9.6, 15.10.12, 19.6.1, 25.1.7, 25.2.7, 28.2.51, 28.3.1*

N_3^- Azide ion *8.52.4*

Ni^+ Nickel(I) ion *15.1*

Ni^{2+} Nickel(II) ion *15.29.5, 25.1.8, 25.2.8, 28.2.52*

NiO_2^+ Dioxonickel(IV) ion *15.73*

$NiO_{14}P_2^{6-}$ Nickel(II) pyrophosphate *9.49.6*

OV^+ Vanadyl(III) ion *26.1*

O_2 Oxygen *1.1.6, 1.2.5, 1.3.4, 2.1.1, 3.1.5, 5.1.48, 6.1.21, 6.4.4, 6.6.16, 6.7.4, 6.34.2, 6.33.1, 6.34.1, 6.35.1, 6.49.1, 6.50.1, 6.67.1, 6.74.1, 6.95.3, 6.98.2, 7.2.3, 7.4.10, 7.6.7, 7.8.5, 7.11.5, 7.15.4, 7.16.6, 8.5.10, 8.15.6, 8.18.2, 8.19.2, 8.20.1, 8.21.2, 8.22.2, 8.29.4, 8.43a.1, 9.13.3, 10.2.3, 10.5.1, 10.6.2, 10.8.2, 10.10.2, 10.11.2, 10.12.2, 12.3.2, 13.3.2, 13.4.2, 13.5.2, 13.6.1, 13.7.1, 13.8.1, 14.2.1, 14.3.1, 15.1.37, 15.6.3, 15.7.3, 15.8.11, 15.9.7, 15.10.14, 15.27.2, 15.28.1, 15.29.6, 15.52.3, 15.72.2, 17.2.2, 19.6.2, 19.37.4, 21.8.2, 21.11.4, 22.3.30, 22.18.2, 22.35.1, 22.37.8, 24.2.2, 25.1.10, 25.2.10, 27.1.1, 28.2.53, 28.9.1, 28.10.3, 28.11.3, 28.15.5*

O_2^- Superoxide radical anion *15.44.2, 15.46.3, 15.50.2, 22.50.57, 28.15.2*

O_2S Sulfur dioxide *7.4.13, 7.8.6, 7.11.7, 7.15.5, 7.17.4, 11.3.1, 28.5.4*

O_2U^{2+} Uranyl(VI) ion *7.4.14, 7.6.9, 7.8.7, 7.11.8*

O_3S^- Sulfite radical ion *22.3.37*

O_3S^{2-} Sulfite ion *22.50.62*

O_4Re^{2-} Rhenate(VI) ion *20.1*

O_4S^- Sulfate radical ion *8.5.2*

O_4S^{2-} Sulfate ion *15.44.5*

$O_8S_2^{2-}$ Peroxodisulfate ion *5.1.53, 6.1.23, 15.1.39, 28.2.57*

Pb Lead atom *17.1*

Pb^+ Lead(I) ion *17.2*

Pb^{2+} Lead(II) ion *5.1.49, 25.1.11, 25.2.11, 28.2.54*

Pd^+ Palladium(I) ion *18.1*

Pd^{3+} Palladium(III) ion *18.1.1*

Sm^{2+} Samarium(II) ion *25.1.13, 25.2.13*

Sm^{3+} Samarium(III) ion *22.3.38*

Tl Thallium(0) *25.1*

Tl^+ Thallium(I) ion *25.1.14*

Tl^{2+} Thallium(II) ion *22.50.63, 25.4, 25.4.10*

Tl_2^+ Thallium(I) ion, complex with Tl(0) *25.2*

Tl_4^{2+} Thallium(0), complex with thallium(I) ion, dimer *25.3*

Yb^{3+} Ytterbium(III) ion *22.3.39*

Zn^+ Zinc(I) ion *13.12.1, 28.2, 28.2.1*

9. Chemical Name Index

Acetaldehyde *25.1.15*

(μ-Acetato)bis(μ-hydroxo)bis[triamminecobalt(III)] ion *5.1.32, 15.9.5, 28.2.34*

μ-Acetatohexaamminebis(μ-hydroxy)dicobalt(III) ion *5.1.32, 15.9.5, 28.2.34*

(Acetato)pentaamminecobalt(III) ion *5.1.27, 15.1.26, 28.2.30*

Acetic acid *6.4.5, 6.5.7, 6.6.21, 15.8.14, 15.10.18*

Acetic acid, chloro-, ion(1-) *1.1.10, 1.3.7*

Acetone *25.1.16, 28.2.58*

Acetonitrile(aqua)-2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraeneiron(II) ion *9.8*

Acetonylacetonatochromium(II) ion *7.26*

Acetophenone *5.1.56, 5.3.1*

Acetylacetonatocobalt(II) ion *6.38*

(*N*-Acetyl-*N*-methylamino)methyl *9.7.3, 22.37.4*

N'-Acetylsulfanilamide *25.4.47*

Acrylamide *8.5.21*

Adenosine *25.5.4*

Adenosine triphosphate, ester with 1-β-D-ribofuranosyl-3-pyridinecarboxamide *13.18.6, 13.20.2*

Adenylyl-(3'⟶5')-guanosine *25.5.5*

β-Alaninato(2-aminoethyl)copper(III) *8.83*

β-Alanine, copper(III) complex *8.59*

Alanine, 2-methyl- *1.5.5, 1.7.2*

Alanine, negative ion *1.9.2*

Allyl alcohol *6.1.25, 15.1.40, 28.2.59*

Aluminum(III) sulfophthalocyanine, radical anion *2.1*

μ-Amido-μ-peroxidooctakisamminedicobalt(III) ion *6.111, 22.50.15*

μ-Amido-μ-peroxidotetrakis(2,2'-bipyridine)dicobalt(III) ion *6.113, 22.50.17*

μ-Amido-μ-peroxidotetrakis(ethylenediamine)dicobalt(III) ion *6.112, 22.50.16*

μ-Amido-μ-peroxidotetrakis(1,10-phenanthroline)-dicobalt(III) ion *6.114, 22.50.18*

μ-Amido-μ-superoxidotetrakis(ethylenediamine)-dicobalt(III) ion *5.1.28*

2-Amino-2-carboxy-2-methylethyl *9.7.2, 22.37.3*

3-Amino-7-(dimethylamino)-2-methylphenothiazinium *25.5.25*

2-Aminoethanol *1.7.1*

α-Aminoisobutyrate negative ion *1.9.3*

α-Aminoisobutyric acid *1.5.5, 1.7.2*

Aminomethyl(glycinato)copper(III) *8.43a*

8-Amino-8-methyl-1,3,6,10,13,15-hexaaza-tricyclo[13.1.1.1^{13,15}]octadecanenickel(I) ion *15.15*

8-Amino-8-methyl-1,3,6,10,13,15-hexaaza-tricyclo[13.1.1.1^{13,15}]octadecanenickel(III) ion *15.54*

2-Amino-2-methylpropanoic acid *1.5.5, 1.7.2*

2-Amino-2-methylpropionate ion *1.9.3*

2-Amino-2-methylpropyl, conjugate acid *9.7.4, 22.37.5*

2-(Aminomethyl)pyridinebis(2,2'-bipyridine)ruthenium(III) ion *22.48*

2-(Aminomethyl)pyridinebis(2,2'-bipyridine)ruthenium(III) ion, deprotonated *22.49*

4-Amino-1-methyl-2-pyrimidinone *25.5.18*

2-Amino-4-(methylthio)butanoic acid *1.5.20, 25.4.36*

6-Aminophenalenone *1.5.6, 25.4.12*

Ammine(2,2'-bipyridine)(2,2':6',2''-terpyridine)ruthenium(III) ion *22.53*

Ammine(2,2'-bipyridine)(2,2':6',2''-terpyridine)ruthenium(II) ion *22.50.60*

cis-Amminechlorobis(ethylenediamine)cobalt(III) ion *5.1.15, 15.1.15, 28.2.18*

Amminecobalt(II) ion *6.26*

Amminecopper(III) complex *8.48*

Amminenickel(III) ions *15.31*

Amminesilver(0)-silver(I) complex *1.3*

Ammonia *1.10.1, 1.11.1*

2-Ammonio-1-carboxyethylcopper(II) ion *8.30*

2-Ammonio-2-carboxypropylcopper(II) ion *8.38*

2-Ammonio-2-carboxypropylcopper(III) ion *8.73*

2-Ammonio-2,2-dimethylethylchromium(III) ion *7.36*

2-Ammonio-2,2-dimethylethylcopper(II) ion *8.33*

2-Ammonioethylcopper(II) ion *8.31*

Ammonium ion *6.6.14*

Aniline, *N,N*-dimethyl-4-nitroso- *5.1.68*

m-Anisic acid *1.5.22, 25.4.38*

o-Anisic acid *1.5.21, 25.4.37*

p-Anisic acid *1.5.23, 25.4.39*

Anisole *1.5.7, 25.4.13*

9,10-Anthraquinone *5.1.57, 6.1.26*

9,10-Anthraquinone-2,6-disulfonate ion *6.4.6, 7.2.4, 8.15.8, 15.8.15, 15.10.19*

9,10-Anthraquinone-2-sulfonate ion *6.6.22, 8.15.9*

Aquabis(ethylenediamine)fluorocobalt(III) ion *5.1.14, 15.1.14, 28.2.17*

Aquabis(ethylenediamine)hydroxyplatinum(III) ion *19.36*

Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion *15.58*

Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenickel(III) ion *15.65*

Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenenickel(III) ion *15.62*

Aquabromo-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion *15.39*

Aqua(bromo)nitrilotriacetatocobaltate(III) ion *6.107*

Aqua(carboxymethyl)nitrilotriacetatocobaltate(III) ion *6.104*

Aqua(chloro)tetraethyldiethylenetriamine(hydroxy)platinum(III) ion *19.43*
Aquadichloro(diethylenetriamine)platinum(III) ion *19.39*
Aqua(dichloro)tetraethyldiethylenetriamineplatinum(III) ion *19.42*
Aqua-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaene(thiocyanato)nickel(III) ion *15.67*
Aqua-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-triene(thiocyanato)nickel(III) ion *15.59*
Aqua-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene(thiocyanato)nickel(III) ion *15.63*
Aqua(1-ethoxyethyl)nitrilotriacetatocobaltate(III) ion *6.105*
Aqua(ethylenediaminetetraacetato)nickelate(III) ion *15.72*
Aqua(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)hydroxycobalt(III) ion *15.8.3, 15.10.5*
Aqua(1-hydroxyethyl)nitrilotriacetatocobaltate(III) ion *6.103*
cis-Aqua(1-hydroxyethyl)(nitrilotriacetato)cuprate(III) ion *8.84.4, 8.85, 8.86.1*
Aqua(1-hydroxy-1-methylethyl)nitrilotriacetatocobaltate(III) ion *6.106*
cis-Aqua(1-hydroxy-1-methylethyl)(nitrilotriacetato)cuprate(III) ion *8.86*
qua(hydroxymethyl)[*N*-(2-hydroxyethyl)-*N*,*N*′,*N*′-ethylenediaminetriacetato]cobaltate(III) ion *6.108*
Aqua(hydroxymethyl)nitrilotriacetatocobaltate(III) ion *6.102*
cis-Aqua(hydroxymethyl)(nitrilotriacetato)cuprate(III) ion *8.84*
Aqua(methyl)nitrilotriacetatocobaltate(III) ion *6.101*
Aqua(methyl)nitrilotriacetatoferrate(III) ion *9.28*
Aqua(methyl)nitrilotriacetatomanganate(III) ion *13.28*
Aquamethyl(1,4,8,11-tetraazacyclotetradecane)nickel(III) ion *15.41*
Aquapentachloroplatinate(III) ion *19.28*
Aquatetrachlorohydroxyplatinate(III) ion *19.29*
Aquatriamminerhodium(II) ion *21.7*
Asaronic acid *1.5.29, 25.4.58*
Ascorbate ion *13.14.1, 13.17.1, 13.19.1, 13.20.1, 15.45.1*
Ascorbate radical anion *6.14.1*
Aspartate monoanion *1.9.4*
Azide ion *8.52.4*
Benzene, (bromomethyl)- *7.3.2*
Benzene, 1,4-dicyano- *25.2.14*
Benzene, 1,2-dimethoxy- *1.5.9, 25.4.18, 25.5.10*
Benzene, 1,3-dimethoxy- *1.5.10, 25.4.19*
Benzene, 1,4-dimethoxy- *1.5.11, 25.4.20, 25.5.11*
Benzene, methoxy- *1.5.7, 25.4.13*
Benzene, nitro- *1.1.12, 1.2.10, 1.3.9*
Benzene, 1,1′-tellurobis- *25.4.32*
Benzene, 1,2,4,5-tetramethoxy- *25.4.48*
Benzene, 1,1′-thiobis- *25.4.31*
Benzene, 1,2,3-trimethoxy- *1.5.24, 25.4.53*
Benzene, 1,2,4-trimethoxy- *1.5.25, 25.4.54*
Benzene, 1,3,5-trimethoxy *1.5.26, 25.4.55*
1,4-Benzenediamine, *N*,*N*,*N*′,*N*′-tetramethyl- *9.34.7, 9.35.1, 9.36.3, 9.37.1, 9.38.1*
1,4-Benzenediol, (1,1-dimethylethyl)- *13.15.2, 13.18.2*
1,4-Benzenediol, trimethyl- *22.50.84*
1,2-Benzenediol *13.15.3, 13.18.3*
1,3-Benzenediol *13.15.4, 13.18.7*
1,4-Benzenediol *22.50.64, 28.22.4*
Benzil *5.1.58, 5.2.1, 5.3.2*
Benzoate ion, 2,3-dimethoxy- *1.6.2*
Benzoate ion, 2,4-dimethoxy- *1.6.4*
Benzoate ion, 2,6-dimethoxy- *1.6.5*
Benzoate ion, 3,4-dimethoxy- *1.6.3*
Benzoate ion, 3,5-dimethoxy- *1.6.6*
Benzoate ion, 2-methoxy- *1.6.7*
Benzoate ion, 3-methoxy- *1.6.8*
Benzoate ion, 4-methoxy- *1.6.9*
1,3-Benzodioxol-5-ol, ion(1-) *9.34.5*
Benzoic acid, 2-methoxy- *1.5.21, 25.4.37*
Benzoic acid, 3-methoxy- *1.5.22, 25.4.38*
Benzoic acid, 4-methoxy- *1.5.23, 25.4.39*
Benzoic acid, 3,4,5-trimethoxy- *1.5.28, 25.4.57*
Benzophenone *5.1.59, 5.2.2, 5.3.3, 5.4.1, 5.5.1, 6.1.27, 28.2.60*
Benzophenone, 4,4′-dimethoxy- *5.1.61, 5.2.3, 5.3.4, 5.4*
1-Benzopyran-2-carboxylic acid, 3,4-dihydro-6-hydroxy-2,5,7,8-tetramethyl-, ion(1-) *13.17.2, 13.18.4*
1,4-Benzoquinone, tetramethyl- *5.1.62, 5.2.4, 5.3.5, 5.4 5.5.2, 22.3.49*
1,4-Benzoquinone *1.2.7, 5.1.60, 6.1.28, 7.2.5, 8.15.10, 10.6.3, 10.7.1, 10.8.4, 10.9.1, 10.10.8, 10.11.3, 10.12.3, 10.13.1, 15.1.41, 15.8.16, 15.10.20, 17.2. 22.3.41, 22.35.3, 25.1.17, 28.2.61*
1,4-Benzosemiquinone, radical ion *28.22.*
3-Benzoylpyridine *6.6.23, 15.8.17, 15.10.21*
Benzyl bromide *7.3.2*
N-Benzyl-3-carbamylpyridinyl *28.23.2*
Benzylcopper(III) ion *8.74*
1-Benzylnicotinamide radical *28.23.2*
Benzyl viologen radical cation *22.50.7*
Bicarbonate ion *6.6.5*
(2,2′-Bipyrazine)(2,2′-bipyridine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct *22.10*
(2,2′-Bipyrazine)(2,2′-bipyridine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, p tonated *22.11*

(2,2′-Bipyrazine)bis(2,2′-bipyridine)ruthenium(II) ion, electron adduct *22.8*
(2,2′-Bipyrazine)bis(2,2′-bipyridine)ruthenium(II) ion, electron adduct, protonated *22.9*
(2,2′-Bipyrazine)bis(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct *22.16*
(2,2′-Bipyrazine)bis(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated *22.17*
2,2′-Bipyridine, conjugate acid *6.11.1, 22.3.42*
(2,2′-Bipyridine)bis(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct *22.14*
(2,2′-Bipyridine)bis(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated *22.15*
2,2′-Bipyridinebis(oxalato)chromate(II) ion *7.21*
2,2′-Bipyridinebis(oxalato)chromate(III) ion *5.1.37, 28.2.39*
2,2′-Bipyridinebis[2-(2-thiazolyl)pyridine]ruthenium(III) ion *22.64*
2,2′-Bipyridinecobalt(II) ion *6.1.13, 22.3.5*
2,2′-Bipyridinecobalt(I) ion *6.9*
2,2′-Bipyridinecobalt(I) ion *6.8*
2,2′-Bipyridinetetracyanoferrate(II) ion, electron adduct *9.3*
4,4′-Bipyridinium, 1,1′-bis(3-sulfonatopropyl)-, radical anion *19.47.3, 22.50.69, 28.14.6*
4,4′-Bipyridinium, 1,1′-bis(3-sulfonatopropyl)-3,3′-dimethyl-, radical anion *22.50.70, 22.55.11*
4,4′-Bipyridinium, 1,1′-bis(4-sulfonatobenzyl)-, dihydroxide bis(inner salt) *22.3.43*
4,4′-Bipyridinium, 1,1′-bis(4-sulfonatobenzyl)-, dihydroxide bis(inner salt), radical anion *22.50.67*
4,4′-Bipyridinium, 1,1′-diheptyl-, radical cation *28.14.11*
4,4′-Bipyridinium, 1,1′-dihexyl-, radical cation *28.14.10*
4,4′-Bipyridinium, 1,1′-dimethyl- *7.3.1, 9.3.2, 9.4.2, 21.11.5, 22.3.48, 22.6.1, 22.7.1, 22.8.1, 22.9.1, 22.10.1, 22.11.1, 22.12.2, 22.13.1, 22.14.1, 22.15.1, 22.16.1, 22.17.1, 22.18.4, 22.19.1, 22.20.1, 22.21.1, 22.22.1, 22.23.1, 22.28.2, 23.1.1*
4,4′-Bipyridinium, 1,1′-dioctyl-, radical cation *28.14.12*
4,4′-Bipyridinium, 1,1′-dipropyl-, radical cation *28.14.9*
4,4′-Bipyridinyl, 1-methyl- *22.50.77*
2,2′-Bipyrid-3-ylium-C^3,N'-bis(2,2′-bipyridine-N,N')iridium(III) ion, electron adduct *12.3*
2,2′-Bipyrid-3-ylium-C^3,N'-bis(2,2′-bipyridine-N,N')iridium(III) ion, conjugate monoacid, electron adduct *12.2*
2,2′-Bipyrid-3-ylium-C^3,N'-bis(2,2′-bipyridine-N,N')iridium(IV) ion, conjugate monoacid *12.4*
Bis(acetylacetonato)chromate(II) *7.25*
Bis(acetylacetonato)cobalt(II) *6.37*
Bis(alaninato)cuprate(I) *8.10*
Bis(β-alanine)copper(III) complex *8.59*
Bis(alanine)copper(III) complex *8.58*
Bis(α-aminobutyric acid)copper(III) complex *8.60*
Bis(β-aminobutyric acid)copper(III) complex *8.61*
Bis(γ-aminobutyric acid)copper(III) complex *8.62*
3,7-Bis(2-aminoethyl)-1,3,5,7-tetraazabicyclo[3.3.1]nonanenickel(I) ion *15.16*
3,7-Bis(2-aminoethyl)-1,3,5,7-tetraazabicyclo[3.3.1]nonanenickel(III) ion *15.55*
Bis(α-aminoisobutyric acid)copper(III) complex *8.63*
Bis(ammine)cobalt(II) ion *6.25*
Bisaquatetraammineplatinum(III) ion *19.20*
Bis(2,2′-bipyrazine)(2,2′-bipyridine)ruthenium(II) ion, electron adduct *22.20*
Bis(2,2′-bipyrazine)(2,2′-bipyridine)ruthenium(II) ion, electron adduct, protonated *22.21*
Bis(2,2′-bipyrazine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct *22.22*
Bis(2,2′-bipyrazine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated *22.23*
Bis(2,2′-bipyridine)([2,2′-bipyridin]-3-yl-C,N')iridium(III) ion, electron adduct *12.3*
Bis(2,2′-bipyridine)([2,2′-bipyridin]-3-yl-C,N')iridium(III) ion, conjugate acid, electron adduct *12.2*
Bis(2,2′-bipyridine)([2,2′-bipyridin]-3-yl-C,N')iridium(IV) ion, conjugate monoacid *12.4*
Bis(2,2′-bipyridine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct *22.6*
Bis(2,2′-bipyridine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated *22.7*
Bis(2,2′-bipyridine)bis(cyano)ruthenate(II) ion, electron adduct *22.2*
Bis(2,2′-bipyridine)bis(cyano)ruthenium(III) ion *22.47*
Bis(2,2′-bipyridine)(4-carboxy-4′-methyl-2,2′-bipyridine)ruthenium(II) ion *22.5.1*
Bis(2,2′-bipyridine)(4-carboxy-4′-methyl-2,2′-bipyridine)ruthenium(II) ion, electron adduct *22.4*
Bis(2,2′-bipyridine)cobalt(II) ion *6.9.1*
Bis(2,2′-bipyridine)cobalt(I) ion *6.10*
Bis(2,2′-bipyridine)copper(I) ion *8.18*
Bis(2,2′-bipyridine)dicyanoferrate(II), OH reaction product *9.14*
Bis(2,2′-bipyridine)dicyanoferrate(II), electron adduct *9.1*
Bis(2,2′-bipyridine)(6,7-dihydro-5,8-dimethyldibenzo[b,j][1,10]phenanthroline)ruthenium(II) ion, electron adduct *22.29*
Bis(2,2′-bipyridine)(dipyrido[3,2-a:2′,3′-c]phenazine)ruthenium(II) ion, electron adduct, diprotonated *22.26*
Bis(2,2′-bipyridine)(dipyrido[3,2-a:2′,3′-c]phenazine)ruthenium(II) ion, electron adduct, protonated *22.27*
Bis(2,2′-bipyridine)(dipyrido[3,2-a:2′,3′-c]phenazine)ruthenium(II) ion, electron adduct *22.28*
Bis(2,2′-bipyridine)(4′-methyl[2,2′-bipyridine]4-carboxylato)ruthenium(II) ion *22.5.1*
Bis(2,2′-bipyridine(oxalato)chromate(II) *7.20*

Bis(2,2′-bipyridine)oxalatochromium(III)ion *5.1.35, 28.2.37*
Bis(2,2′-bipyridine)rhodium(II) ion *21.10, 21.11.2*
Bis(2,2′-bipyridine)ruthenium(II)(4-carboxy-4′-methyl-2,2′-bipyridine)(prolylprolinato)-pentaamminecobalt(III) ion, electron adduct *22.5*
Bis(2,2′-bipyridine)[2-(2-thiazolyl]pyridine]ruthenium(III) ion *22.63*
1,1′-Bis(carboxyethyl)-4,4′-bipyridinium radical ion (1+) *28.15.6*
1,1′-Bis(carboxymethyl)-4,4′-bipyridinium radical cation *22.50.65*
Bis(5-chloro-1,10-phenanthroline)copper(I) ion *8.20*
Bis(diethylenetriamine)cobalt(II) ion *6.30*
1,4-Bis(*N,N*-dimethylamino)benzene *9.34.7, 9.35.1, 9.36.3, 9.37.1, 9.38.1*
3,7-Bis(dimethylamino)phenothiazinium *25.5.19*
Bis(4,4′-dimethyl-2,2′-bipyridine)cobalt(I) ion *6.15*
Bis(4,4′-dimethyl-2,2′-bipyridine)cobalt(II) ion *6.12.1*
Bis(dimethylglyoximato)methylcobalt(III) difluoroborate *22.3.11*
Bis(2,9-dimethyl-1,10-phenanthroline)copper(I) ion *8.23*
Bis(ethylenediamine)cobalt(II) ion *6.28*
cis-Bis(ethylenediamine)difluorocobalt(III) ion *5.1.13, 15.1.13, 28.2.16*
Bis(ethylenediamine)platinum(I) ion *19.7, 19.7.1*
Bis(ethylenediamine)platinum(II), $Cl_2^{\cdot-}$ reaction product *19.34*
Bis(ethylenediamine)platinum(II), H reaction product *19.11*
Bis(ethylenediamine)platinum(III) ion, deprotonated *19.37*
Bis(glycinato)cobalt(II) *6.46*
Bis(glycinato)methylcopper(III) ion *8.82*
cis-Bis(glycinato)platinate(I) ion *19.9*
trans-Bis(glycinato)platinate(I) ion *19.10*
cis-Bis(glycinato)platinum(II), H reaction product *19.14*
trans-Bis(glycinato)platinum(II), H reaction product *19.15*
cis-Bis(glycinato)platinum(II), OH reaction product *19.45*
trans-Bis(glycinato)platinum(II), OH reaction product *19.46*
Bis(glycinato)platinum(III) *19.45*
Bis(glycine)copper(III) complex *8.57*
1,1′-Bis(2-hydroxyethyl)-4,4′-bipyridinium radical cation *22.50.66*
Bis(hydroxyprolinato)palladate(I) ion *18.2*
Bis(hydroxyprolinato)palladium(II), electron adduct *18.2*
Bis(iminodiacetato)nickelate(II), H-abstraction product *15.28*
Bis(5-methyl-1,10-phenanthroline)copper(I) ion *8.22*
Bismuth(II) ion *4.1, 4.1.1*
Bis(5-nitro-1,10-phenanthroline)copper(I) ion *8.21*
Bis(octahydro-1,4,7-triazonine)nickel(III) ion *15.34*
Bis(oxalato)phenanthrolinechromate(II) ion *7.23*
Bis(oxalato)phenanthrolinechromate(III) ion *5.1.38, 28.2.40*
Bis(μ-oxo)bis[aqua(oxalato)oxomolybdate(IV)(V) ion
Bis(μ-oxo)bis[(cysteinato)oxomolybdate(V)] ion *28.2.4*
Bis(μ-oxo)(ethylenediaminetetraacetato)-bis[oxomolybdate(V)] ion *28.2.47*
Bis(μ-oxo)(ethylenediaminetetraacetato)-bis[oxomolybdate(IV)(V)] ion *14.2*
Bis(2,4-pentanedionato)cobalt(II) *6.37*
Bis(1,10-phenanthroline)copper(I) ion *8.19*
Bis(1,10-phenanthroline)(2-hydroxy-2,2-dimethylethyl)copper(II) ion *8.43*
Bis(1,10-phenanthroline)(2-hydroxyethyl)copper(II) ion *8.42*
Bis(1,10-phenanthroline)(oxalato)chromate(II) *7.22*
Bis(1,10-phenanthroline)(oxalato)chromium(III) ion *5.1.36, 28.2.38*
1,1′-Bis(4-sulfonatobenzyl)-4,4′-bipyridinium zwitterion *22.3.43*
1,1′-Bis(4-sulfonatobenzyl)-4,4′-bipyridinium zwitterion radical anion *22.50.67*
1,1′-Bis(2-sulfonatoethyl)-4,4′-bipyridinium radical anion *19.47.2, 22.50.68, 28.14.5, 28.15.7*
1,1′-Bis(3-sulfonatopropyl)-4,4′-bipyridinium radical anion *19.47.3, 22.50.69, 28.14.6*
1,1′-Bis(3-sulfonatopropyl)-3,3′-dimethyl-4,4′-bipyridin radical anion *22.50.70, 22.55.11*
Bis(1,4,7-triazacyclononane)nickel(III) ion *15.34*
1,1′-Bis[3-(trimethylammonio)propyl]-4,4′-bipyridinium radical cation *22.50.71, 28.14.7, 28.15.8*
Bleomycin-copper(I) complex *8.11*
Boric acid *6.6.2*
Bromate ion *5.1.8, 5.7.2, 5.8.1, 5.9.1, 5.10.2, 6.1.2, 1 28.2.8*
Bromide ion *15.29.1, 15.48.2, 15.65.3*
(4-Bromobenzyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.36*
Bromocob(III)alamin *6.94*
Bromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13 hexaenenickel(III) ion *15.69*
Bromoform *1.1.8, 1.2.8, 1.3.5*
Bromo(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)nickel(III) ion *15.48*
Bromo(iminodiacetato)cobalt(III) *6.77*
Bromomercury(I) *10.6*
Bromomercury(I)peroxyl *10.7*
4-Bromophenoxyl *22.3.44*
Bromo[5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(III) ion *13.31*
Bromo[5,10,15,20-tetrakis(4-sulfonatophenyl)-porphinatomanganate(III) ion *13.29*
α-Bromotoluene *7.3.2*

tert-Butyl alcohol *17.9.2*
1,1′-Butylene-2,2′-bipyridinium radical cation *22.50.80*
tert-Butyl hydroperoxide *7.3.3*
tert-Butylhydroquinone *13.15.2, 13.18.2*
(2-Butyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.33*
(Butyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.32*
C.I. 75480 *5.1.64*
Cadmium(II) ion *25.1.3, 25.2.3*
Cadmium(I) ions *5.1*
Carbonate ion *15.70.2*
Carbonatobis(ethylenediamine)cobalt(III) ion *5.1.12, 15.1.12, 28.2.15*
Carbonatoiron(IV) *9.48*
Carbon dioxide *6.5.3, 6.6.4, 25.1.2*
Carbon dioxide radical anion *5.1.7, 6.80.1, 15.1.3, 22.3.45*
Carbon monoxide *6.5.4, 6.6.3, 9.8.1, 9.9.1, 9.10.1, 9.11.1*
Carbon tetrachloride *1.1.9, 1.2.9, 1.3.6*
Carboxybismuth(IV) ion *4.6*
2-Carboxy-2,2-dimethylethyl, anion *9.7.6, 22.37.7*
2-Carboxy-2,2-dimethylethylchromium(III) ion *7.35*
2-Carboxy-2,2-dimethylethylcopper(II) ion *8.37*
2-Carboxy-2,2-dimethylethylcopper(III) ion *8.72*
1-Carboxyethylcopper(III) ion *8.69*
Carboxyferricenium *9.35*
1-Carboxy-1-hydroxyethylchromium(III) ion *7.34*
2-Carboxy-2-hydroxy-2-methylethyl, anion *9.7.5, 22.37.6*
2-Carboxy-2-hydroxypropyl anion *9.7.5, 22.37.6*
Carboxylatocopper(II) *8.29*
Carboxylato(2-hydroxyethylethylenediaminetriacetato)ferrate(III) ion *9.30*
Carboxylatomethylcopper(III) ion *8.68*
Carboxylatonickel(II) *15.20*
Carboxylato(nitrilotriacetato)ferrate(III) ion *9.29*
Carboxyl radical anion *5.1.7, 6.80.1, 15.1.3, 22.3.45*
Carboxymethylcopper(III) ion *8.68*
4-Carboxyphenoxyl, conjugate base *22.3.46*
Catechol *13.15.3, 13.18.3*
Cerium(IV) sulfate complex *8.5.1*
Chlorate ion *28.2.9*
Chloride ion *8.51.1, 8.52.2, 12.4.2, 19.20.2, 19.38.1, 25.4.1*
Chloroacetate ion *1.1.10, 1.3.7*
Chlorobis(ethylenediamine)platinum(III) ion *19.35*
Chlorocobalt(III) ion *6.100*
Chloro(diethylenetriamine)platinum(I) *19.8*
Chloro(diethylenetriamine)platinum(II), $Cl_2^{\cdot-}$ reaction product *19.39*
Chloro(diethylenetriamine)platinum(II), H reaction product *19.12*
Chloro(diethylenetriamine)platinum(II), OH reaction product *19.40*
2-Chloro-10-dimethylaminopropylphenothiazine, conjugate acid *25.4.14, 25.5.6*
Chloroform *1.1.11, 1.3.8*
Chloro-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(III) ion *8.51*
Chloroiron(III) complexes *7.4.8, 7.6.5, 7.7.1, 7.8.4, 7.11.4, 7.14.1, 7.15.3, 7.17.2, 7.18.1, 7.19.1*
Chloroiron(III) ion *25.7.2*
Chloromanganese(III) ion *13.25*
Chloromercury(I) *10.8*
Chloromercury(I)peroxyl *10.9*
Chloro(oxo)antimony(V) uroporphyrin I, radical anion *23.1*
Chloropentaammineruthenium(III) ion *22.43.1*
Chloro(pentacyano)cobaltate(II) ion *6.42*
4-Chlorophenoxyl *22.3.47*
(4-Chlorophenyl)methylcopper(III) ion *8.75*
(4-Chlorophenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.37*
Chloro(tetraethyldiethylenetriamine)platinum(II), OH reaction product *19.43*
Chloro(tetraethyldiethylenetriamine)platinum(II), $Cl_2^{\cdot-}$ reaction product *19.42*
Chloro(tetraethyldiethylenetriamine)platinum(II), H reaction product *19.13*
Chlorothallium(II) ion *25.7*
Chlorotris[3-(diphenylphosphino)-benzenesulfonato]rhodate(I) ion *22.3.33*
Chlorotris[3-(diphenylphosphino)-benzenesulfonato]rhodate(0) ion *21.1*
Chlorpromazine, conjugate acid *25.4.14, 25.5.6*
Chromate(V) *1.5.1, 7.39*
Chromate(VI) ion *5.1.39*
Chromate(V) ion *7.40*
Chromium(II), pentaaqua(1-methylethyl)- *22.50.22*
Chromium(III), tris(1,10-phenanthroline-N_1,N_{10})- *5.1.34, 7.9.1, 7.10.1, 28.2.36*
Chromium(III) ion *22.3.12, 25.1.4, 25.2.4*
Chromium(II) bis(acetylacetonate) *7.25*
Chromium(II) ion *7.2, 22.50.19*
Chromium(II) tris(2,2′-bipyridine) *5.1.33, 6.4.2, 6.6.11, 7.5.1, 8.15.3, 15.8.6, 15.10.8, 15.11.1, 15.13.1, 28.2.35*
Chromium(II) tris(4,7-dimethyl-1,10-phenanthroline) *7.16*
Chromium(II) tris(4,4′-diphenyl-2,2′-bipyridine) *7.7*
Chromium(II) tris(4,7-diphenyl-1,10-phenanthroline) *7.19*
Chromium(II) tris(5-phenyl-1,10-phenanthroline) *7.18*
Chromium(I) ion *7.1*
Cob(III)alamin *6.18.2*
Cob(I)alamin *6.18*

Cobal(I)amin *6.18*
Cobalt(II), bis(4,4′-dimethyl-2,2′-bipyridine) *6.12.1*
Cobalt(II), 4,4′-dimethyl-2,2′-bipyridine *6.1.14, 22.3.6*
Cobalt(II), 5,7,7,12,12,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,14-diene *22.3.8*
Cobalt(II), 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene *6.5.2, 6.100.2, 13.25.2*
Cobalt(II), 8-methyl-1,3,13,16-tetraaza-6,10,19-trithiabicyclo[6.6.6]eicosane *6.53, 22.50.3*
Cobalt(II), 2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene *6.55, 6.100.1, 13.25.1, 22.50.8*
Cobalt(II), tris(4,4′-dimethyl-2,2′-bipyridine) *6.15.1, 22.3.7*
Cobalt(III), 2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene *15.10.6*
Cobalt(III), tris(4,4′-dimethyl-2,2′-bipyridine) *6.16.1*
Cobalt(III) (1-hydroxy-1-methylethyl)-5,10,15,20-tetraphenyl)porphyrin *6.88*
Cobalt(III) ion *6.99, 25.4.3*
Cobalt(III) (1-methylethyl)-5,10,15,20-tetraphenyl)porphyrin *6.86*
Cobalt(III) tris(2,2′-bipyridine) *6.4.1, 6.6.6, 7.4.3, 7.6.2, 7.8.1, 7.11.1, 7.16.2, 8.15.2, 8.16.1, 8.17.1, 15.8.5, 15.10.4, 22.3.10, 28.2.11*
Cobalt(III) tris(1,10-phenanthroline) *7.4.4, 7.6.3, 7.8.2, 7.11.2, 7.16.3*
Cobalt(II) 2,2′-bipyridine *6.1.13, 22.3.5*
Cobalt(II) bis(acetylacetonate) *6.37*
Cobalt(II) bis(2,2′-bipyridine) *6.9.1*
Cobalt(II) dihydroxytetrakis(1-methylpyridinium-4-yl)porphyrin *28.4.3, 28.5.3, 28.6.3*
Cobalt(II) dihydroxytetrakis(4-sulfonatophenyl)porphyrin *28.4.1, 28.5.1, 28.6.1*
Cobalt(II) dihydroxytetrakis[4-(*N,N,N*-trimethylammonio)-phenyl]porphyrin *28.4.2, 28.5.2, 28.6.2*
Cobalt(II) iminodiacetate *6.57.1, 6.59.1*
Cobalt(II) ion *22.3.2, 25.4.2, 28.2.10*
Cobalt(II) pyrophosphate *9.49.5*
Cobalt(II) 5,10,15,20-tetrakis(4-sulfonatophenyl)porphyrin *28.14.3, 28.15.3*
Cobalt(II) tris(2,2′-bipyridine) *6.10.1, 6.39, 22.50.10, 22.54.1, 22.55.1, 22.59.1, 22.62.1*
Cobalt(II) tris(1,10-phenanthroline) *6.40, 22.50.11*
Cobalt(I) 2,2′-bipyridine *6.9*
Cobalt(I) bis(2,2′-bipyridine) *6.10*
Cobalt(I) ion *6.1, 6.1.3*
Cobalt(I) 5,10,15,20-tetrakis(4-sulfonatophenyl)porphyrin *6.17*
Cobalt(I) tris(2,2′-bipyridine) *6.11*
Cobaltate(II), [phthalocyaninetetrasulfonato- *6.41, 22.50.12*
Cobaltocene *6.65*
Copper, (C,O)-carbon dioxide *8.29*
Copper(II), 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane *6.100.3*
Copper(III) *8.45*
Copper(III), bis(β-alanine) *8.59*
Copper(III), 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene *8.52*
Copper(III) hydroxide *8.47*
Copper(II) ion *1.1.4, 5.1.41, 6.1.15, 8.29.2, 15.1.29, 15.29.2, 22.3.24, 22.30.1, 22.31.1, 22.33.1, 25.1.5, 25.2.5, 28.2.42*
Copper(II) ion, complex with cyclohexene *8.39*
Copper(II) ions *19.25.2, 19.34.2, 19.35.2, 19.37.2, 19.39.1, 19.42.1, 19.45.2, 19.46.2, 19.46.3*
Copper(II) pyrophosphate *9.49.7*
Copper(I) bis(2,2′-bipyridine) *8.18*
Copper(I) chloride *8.6, 22.50.43*
Copper(I) chloride complex *8.2.1, 8.4.1*
Copper(I) chloride complex with copper(0) *8.3*
Copper(I) ion *8.5, 8.29.1, 22.50.42, 22.51.1, 22.55.6, 22.56.1, 22.57.3, 22.58.1, 22.59.5, 22.60.1, 22.61.1, 22.62.2*
Copper(I) ion complex with copper(0) *8.4*
Copper(I) sarcophagine *8.12*
Copper atoms *8.2*
Copper(0) chloride complex *8.1*
Cuprous chloride *8.6, 22.50.43*
Cyclohexane, 1,2-dihydroxy- (*cis*) *1.7.3*
Cyclohexane, 1,2-dihydroxy- (*trans*) *1.7.4*
cis-1,2-Cyclohexanediol *1.7.3*
trans-1,2-Cyclohexanediol *1.7.4*
Cyclohexene-copper(II) complex *8.39*
(Cyclohexyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50*
Cyclopentyl *15.1.7*
Cyclopentylnickel(II) ion *15.24*
Cysteine *22.50.72*
Cytosine, 1-methyl- *25.5.18*
DPN *28.23.1*
Decaammine(dinitrogen)diruthenium(I-II) ion *22.38*
Decaammine(dinitrogen)diruthenium(II) ion, OH-adduct *22.39*
Decaammine(dinitrogen)diruthenium(II-III) ion *22.40*
Decaammine-μ-peroxidodicobalt(III) ion *6.110, 22.50.*
1,4,5,7,7,8,11,12,14,14-Decamethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion *15.9*
2′-Deoxyadenosine 5′-monophosphate *25.5.7*
Deoxyadenosine monophosphate *25.5.7*
Deoxyadenylic acid *25.5.7*
2′-Deoxy-5′-adenylic acid *25.5.7*
2′-Deoxyguanosine 5′-monophosphate *25.5.8*
Deoxyguanylic acid *25.5.8*

3,7-Diamino-2,8-dimethyl-5-phenylphenazinium *25.5.23*
3,7-Diamino-2,8-dimethyl-5-phenylphenazinium, conjugate monoacid *25.4.46*
1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosanecobalt(II) ion *6.52, 22.55.5, 22.57.2, 22.59.4*
1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosanecobalt(II) ion, conjugate diacid *6.51, 22.55.4*
1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosaneplatinum(III) ion *19.44*
cis-Diammine(aqua)(1,4,8,11-tetraazacyclotetradecane)chromium(III) ion *7.37*
cis-Diamminedichloroplatinate(I) ion *19.2*
trans-Diamminedichloroplatinate(I) ion *19.3*
cis-Diamminedichloroplatinum(II), OH reaction product *19.22*
trans-Diamminedichloroplatinum(II), OH reaction product *19.23*
Diammine(hydroxy)silver(II) *1.10*
Diamminesilver(I) ion *1.1.3, 1.3.1*
1,3-Diammonio-2-propylcopper(II) ion *8.34*
Diaqua-α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion *15.56*
Diaquabis(ethylenediamine)platinum(III) ion *19.38*
Diaqua-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion, conjugate base *15.40*
trans-Diaqua-1,4,8,11-tetraazacyclotetradecanechromium(II) ion *7.3*
Diaqua(2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraeneiron(II) ion *9.9*
1,1′-Dibenzyl-4,4′-bipyridinium radical cation *22.50.73*
Dibenzylsulfonate viologen *22.3.43*
Dibenzylsulfonate viologen radical anion *22.50.67*
Dibromine radical ion *6.1.1, 12.2.2, 12.3.1, 15.69.1*
Dibromo-α,2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenickel(III) ion *15.66*
Dibromo(iminodiacetato)cobaltate(III) ion *6.76*
Dibromomanganese(III) ion *13.24*
1,1′-Dicarboxyferricenium *9.36*
1,2-Dicarboxy-2-hydroxyethylcopper(III) ion *8.71*
cis-Dichlorobis(ethylenediamine)cobalt(III) ion *5.1.10, 15.1.10, 28.2.13*
trans-Dichlorobis(ethylenediamine)cobalt(III) ion *5.1.11, 15.1.11, 28.2.14*
cis-[Dichlorobis(1-(2-hydroxyethyl)-2-methyl-5-nitroimidazole-N^3)]platinum(III) ion *19.48*
Dichlorobis(hydroxy)platinate(III) ion *19.31*
cis-Dichlorobis(isopropylamine)-*trans*-dihydroxyplatinum(IV), OH reaction product *19.49*
cis-Dichlorobis(isopropylamine)-*trans*-dihydroxyplatinate(III) ion *19.24*
cis-Dichlorodiammineplatinate(I) ion *19.2*
trans-Dichlorodiammineplatinate(I) ion *19.3*
cis-Dichlorodiammineplatinum(II), OH reaction product *19.22*
cis-Dichlorodiammineplatinum(III) ion *19.22*
trans-Dichlorodiammineplatinum(II), OH reaction product *19.23*
trans-Dichlorodiammineplatinum(III) ion *19.23*
Dichloro(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)nickel(III) ion *15.49*
Dichloro-*meso*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydroxy)manganese(IV) ion *13.34*
Dichloro-*rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydroxy)manganese(IV) ion *13.35*
Dichlorohydroxy(1,4,7,11-tetraazacyclotetradecane)manganese(IV) ion *13.33*
Dichloromanganese(III) ion *13.26*
Dichloromercurate(I) ion *22.50.56, 22.51.3, 22.56.2, 22.62.3*
Dichloromethyliron(IV) deuteroporphyrin (2-propanol)$_2$, *9.43*
Dichloro[5,10,15,20-tetrakis(4-sulfonatophenyl)-porphinatostannate(IV) radical anion *24.2*
Dichlorothallium(II) *25.8*
Dichromate(VI) ion *5.1.40, 28.2.41*
Dicyanoaurate(0) ion *3.1*
1,4-Dicyanobenzene *25.2.14*
Dicyanobis(2,2′-bipyridine)iron(III) ion *9.1.1*
Dicyanobis(4,4′-dimethyl-2,2′-bipyridine)ferrate(II), electron adduct *9.2*
Dicyano(hydroxy)aurate(II) ion, protonated *3.5*
Dicyanohydroxyaurate(II) ion *3.4*
Dicyclopentadienylcobalt(II) *6.65*
1,1′-Didodecyl-4,4′-bipyridinium radical cation *28.14.13*
Diethyl disulfide *1.5.8, 1.7.5, 25.4.15, 25.5.9*
Diethylenetriaminecobalt(II) ion *6.31*
Diethylenetriaminepentaacetatoferrate(III), DTPA radical adduct *9.31*
Diethylenetriamine(pyridine)platinum(II) ion *19.41.2*
Diethylenetriamine(pyridine)platinum(II) ion OH-adduct *19.41*
Diethyl sulfoxide *25.4.16*
(μ-Difluoroacetato)bis(μ-hydroxo)bis[triamminecobalt(III)] ion *5.1.30, 15.9.3, 28.2.32*
1,1′-Diheptyl-4,4′-bipyridinium radical cation *28.14.11*
1,1′-Dihexyl-4,4′-bipyridinium radical cation *28.14.10*
7,8-Dihydrodipyrido[1,2-*a*:2′,1′-*c*][1,4]diazepinediium, radical cation *22.50.82*

Dihydrogen dicyanoaurate(0) *3.3*
Dihydrogenferrate(V) ion *9.51*
Dihydrogen phosphate ion *6.5.8, 6.6.18, 6.7.5, 15.8.9, 15.10.15*
Dihydronicotinamide adenine dinucleotide *13.18.5*
1,2-Dihydroxybenzene *13.15.3, 13.18.3*
1,3-Dihydroxybenzene *13.15.4, 13.18.7*
1,4-Dihydroxybenzene *22.50.64, 28.22.4*
Dihydroxycopper(III) ion *8.5.3, 8.46*
1,4-Dihydroxy(1,1-dimethylethyl)benzene *13.15.2, 13.18.2*
1,2-Dihydroxyethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion *6.85*
Dihydroxylead(III) ion *17.8*
Dihydroxymethylchromium(III) ion *7.28*
Dihydroxysilver(II) *1.8*
trans-Dihydroxy-1,4,8,11-tetraazacyclotetradecane-chromium(III), OH reaction product *7.38*
Dihydroxytetrakis(1-methylpyridinium-4-yl)porphinecobalt(II) ion *28.4.3, 28.5.3, 28.6.3*
Dihydroxytetrakis(4-sulfonatophenyl)-porphinatocobaltate(II) ion *28.4.1, 28.5.1, 28.6.1*
Dihydroxytetrakis[4-(*N,N,N*-trimethylammonio)-phenyl]porphinecobalt(II) ion *28.4.2, 28.5.2, 28.6.2*
Dihydroxy(2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene)cobalt(III) ion *6.6.10, 15.8.4, 15.10.7*
Dihydroxythallium(II) *25.6*
Diiodine radical ion *6.41.1*
3,5-Diiodotyrosine *25.4.17*
1,2-Dimethoxybenzene *1.5.9, 25.4.18, 25.5.10*
1,3-Dimethoxybenzene *1.5.10, 25.4.19*
1,4-Dimethoxybenzene *1.5.11, 25.4.20, 25.5.11*
1,4-Dimethoxybenzene radical cation *12.3.3, 25.4.21*
2,3-Dimethoxybenzoate ion *1.6.2*
2,4-Dimethoxybenzoate ion *1.6.4*
2,6-Dimethoxybenzoate ion *1.6.5*
3,4-Dimethoxybenzoate ion *1.6.3*
3,5-Dimethoxybenzoate ion *1.6.6*
2,3-Dimethoxybenzoic acid *1.5.12, 25.4.22*
2,4-Dimethoxybenzoic acid *1.5.14, 25.4.24*
2,6-Dimethoxybenzoic acid *1.5.15, 25.4.25*
3,4-Dimethoxybenzoic acid *1.5.13, 25.4.23*
3,5-Dimethoxybenzoic acid *1.5.16, 25.4.26*
4,4′-Dimethoxybenzophenone *5.1.61, 5.2.3, 5.3.4, 5*
3,4-Dimethoxyphenol *9.38.2*
2,6-Dimethoxyphenoxide ion *9.36.2*
3,4-Dimethoxyphenoxide ion *9.34.1*
3,5-Dimethoxyphenoxide ion *9.36.1*
(Dimethylaminomethyl)ferricenium *9.38*
2-(Dimethylammonio)-1-(dimethylammoniomethyl)-ethylcopper(II) ion *8.35*
2-(Dimethylammonio)ethylcopper(II) ion *8.36*
2,6-Dimethylbenzosemiquinone, radical ion *28.22.3*
4,4′-Dimethyl-2,2′-bipyridine, conjugate monoacid *6.1*
4,4′-Dimethyl-2,2′-bipyridinecobalt(I) ion *6.12*
4,4′-Dimethyl-2,2′-bipyridinecobalt(I) ion, protonated *6*
4,4′-Dimethyl-2,2′-bipyridinecobalt(I) ions *6.13*
4,4′-Dimethyl-2,2′-bipyridinecobalt(II) ion *6.1.14, 22.3*
4,4′-Dimethyl-2,2′-bipyridine(hydrido)cobalt(III) ion *6*
1,1′-Dimethyl-4,4′-bipyridinium *7.3.1, 9.3.2, 9.4.2, 21.11.5, 22.3.48, 22.6.1, 22.7.1, 22.8.1, 22.9.1, 22.10.1, 22.11.1, 22.12.2, 22.13.1, 22.14.1, 22.15.1, 22.16.1, 22.17.1, 22.18.4, 22.19.1, 22.20.1, 22.21.1, 22.22.1, 22.23.1, 22.28.2, 23.1.1*
1,1′-Dimethyl-4,4′-bipyridinium radical cation *9.32.1, 12.4.1, 22.47.2, 22.50.74, 22.63.2, 22.64.1, 22.65.1, 28.14.8, 28.15.9*
Dimethyl disulfide *1.5.17, 1.7.6, 25.4.27, 25.5.12*
1,1-Dimethylethanol *17.9.2*
N,N-Dimethyl-4-nitrosoaniline *5.1.68*
Dimethyl sulfoxide *25.4.28*
α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenenickel(I) ion *15.13*
α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenecopper(II) ion *15.10.9*
α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenenickel(II) ion *15.10.13*
α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenecopper(I) ion *8.17*
α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,6,11,13,15-hexaenebis(thiocyanato)nickel(III) ion *15.68*
α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenebis(hydroxo)nickel(III) ion *15.61*
α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenebis(thiocyanato)nickel(III) ion *15.64*
α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),13,15-trienenickel(I) ion *15.12*
α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenecopper(II) ion OH-adduct *8.44*
α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaene(hydroxo)nickel(III) ion *15.60*
5,7-Dimethyl-1,4,8,11-tetraazacyclotetradeca-4,7-dienenickel(II) ion *6.100.5*
11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion *15.37*
11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion, conjugate base *15.38*

11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienatonickel(III) ion *15.38*
1,5-Dimethyluracil *25.5.20*
1,1′-Dioctyl-4,4′-bipyridinium radical cation *28.14.12*
Dioxomanganese(III) ion *13.13*
Dioxomethylnickel(II) *15.20*
Dioxonickel(IV) ion *15.73*
Dioxonickel(IV) ion, protonated *15.74*
Dioxygen anion *15.44.2, 15.46.3, 15.50.2, 22.50.57, 28.15.2*
Diphenyl selenide *25.4.30*
Diphenyl sulfide *25.4.31*
Diphenyl telluride *25.4.32*
Diphosphooctadecamolybdate ion(7-), protonated *14.1*
1,1′-Dipropyl-4,4′-bipyridinium radical cation *28.14.9*
Dipropyl sulfoxide *25.4.33*
Dipyrido[1,2-*a*:2′,1′-*c*][1,4]diazocine, 6,7,8,9-tetrahydro-, radical ion (1+) *22.50.80*
1-Dodecyl-1′-methyl-4,4′-bipyridinium radical cation *28.14.14*
Dodecyl methyl viologen radical cation *28.14.14*
Duroquinone *5.1.62, 5.2.4, 5.3.5, 5.4.3, 5.5.2, 22.3.49*
Electron adduct of nitrobenzene *28.15.12*
Eosin dianion *15.10.22*
Ethanol *25.4.34, 25.5.13*
Ethanolamine *1.7.1*
2-Ethoxyethylchromium(III) ion *7.33*
1-Ethoxyethylnickel(II) ion *15.23*
4-Ethoxyphenoxyl *22.3.50*
Ethyl alcohol *25.4.34, 25.5.13*
Ethyl disulfide *1.5.8, 1.7.5, 25.4.15, 25.5.9*
Ethylenediaminecadmium(I) ion *5.8*
Ethylenediaminecobalt(II) ion *6.29*
Ethylenediaminecopper(III) complex *8.49, 8.49.2*
Ethylenediaminenickel(III) ions *15.32*
Ethylenediaminetetraacetate ions *22.50.75, 22.63.1, 22.65.2, 22.66.1, 22.67.1, 28.14.15*
Ethylenediaminetetraacetato(1-hydroxybutyl)cuprate(II) ion *8.41*
Ethylenediaminetetraacetatoargentate(II) *1.13*
Ethylenediaminetetraacetatocadmate(I) ion *5.7*
Ethylenediaminetetraacetatocobaltate(II) ion *6.48, 22.50.2, 28.14.2*
Ethylenediaminetetraacetatocobaltate(II) ion, H-abstraction product *6.61*
Ethylenediaminetetraacetatocobaltate(II) ion, superoxide adduct *6.58*
Ethylenediaminetetraacetatocobaltate(III) ion, superoxide adduct *6.79*
Ethylenediaminetetraacetatocuprate(I) ion *8.9*
Ethylenediaminetetraacetatomanganate(II), ion H-abstraction product *13.10*
Ethylenediaminetetraacetatonickelate(II) ion *15.30.1*
Ethylenediaminetetraacetatonickelate(II), H-abstraction product *15.30*
Ethylenediaminetetraacetatonickelate(III) ion *15.70*
Ethylenediaminetetraacetatoosmate(III) ion *22.3.32*
Ethylenediaminetetraacetatoplumbate(II) ion *5.7.7*
Ethylenediaminetetraacetatozinc(II) H-abstraction product *28.11*
Ethylene glycol *1.5.18, 1.7.7*
Ethylperoxyl, 2-hydroxy-2,2-dimethyl- *22.37.9*
4-Ethylphenoxyl *22.3.51*
(Ethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.29*
Europium(II), 4,7,13,16,21-pentaoxa-1,10-diazabicyclo[8.8.5]tricosane *22.50.46*
Europium(III), 4,7,13,16,21-pentaoxa-1,10-diazabicyclo[8.8.5]tricosane *22.3.26, 22.29.1*
Europium(III) ion *22.3.25, 22.30.2, 22.31.2, 22.32.1, 22.33.2*
Europium(II) ion *22.59.6*
Ferrate(IV) ion *9.46*
Ferrate(V) ion *9.52.2, 9.53*
Ferricenium, (dimethylamino)methyl- *9.38*
Ferric oxalate *9.5.1*
Ferricyanide ion *3.1.3, 6.98.1, 8.84.3, 9.13.2, 9.34, 15.28.2, 22.24.2, 25.1.6, 25.2.6, 28.6.4*
Ferrocyanide ion *9.49.8, 19.31.1, 19.37.3, 19.45.3, 19.46.4, 22.46.1, 22.50.53, 28.13.3, 28.15.4*
Ferrous oxalate *9.5*
Ferrous sulfate *22.47.1, 22.50.51, 22.51.2, 22.52.1, 22.54.2, 22.57.4*
9-Fluorenone *5.1.63, 5.3.6, 5.4.4, 5.5.3, 6.6.24*
Fluoren-9-one *5.1.63, 5.3.6, 5.4.4, 5.5.3, 6.6.24*
Fluorescein dianion *15.8.18, 15.10.23*
Fluorescein dianion, 2′,4′,5′,7′-tetrabromo- *15.10.22*
(μ-Fluoroacetato)bis(μ-hydroxo)bis[triamminecobalt(III)] ion *5.1.31, 15.9.4, 28.2.33*
(4-Fluorophenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.38*
Formaldehyde *25.1.18, 25.5.14*
Formic acid *6.5.6, 6.6.25*
Fumaric acid *8.5.22*
Glycinate ion *1.7.8, 1.9.5*
Glycinatocadmium(I) ion *5.9*
Glycinatocobalt(II) ion *6.47*
Glycinatocopper(II) ion *8.47.3*
Glycinatonickel(III) ion *15.33*
Glycine *1.5.19*
Glycine, negative ion *1.7.8, 1.9.5*
Glycine ion(1-) *1.7.8, 1.9.5*
Glycyltryptophan *25.5.16*
Gold(II) *3.6*

Guanosine *25.5.15*
H-abstraction product of ethylenediaminetetraacetatomanganate(II) ion *13.10*
H-abstraction product of nitrilotriacetatocobaltate(II) ion *6.60*
H-abstraction product of nitrilotriacetatomanganate(II) ion *13.9*
Hexaamminebis(μ-hydroxy)-μ-(trifluoroacetato)dicobalt(III) ion *5.1.29, 15.9.2, 28.2.31*
Hexaamminecobalt(III) ion *5.1.17, 6.1.5, 6.6.8, 8.84.1, 15.1.17, 15.6.1, 15.7.1, 15.8.1, 15.9.1, 15.10.2, 17.3.1, 22.3.3, 28.2.20*
Hexaammine-μ-(difluoroacetato)bis(μ-hydroxy)dicobalt(III) ion *5.1.30, 15.9.3, 28.2.32*
Hexaammine-μ-(fluoroacetato)bis(μ-hydroxy)dicobalt(III) ion *5.1.31, 15.9.4, 28.2.33*
Hexaamminerutheniumm(III) ion *5.1.50, 8.15.7, 8.16.3, 8.17.2, 8.84.2, 15.1.38, 15.6.4, 15.7.4, 15.8.12, 15.9.8, 15.10.16, 15.11.2, 15.13.2, 22.3.35, 28.2.56*
Hexaamminerutheniumm(III) ion, OH reaction product *22.68*
Hexaamminerutheniumm(II) ion *6.6.19, 22.50.59*
Hexaaquachromium(II) ion *15.41.2*
Hexaaquadi-μ-oxodioxodimolybdenum(V,VI) ion *14.6*
3,6,10,13,16,19-Hexaazabicyclo[6.6.6]eicosanecopper(I) ion *8.12*
Hexabromoplatinate(III) ion *19.33*
Hexachloroiridate(III) ion, electron adduct *12.1*
Hexachloroiridate(IV) ion *12.5, 15.29.4*
Hexachloroplatinate(III) ion *19.26*
Hexacyanoferrate(III) ion *3.1.3, 6.98.1, 8.84.3, 9.13.2, 9.34, 15.28.2, 22.24.2, 25.1.6, 25.2.6, 28.6.4*
Hexacyanoferrate(II) ion *9.49.8, 19.31.1, 19.37.3, 19.45.3, 19.46.4, 22.46.1, 22.50.53, 28.13.3, 28.15.4*
Hexacyanoosmate(II) ion *22.46.2*
Hexacyanoruthenate(III) ion *22.46*
1,1′,2,2′,6,6′-Hexamethyl-4,4′-bipyridinium radical cation *22.50.76*
2,2,4,11,11,13-Hexamethyl-1,5,10,14-tetraaza-cyclooctadeca-4,13-diene(hydrido)copper(III) ion *8.56*
2,2,4,11,11,13-Hexamethyl-1,5,10,14-tetraaza-cyclooctadeca-4,13-dienecopper(III) H-adduct *8.56*
β-*rac*-(5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecane)nickel(III) ion *15.43*
5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,14-dienecobalt(I) ion *6.7*
5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,14-dienecobalt(II) ion *22.3.8*
5,7,7,12,14,14-Hexamethyl-1,4,7,11-tetraaza-cyclotetradeca-4,11-diene(hydroxo)nickel(III) ion *15.47*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienenickel(I) ion *15.10, 15.46.1*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-diene(hydrido)cobalt(III) ion *6.80*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienedihydroxycobalt(III) io *6.6.9*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienenickel(II) ion *6.100.7*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanenickel(II) ion *6.100.6*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanecopper(II) ion *6.100.3*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienecobalt(II) ion *6.5.2, 6.100.2, 13.25.2*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanesilver(II) ion *7.4.1, 15.10.1, 15.49.1, 21.11.3*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienecobalt(I) ion *6.6*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienecopper(I) ion *8.15*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanenickel(I) ion *15.8*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanecobalt(II) ion *6.50, 22.50.7*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienenickel(III) ion *15.46*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-1,4,8,11-tetraenenickel(III) ion *15.50*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-diene(hydrido)copper(III) ion *8.55*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-1,4,8,11-tetraenenickel(I) ion *15.11*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienecopper(III) ion *8.52*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanenickel(III) ion *15.44*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-diene(2,2,2-trifluoro-1-hydroxyethyl)cobalt(III) ion *6.84*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanecopper(I) ion *8.14*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecane(hydrido)copper(III) ion *8.54*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienenickel(II) ion, OH reaction product *15.26*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanenickel(II) ion, OH reaction product *15.25*
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanedi(phosphato)nickel(III) ion *15.45*

5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecopper(III) ion *8.50*

N-d,l-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(II) ion *6.5.2, 6.100.2, 13.25.2*

meso-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane(dichloro)manganese(III) ion OH reaction product *13.34*

prim-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene(hydrido)cobalt(III) ion *6.81*

prim-N-rac-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene(hydrido)cobalt(III) ion *6.81*

rac-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(II) ion *6.5.2, 6.100.2, 13.25.2*

rac-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane(dichloro)manganese(III) ion OH reaction product *13.35*

N-meso-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion *6.5*

N-rac-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene(hydrido)cobalt(III) ion *6.80*

N-rac-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(II) ion *6.5.2, 6.100.2, 13.25.2*

N-rac-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion *6.6*

4,7,13,16,21,24-Hexaoxa-1,10-diazabicyclo[8.8.8]hexacosanecadmium(I) ion *5.5*

Hexyl viologen radical cation *28.14.10*

Hydrazine *15.31.1*

Hydridochromium(III) ion *7.27*

Hydridocopper(II) ion *8.27*

(Hydrido)-7,12-diethenyl-3,8,13,17-tetramethylporphine-2,18-dipropanoatoferrate(III), dihydrogen *9.20*

Hydrido-*prim-N-rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(III) ion *6.81*

Hydrido-*N-rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(III) ion *6.80*

Hydridoiron(III) ion *9.16*

Hydridoiron(III) protoporphyrin *9.20*

Hydrodioxy *1.5.2, 15.44.1, 15.46.2, 15.50.1, 25.4.7*

Hydrogen atom *8.5.6, 28.2.2*

Hydrogen dicyanoaurate(0) ion *3.2*

Hydrogenferrate(V) ion *9.51.2, 9.52*

Hydrogen ion *1.6.1, 3.2.1, 3.4.2, 6.4.3, 6.5.5, 6.6.13, 6.7.2, 6.10.2, 6.15.2, 6.27.2, 6.28.2, 6.29.2, 6.36.2, 6.37.2, 6.38.2, 6.45.2, 6.46.2, 6.47.2, 6.65.1, 7.25.1, 7.26.1, 7.27.1, 7.29.1, 7.30.1, 7.31.1, 7.32.1, 7.33.1, 7.34.1, 7.35.1, 8.12.1, 8.15.4, 8.24.2, 8.25.1, 8.26.1, 8.28.1, 8.53.1, 8.54.1, 8.55.1, 8.56.1, 9.16.1, 12.2.1, 13.3.1, 13.30.1, 13.32.1, 15.1.31, 15.8.8, 15.10.11, 15.26.2, 19.18.2, 19.36.3, 21.1.1, 21.2.1, 21.12.1, 22.41.1, 22.49.1, 25.5.2, 26.1.1, 28.2.44*

Hydrogen peroxide *1.1.7, 1.2.4, 1.3.3, 1.5.3, 5.1.42, 5.7.4, 6.1.16, 6.19.1, 7.2.2, 8.5.7, 8.11.1, 8.18.1, 8.19.1, 8.21.1, 8.22.1, 8.45.2, 8.52.3, 9.49.2, 11.2.3, 15.1.30, 15.19.2, 15.21.2, 15.22.2, 15.23.2, 15.24.2, 15.25.1, 15.26.3, 15.46.5, 15.50.4, 25.1.9, 25.2.9, 25.4.8, 28.2.43*

Hydrogen phosphate ion *6.6.17*

Hydroperoxide, 1,1-dimethylethyl- *7.3.3*

Hydroperoxide-iron(III) complex *9.17*

Hydroperoxide-iron(III) iron(II) complex *9.15*

Hydroperoxide-sulfatoiron(III) complex *9.18*

Hydroperoxide-sulfatoiron(III) iron(II) complex *9.19*

Hydroperoxidomanganese(III) formate complex *13.15*

Hydroperoxidomanganese(III) sulfate complex *13.22*

Hydroperoxocopper(III) ion *8.64*

Hydroperoxyl *1.5.2, 15.44.1, 15.46.2, 15.50.1, 25.4.7*

Hydroquinone *22.50.64, 28.22.4*

Hydroquinone, *tert*-butyl- *13.15.2, 13.18.2*

Hydroquinone, trimethyl- *22.50.84*

Hydroquinone dimethyl ether *1.5.11, 25.4.20, 25.5.11*

Hydroxide ion *8.83.2, 15.42.2, 15.43.2, 15.44.4, 15.46.7, 15.57.1, 15.58.1, 15.60.1, 15.61.1, 15.65.2, 17.10.1, 19.18.3, 19.36.2*

Hydroxocob(III)alamin *6.18.2*

Hydroxomercury(I) *10.4*

1-Hydroxybutyl *8.9.1*

(1-Hydroxybutyl)ethylenediaminetetraacetatocuprate(II) ion *8.41*

2-Hydroxycyclohexyl *8.39.1*

2-Hydroxy-2,2-dimethylethyl *5.1.6, 6.6.26, 6.81.1, 9.7.1, 10.10.7, 15.1.6, 19.37.6, 22.3.52, 22.37.2*

2-Hydroxy-2-dimethylethylbismuth(IV) ion *4.5*

2-Hydroxy-1,2-dimethylethylchromium(III) ion *7.31*

2-Hydroxy-2,2-dimethylethylchromium(III) ion *7.32*

2-Hydroxy-2,2-dimethylethylcopper(II) ion *8.32*

2-Hydroxy-2,2-dimethylethylcopper(III) ion *8.70*

2-Hydroxy-2,2-dimethylethylperoxyl *22.37.9*

(2-Hydroxy-2,2-dimethylethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion *6.90*

2-Hydroxy-2,2-dimethylethyl[5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(III) ion *13.32*

2-Hydroxy-2,2-dimethylethyl[5,10,15,20-tetrakis(4-sulfonatophenyl)porphinatomanganate(III) ion *13.30*

2-Hydroxy-2,2-dimethylethyltetrakis(4-sulfonatophenyl)-porphinatomanganate(III) ion *13.30*
Hydroxy-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion *15.57*
1-Hydroxyethyl *5.1.4, 6.103.1, 10.10.5, 15.1.4, 22.3.53*
2-Hydroxyethyl *8.5.24*
1-Hydroxyethylbismuth(IV) ion *4.3*
1-Hydroxyethylcadmium(II) ion *5.11*
1-Hydroxyethylchromium(III) ion *7.28a*
2-Hydroxyethylchromium(III) ion *7.29*
2-Hydroxyethylcopper(III) ion *8.67*
(1-Hydroxyethyl)-7,12-diethenyl-3,8,13,17-tetramethylporphine-2,18-dipropanoatoferrate(III), dihydrogen *9.22*
(2-Hydroxyethyl)-7,12-diethenyl-3,8,13,17-tetramethylporphine-2,18-dipropanoatoferrate(III), dihydrogen *9.24*
Hydroxy(ethylenediaminetetraacetato)nickelate(III) ion *15.71*
1-Hydroxyethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion *6.83*
1-Hydroxyethyliron(III) protoporphyrin *9.22*
2-Hydroxyethyliron(III) protoporphyrin *9.24*
1-Hydroxyethylnickel(II) ion *15.21*
(2-Hydroxyethyl)-3,10,17,24-tetrasulfophthalocyanine-cobaltate(III) ion *6.92*
Hydroxy-*meso*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraaza-cyclotetradecane(dichloro)manganese(IV) ion *13.34*
Hydroxy-*rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraaza-cyclotetradecane(dichloro)manganese(IV) ion *13.35*
Hydroxy(iminodiacetato)cobalt(III) *6.78*
5-Hydroxyindole, conjugate base *9.34.2*
5-Hydroxyindole *12.5.1*
5-Hydroxyindole-3-acetate ion, conjugate base *9.34.3*
Hydroxyl *4.1.2, 5.1.2, 6.1.22, 7.40.1, 10.8.3, 10.10.3, 11.2.2, 15.1.1, 28.2.3*
Hydroxymanganese(III) ion *13.12, 28.2.46*
Hydroxymercury(II) ion *10.1.2*
Hydroxymethyl *5.1.3, 6.102.2, 8.5.23, 10.10.4, 11.2.4, 15.1.2, 22.3.54*
Hydroxymethylbismuth(IV) ion *4.2*
Hydroxymethylchromium(III) ion *7.27a*
(Hydroxymethyl)-7,12-diethenyl-3,8,13,17-tetramethylporphine-2,18-dipropanoatoferrate(III), dihydrogen *9.21*
1-Hydroxy-1-methylethyl *5.1.5, 6.106.2, 10.10.6, 11.2.5, 15.1.5, 19.37.5, 22.3.55*
1-Hydroxy-1-methylethylbismuth(IV) ion *4.4*
1-Hydroxy-1-methylethylcadmium(II) ion *5.12*
1-Hydroxy-1-methylethylchromium(III) ion *7.29a*
2-Hydroxy-1-methylethylchromium(III) ion *7.30*
(1-Hydroxy-1-methylethyl)-7,12-diethenyl-3,8,13,17-tetramethylporphine-2,18-dipropanoatoferrate(III) dihydrogen *9.23*
1-Hydroxy-1-methylethyliron(III) protoporphyrin *9.23*
2-Hydroxy-1-methylethyliron(III) protoporphyrin *9.25*
1-Hydroxy-1-methylethylnickel(II) ion *15.22*
(1-Hydroxy-1-methylethyl)tetrakis(4-sulfonatophenyl) porphinatocobaltate(III) ion *6.88*
1-Hydroxy-1-methylethyltetrakis(4-sulfonatophenyl)-porphinatocobaltate(III) ion *6.88*
(2-Hydroxy-1-methylethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion *6.93*
Hydroxymethylferricenium *9.37*
Hydroxymethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion *6.82*
Hydroxymethyliron(III) protoporphyrin *9.21*
Hydroxymethylnickel(II) ion *15.19*
3-Hydroxy-5-methylphenoxycopper(III) ion *8.79, 8.79.*
2-Hydroxy-2-methylpropyl *5.1.6, 6.6.26, 6.81.1, 9.7.1, 10.10.7, 15.1.6, 19.37.6, 22.3.52, 22.37.2*
(2-Hydroxy-1-methylpropyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion *6.91*
Hydroxymethyltetrakis(4-sulfonatophenyl)-porphinatocobaltate(III) ion *6.87*
2-Hydroxy-1,4-naphthoquinone *5.1.64*
Hydroxy(oxo)lead(IV) ion *17.10*
2-Hydroxyphenoxycopper(III) ion *8.76*
3-Hydroxyphenoxycopper(III) ion *8.77*
4-Hydroxyphenoxycopper(III) ion, conjugate base
4-Hydroxyphenoxycopper(II) ion, conjugate base *8.40*
4-Hydroxyphenoxyl, conjugate base *28.22.2*
Hydroxysilver(II) ion *1.6*
Hydroxy-1,4,8,11-tetraaza-cyclotetradecane(dichloro)manganese(IV) ion *13*
Hydroxy(tetrakis(2-hydroxyphenyl)porphinato)zinc(II), ical cation, deprotonated *28.16*
Hydroxy(tetrakis(3-hydroxyphenyl)porphinato)zinc(II), ical cation, deprotonated *28.17*
6-Hydroxy-2,5,7,8-tetramethylchroman-2-carboxylate i *13.17.2, 13.18.4*
Hydroxythallium(II) ion *25.5*
Hydroxytriethylenetetraminecobalt(II) ion *6.33*
5-Hydroxytryptamine, conjugate base *9.34.6*
5-Hydroxytryptophan, conjugate base *9.34.4*
Iminodiacetatocobalt(II) *6.57.1, 6.59.1*
Iminodiacetatocobalt(II), H-abstraction product *6.59*
Iminodiacetatocobalt(II) OH-adduct *6.78*
Iminodiacetatocobaltate(II) ion, superoxide adduct *6.*
Iminodiacetatonickelate(II), H-abstraction product *15*
Indigomonosulfonate ion *6.4.7*
Indium(II) ion *11.2*
Indium atoms *11.1*

Indole, 5-hydroxy- *12.5.1*
Indol-5-ol, 3-(2-aminoethyl)-, conjugate base *9.34.6*
Indol-5-ol, 3-carboxymethyl-, conjugate dibase *9.34.3*
5-Indolol *12.5.1*
Iodate ion *5.1.43, 5.7.3, 5.8.2, 5.9.2, 5.10.3, 6.1.17, 15.1.32, 28.2.45*
Iodide ion *15.29.3, 15.46.6, 15.72.1*
Iodomercury(I) *10.11*
Iodomethane *6.6.27, 6.17.2, 8.15.11, 15.8.19, 15.10.24*
4-Iodophenoxyl *22.3.56*
Iridium(IV) tris(2,2′-bipyridine), ortho-metallated complex, conjugate monoacid *12.4*
Iron(2+), (hydroperoxy)- *9.17*
Iron(III), 5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphine, superoxide complex *9.41*
Iron(III) deuteroporphyrin dimethyl ester (2-propanol)$_2$, 1-hydroxy-1-methylethylperoxyl adduct *9.45*
Iron(III) deuteroporphyrin (2-propanol)$_2$, ·$CHCl_2$ radical adduct *9.43*
Iron(III) deuteroporphyrin (2-propanol)$_2$, dichloromethyl radical adduct *9.43*
Iron(III) deuteroporphyrin (2-propanol)$_2$, methyl radical adduct *9.42*
Iron(III) deuteroporphyrin (2-propoxy)(2-propanol), ·CF_3 reaction product *9.44*
Iron(III) ion *1.1.5, 1.2.2, 7.4.7, 8.5.4, 9.5.2, 25.4.6*
Iron(III) oxalate *9.5.1*
Iron(III) tris(2,2′-bipyridine) *6.6.12, 15.8.7, 15.10.10*
Iron(III) tris(1,10-phenanthroline) *9.27*
Iron(II) acetate *22.50.48*
Iron(II) deuteroporphyrin (2-propanol)$_2$ *9.12, 9.42.1*
Iron(II) deuteroporphyrin (2-propanol)$_2$-trifluoromethyl adduct *9.26*
Iron(II) ion *6.63.1, 6.100.4, 8.45.1, 9.27.1, 15.44.3, 15.46.4, 15.50.3, 15.52.2, 16.1.1, 16.2.1, 16.3.1, 16.4.1, 22.50.47, 22.53.1, 22.55.7, 25.4.4, 25.7.1, 25.8.1, 25.9.1, 25.10.1, 28.13.2, 28.14.4*
Iron(II) ions *19.34.3, 28.19.1, 28.20.1*
Iron(II) oxalate *9.5*
Iron(II) protoporphyrin 1-hydroxy-1-methylethyl complex *9.23*
Iron(II) protoporphyrin 1-hydroxyethyl complex *9.22*
Iron(II) protoporphyrin 2-hydroxy-1-methylethyl complex *9.25*
Iron(II) protoporphyrin 2-hydroxyethyl complex *9.24*
Iron(II) protoporphyrin hydroxymethyl complex *9.21*
Iron(II) pyrophosphate *9.49.4*
Iron(II) sulfate *22.47.1, 22.50.51, 22.51.2, 22.52.1, 22.54.2, 22.57.4*
Iron(II) α,α,α,β-tetrakis(*N*-methylisonicotinamidophenyl)porphyrin *9.11*
Iron(II) 5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphyrin *9.10*
Iron(II) tris(1,10-phenanthroline) *22.50.52*
Iron(II) tris(1,10-phenanthroline-5,6-dione) *25.4.5, 25.5.1*
Iron(II) tris(1,10-phenanthroline-5,6-quinone) *25.4.5, 25.5.1*
Iron(IV) (hydroxo)undecatungstosilicate ion *9.50*
Iron(IV) pyrophosphate *9.49*
Isopropanol *6.75.1, 8.14.2, 25.4.45, 25.5.22*
Isopropyl alcohol *6.75.1, 8.14.2, 25.4.45, 25.5.22*
4-Isopropylphenoxyl *22.3.57*
Isopropyltetrakis(4-sulfonatophenyl)-porphinatocobaltate(III) ion *6.86*
Lawsone *5.1.64*
Lead(I) *17.3*
Lead(III) *17.7*
Lead(II) ions *5.1.49, 25.1.11, 25.2.11, 28.2.54*
Lead(I) ions *17.2*
Lead atom *17.1*
Maleic acid *8.5.25*
Manganate(VI) ion *13.36.1*
Manganese(III) 2-hydroxy-2,2-dimethylethyl-5,10,15,20-tetrakis(4-sulfonatophenyl)porphyrin *13.30*
Manganese(III) ion *13.11*
Manganese(III) phosphate complex *13.17*
Manganese(III) pyrophosphate complex *13.19*
Manganese(III) sulfate complex *13.20*
Manganese(II) formate-hydroperoxyl adduct *13.15*
Manganese(II) formate-superoxide adduct *13.14*
Manganese(II) ion *15.50.5, 25.4.9*
Manganese(II) phosphate-superoxide adduct *13.18*
Manganese(II) pyrophosphate *9.49.3*
Manganese(II) sulfate hydroperoxyl adduct *13.22*
Manganese(II) sulfate-superoxide adduct *13.21*
Manganese(II) 5,10,15,20-tetrakis(4-carboxyphenyl)porphyrin *13.8*
Manganese(II) α,α,α,β-tetrakis(*N*-methylisonicotinamidophenyl)porphyrin *13.7*
Manganese(II) 5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphyrin *13.4*
Manganese(II) 5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphyrin radical anion *13.2*
Manganese(II) 5,10,15,20-tetrakis(2,1-phenyleneiminocarbonyl)tetrakis[1-methylpyridiniumato]porphyrin *13.7*
Manganese(II) 5,10,15,20-tetrakis(4-pyridyl)porphyrin *13.5*
Manganese(II) 5,10,15,20-tetrakis(4-sulfonatophenyl)-porphyrin *13.3*
Manganese(II) 5,10,15,20-tetrakis(4-sulfonatophenyl)-porphyrin radical anion *13.1*
Manganese(II) tetrakis[4-(*N,N,N*-trimethylamino)phenyl]porphyrin *13.6*
Manganese(V) *13.36*

Menadione *5.1.65, 6.1.29, 6.6.28, 6.67.2, 8.47.4, 15.1.42, 17.2.4, 28.2.62*
Menaquinone *5.1.65, 6.1.29, 6.6.28, 6.67.2, 8.47.4, 15.1.42, 17.2.4, 28.2.62*
Mercurous bromide *10.6*
Mercurous chloride *10.8*
Mercurous cyanide *10.10*
Mercurous iodide *10.11*
Mercurous thiocyanate *10.12*
Mercury(I) *10.5*
Mercury(II) dihydroxide *10.1.3*
Mercury(II) ion *10.1.1*
Mercury(I) bromide *10.6*
Mercury(I) chloride *10.8*
Mercury(I) cyanide *10.10*
Mercury(I) dimer ion *10.2.2, 22.50.55, 22.55.9, 22.57.6, 22.58.3, 22.59.8, 22.60.3*
Mercury(I) hydroxide *10.4*
Mercury(I) iodide *10.11*
Mercury(I) ion *10.3, 22.50.54, 22.55.8, 22.57.5, 22.58.2, 22.59.7, 22.60.2*
Mercury(I) ion, complex with mercury(0) *10.2*
Mercury(I) thiocyanate *10.12*
Mercury atom *10.1*
Methanol *8.45.3, 25.4.35, 25.5.17*
Methionine *1.5.20, 25.4.36*
Methoxybenzene *1.5.7, 25.4.13*
2-Methoxybenzoate ion *1.6.7*
3-Methoxybenzoate ion *1.6.8*
4-Methoxybenzoate ion *1.6.9*
2-Methoxybenzoic acid *1.5.21, 25.4.37*
3-Methoxybenzoic acid *1.5.22, 25.4.38*
4-Methoxybenzoic acid *1.5.23, 25.4.39*
m-Methoxybenzoic acid *1.5.22, 25.4.38*
o-Methoxybenzoic acid *1.5.21, 25.4.37*
p-Methoxybenzoic acid *1.5.23, 25.4.39*
4-Methoxy-*N,N*-dimethylaniline radical cation *22.3.58*
3-Methoxyphenoxyl *22.3.59*
4-Methoxyphenoxyl *22.3.60*
(4-Methoxyphenyl)methylcopper(III) ion *8.80*
(4-Methoxyphenylmethyl)-1,4,8,12-tetraaza-cyclopentadecanechromium(III) ion *22.50.41*
Methyl *6.101.2, 8.82.1, 9.28.2, 13.28.2*
2-Methylalanine *1.5.5, 1.7.2*
Methyl alcohol *8.45.3, 25.4.35, 25.5.17*
(4-Methylbenzyl)-1,4,8,12-tetraaza-cyclopentadecanechromium(III) ion *22.50.39*
1-Methyl-4,4′-bipyridinyl *22.50.77*
Methylcopper(III) ion *8.65*
Methylcopper(II) ion *8.28, 8.28.2*
1-Methylcytosine *25.5.18*
N_1-Methylcytosine *25.5.18*
10-(2-Methyl-2-dimethylaminoethyl)phenothiazine, conjugate acid *25.4.44*
Methyl disulfide *1.5.17, 1.7.6, 25.4.27, 25.5.12*
Methylene Blue cation *25.5.19*
3,4-Methylenedioxyphenoxide ion *9.34.5*
(1-Methylethyl)-1,4,8,12-tetraaza-cyclopentadecanechromium(III) ion *22.50.31*
1-Methylethyltetrakis(4-sulfonatophenyl)-porphinatocobaltate(III) ion *6.86*
(1-Methyl-2-hydroxyethyl)-7,12-Diethenyl-3,8,13,17-tetramethylporphine-2,18-dipropanoatoferrate(III), dihydrogen *9.25*
Methyl iodide *6.6.27, 6.17.2, 8.15.11, 15.8.19, 15.10.24*
Methyliron(IV) deuteroporphyrin (2-propanol)$_2$ *9.42*
2-Methyl-1,4-naphthoquinone *5.1.65, 6.1.29, 6.6.28, 6.67.2, 8.47.4, 15.1.42, 17.2.4, 28.2.62*
8-Methyl-8-nitro-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1^{13,15}]octadecanenickel(III) ion *15.53*
8-Methyl-8-nitro-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1^{13,15}]octadecanenickel(II) ion, electron adduct *15.14*
9-Methyl-9-nitro-1,4,7,11-tetraazacyclotridecanenickel(III) ion *15.36*
9-Methyl-9-nitro-1,4,7,11-tetraazacyclotridecanenickel(II) ion, electron adduct *15.5*
10-Methylphenothiazine *14.4.1*
N-Methylphenothiazine *14.4.1*
10-Methylphenothiazin-2-ylacetate ion *25.6.2*
3-Methylphenoxyl *22.3.61*
4-Methylphenoxyl *22.3.62*
(4-Methylphenyl)methylcopper(III) ion *8.81*
2-Methyl-2-propanol *17.9.2*
2-Methylpyrazine *9.6.1*
1-Methyl-1′-(2-sulfonato)ethyl-4,4′-bipyridinium radical cation *28.14.17, 28.15.10*
Methyl sulfoxide *25.4.28*
(Methyl)-1,4,8,12-tetraazacyclopentadecanechromium(III ion *22.50.28*
8-Methyl-1,3,13,16-tetraaza-6,10,19-trithiabicyclo[6.6.6]-eicosanecobalt(II) ion *6.53, 22.50.3*
1-Methyl-1′-tetradecyl-4,4′-bipyridinium radical cation *22.50.78, 28.14.16*
N-Methyl-5,10,15,20-tetrakis(4-sulfonatophenyl)-porphinatonickelate(II), radical anion *15.18*
N-Methyltetrakis(4-sulfonatophenyl)porphinatocobaltate(radical anion *6.21*
(Methyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(II ion *6.89*
1-Methylthymine *25.5.20*
N_1-Methylthymine *25.5.20*
1-Methyl-1′-[3-(trimethylammonio)propyl]-4,4′-bipyridinium radical cation *28.14.18, 28.15.11*

Methyl viologen *7.3.1, 9.3.2, 9.4.2, 21.11.5, 22.3.48, 22.6.1, 22.7.1, 22.8.1, 22.9.1, 22.10.1, 22.11.1, 22.12.2, 22.13.1, 22.14.1, 22.15.1, 22.16.1, 22.17.1, 22.18.4, 22.19.1, 22.20.1, 22.21.1, 22.22.1, 22.23.1, 22.28.2, 23.1.1*

Methyl viologen radical cation *9.32.1, 12.4.1, 22.47.2, 22.50.74, 22.63.2, 22.64.1, 22.65.1, 28.14.8, 28.15.9*

Metiazinic acid, conjugate base *25.6.2*

Molybdate(IV)(V), bis[ethylenediaminotetraacetato]di-μ-oxodioxodi- *14.2*

Molybdate(V), bis[cysteinato]di-μ-oxodioxodi- *28.2.48*

Molybdate(V), bis[ethylenediaminotetraacetato]di-μ-oxodioxodi- *28.2.47*

18-Molybdodiphosphate ion(7-), conjugate acid *14.1*

Mono- and dihydroxysilver(II) *1.7*

Nadide *28.23.1*

1,4-Naphthoquinone, 2-hydroxy- *5.1.64*

1,4-Naphthoquinone, 2-methyl- *5.1.65, 6.1.29, 6.6.28, 6.67.2, 8.47.4, 15.1.42, 17.2.4, 28.2.62*

1,4-Naphthoquinone-2-sulfonate ion *5.1.67, 6.1.30*

Natural Orange 6 *5.1.64*

Nickel(I), 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene *15.10, 15.46.1*

Nickel(I), 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-1,4,8,11-tetraene *15.11*

Nickel(I), 1,4,8,11-tetramethyl-1,4,8,11-tetraazacyclotetradecane *15.7*

Nickel(II), 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene *6.100.7*

Nickel(II), 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane *6.100.6*

Nickel(II), (1*R*,4*R*,8*S*,11*S*)-1,4,8,11-tetramethyl-1,4,8,11-tetraazacyclotetradecane *22.3.28*

Nickel(III), bis(octahydro-1,4,7-triazonine) *15.34*

Nickel(III), bromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaene *15.69*

Nickel(III), 11,13-dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-diene *15.37*

Nickel(II) ion *15.29.5, 25.1.8, 25.2.8, 28.2.52*

Nickel(II) pyrophosphate *9.49.6*

Nickel(I) ion *15.1*

Nicotinamide adenine dinucleotide *5.1.66*

Nicotinamide adenine dinucleotide, hydroxide, inner salt *28.23.1*

Nicotinamide adenine dinucleotide, reduced *13.18.5*

Nicotinamide-adenine dinucleotide phosphate, reduced *13.18.6, 13.20.2*

Nitrate ion *5.1.46, 5.7.6, 5.8.4, 5.9.4, 5.10.5, 6.1.20, 15.1.35, 28.2.50*

Nitrilotriacetatoargentate(II) *1.12*

Nitrilotriacetatocadmium(I) ion *5.10*

Nitrilotriacetatocobaltate(I) ion *6.3*

Nitrilotriacetatocobaltate(II) ion, H-abstraction product *6.60*

Nitrilotriacetatocuprate(II) ion *8.46.2*

Nitrilotriacetatomanganate(II) ion, H-abstraction product *13.9*

Nitrilotriacetatonickelate(I) ion *15.17*

Nitrilotriacetatonickelate(II), H-abstraction product *15.29*

Nitrilotriacetatozinc(II) H-abstraction product *28.10*

2,2′,2″-Nitrilotriethanol *22.50.83, 22.59.9*

Nitrite ion *5.1.45, 5.7.5, 5.8.3, 5.9.3, 5.10.4, 8.41.1, 15.1.34, 22.3.27, 28.2.49*

Nitritocopper(II) ion *8.47.2*

Nitrito(triethylenetetramine)cobalt(II) ion *6.34*

cis-Nitroamminebis(ethylenediamine)cobalt(III) ion *5.1.16, 15.1.16, 28.2.19*

Nitrobenzene *1.1.12, 1.2.10, 1.3.9*

Nitrobenzene radical anion *28.15.12*

Nitromethane *1.1.13, 1.2.11, 1.3.10*

N-Nitrosodimethylamine *25.4.42*

4-Nitroso-*N*,*N*-dimethylaniline *5.1.68*

Nitrous oxide *3.1.4, 5.1.47, 5.6.1, 6.1.19, 6.5.9, 6.6.15, 6.7.3, 6.17.1, 6.18.1, 8.15.5, 15.1.36, 15.8.10, 15.9.6, 15.10.12, 19.6.1, 25.1.7, 25.2.7, 28.2.51, 28.3.1*

Octaammine-μ-amido-μ-peroxidodicobalt(III) ion *6.111, 22.50.15*

cis-Octaaqua-μ-oxo-bis(oxo)dimolybdenum(IV) ion *14.5*

1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(II) ion *6.54, 22.50.4, 22.55.3, 22.57.1, 22.59.3*

1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(III) ion *22.3.9, 22.18.1, 22.19.2*

1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanerhodium(II) ion *21.9*

Octacyanomolybdate(V) ion *14.4*

Octahydrogen tetrakis(μ-diphosphito)diplatinate(I)(II) ion *19.16*

Octahydrogen tetrakis(μ-diphosphito)diplatinate(II)(III) ion *19.47*

Osmium(III) tris(2,2′-bipyridine) *16.1*

Oxalate ion *22.50.79*

Oxalatobis(1,10-phenanthroline)chromium(II) *7.22*

Oxalatobis(1,10-phenanthroline)chromium(III) ion *5.1.36, 28.2.38*

Oxalatocuprate(II) ions *8.29.3*

Oxygen *1.1.6, 1.2.5, 1.3.4, 2.1.1, 3.1.5, 5.1.48, 6.1.21, 6.4.4, 6.6.16, 6.7.4, 6.33.1, 6.34.1, 6.35.1, 6.49.1, 6.50.1, 6.67.1, 6.74.1, 6.95.3, 6.98.2, 7.2.3, 7.4.10, 7.6.7, 7.8.5, 7.11.5, 7.15.4, 7.16.6, 8.5.10, 8.15.6, 8.18.2, 8.19.2, 8.20.1, 8.21.2, 8.22.2, 8.29.4, 8.43a.1, 9.13.3, 10.2.3, 10.5.1, 10.6.2, 10.8.2, 10.10.2, 10.11.2, 10.12.2, 12.3.2, 13.3.2, 13.4.2, 13.5.2, 13.6.1, 13.7.1, 13.8.1, 14.2.1, 14.3.1, 15.1.37, 15.6.3, 15.7.3, 15.8.11, 15.9.7, 15.10.14, 15.27.2, 15.28.1, 15.29.6, 15.52.3, 15.72.2, 17.2.2, 19.6.2, 19.37.4, 21.8.2, 21.11.4, 22.3.30, 22.18.2, 22.35.1, 22.37.8, 24.2.2, 25.1.10, 25.2.10, 27.1.1, 28.2.53, 28.9.1, 28.10.3, 28.11.3, 28.15.5*

Palladium(III) ion *18.1.1*

Palladium(I) ion *18.1*

Paraquat *7.3.1, 9.3.2, 9.4.2, 21.11.5, 22.3.48, 22.6.1, 22.7.1, 22.8.1, 22.9.1, 22.10.1, 22.11.1, 22.12.2, 22.13.1, 22.14.1, 22.15.1, 22.16.1, 22.17.1, 22.18.4, 22.19.1, 22.20.1, 22.21.1, 22.22.1, 22.23.1, 22.28.2, 23.1.1*

Pentaammine(acetylenedicarboxylato)ruthenium(III), OH-adduct *22.70*

Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)-pyridinio]cobalt(III) ion *6.70.1, 6.71.1*

Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)-pyridinio]cobalt(III) radical anion *6.70*

Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)-pyridinio]cobalt(III) radical, protonated *6.71*

Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)-pyridinio]cobalt(III) radical anion *6.72*

Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)-pyridinio]cobalt(III) radical, protonated *6.73*

Pentaammine[4-(aminocarbonyl)-1-(3-carboxypropyl)-pyridinio]cobalt(III) ion *6.72.1, 6.73.1*

Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)-pyridinio]cobalt(III) ion *6.68.1, 6.69.1*

Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)-pyridinio]cobalt(III) radical anion *6.68*

Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)-pyridinio]cobalt(III) radical, protonated *6.69*

Pentaammine(aqua)cobalt(III) ion *5.1.23, 6.1.6, 15.1.22, 17.3.2, 28.2.26*

Pentaammine(aquo)ruthenium(II) ion *22.43*

Pentaammine(azido)cobalt(III) ion *5.1.25, 15.1.24, 28.2.28*

Pentaammine(bromo)cobalt(III) ion *5.1.18, 6.1.9, 15.1.18, 17.3.4, 28.2.21*

Pentaammine(chloro)cobalt(III) ion *5.1.19, 6.1.8, 15.1.19, 17.3.3, 28.2.22*

Pentaammine(chloro)osmium(III) ion *22.3.31*

Pentaammine(chloro)ruthenium(II) ion *22.42*

Pentaammine(chloro)ruthenium(III) ion *22.43.1*

Pentaammine(chloro)ruthenium(III) ion, OH reaction product *22.69*

Pentaamminecobalt(II) ion *6.22*

Pentaammine(cyano)cobalt(III) ion *5.1.20, 15.1.20, 28.2.23*

Pentaammine(dinitrogen)ruthenium(I) ion *22.1*

Pentaammine(dinitrogen)ruthenium(III) ion *22.45*

Pentaammine(fluoro)cobalt(III) ion *5.1.21, 6.1.7, 15.1.21, 28.2.24*

Pentaammine(fumarato)cobalt(III) ion *5.1.22, 28.2.25*

Pentaammine(hydroxy)cobalt(III) ion *5.1.24, 15.1.23, 28.2.27*

Pentaammine(isonicotinamide)cobalt(III) ion, OH adduct *6.97, 6.97.1*

Pentaammine(1-methyl-4,4′-bipyridinium)cobalt(III) ion *6.66.1*

Pentaammine(1-methyl-4,4′-bipyridinium)cobalt(III) ion, electron adduct *6.66, 6.66.2*

Pentaammine(nicotinamide)cobalt(III) ion, OH adduct *6.*

Pentaammine(4-nitrobenzoato)cobalt(III) ion, electron adduct *6.67*

Pentaammine(4-nitrobenzoato)cobalt(III) ion, radical anion *6.67*

Pentaammine(nitroso)ruthenium(III) ion *6.6.20, 15.8.13, 15.10.17, 22.36.1*

Pentaamminenitrosylruthenium(II) ion *22.37*

Pentaammine(1-L-prolyl-L-prolinato)cobalt(III) ion *22.4.*

Pentaammine(pyridine)cobalt(III) ion, OH adduct *6.95, 6.95.2*

Pentaammine(thiocyanato-*N*)cobalt(III) ion *5.1.26, 15.1.25, 28.2.29*

Pentaaqua(benzyl)chromium(III) ion *22.3.16, 22.50.26*

Pentaaqua(3-chloropyridine)chromium(III) ion *22.3.20*

Pentaaqua(4-cyanobenzyl)chromium(III) ion *22.50.24*

Pentaaqua(3-cyanopyridine)chromium(III) ion *22.3.21*

Pentaaqua(dichloromethyl)chromium(III) ion *22.3.15*

Pentaaqua(ethyl)chromium(III) ion *22.50.21*

Pentaaqua(isopropyl)chromium(III) ion *22.50.22*

Pentaaqua(methoxymethyl)chromium(III) ion *22.3.14, 22.50.23*

Pentaaqua(4-methylbenzyl)chromium(III) ion *22.50.27*

Pentaaquamethylchromium(III) ion *22.50.20*

Pentaaqua(4-methylpyridine)chromium(III) ion *22.3.18*

Pentaaqua(pyridine)chromium(III) ion *22.3.19*

Pentaaqua(pyridinio)chromium(III) ion *22.3.19*

Pentaaqua(4-pyridiniomethyl)chromium(III) ion *22.3.17*

Pentaaqua[4-(trifluoromethyl)benzyl]chromium(III) ion *22.50.25*

Pentaaqua(trifluoromethyl)chromium(III) ion *22.3.13*

1,4,7,10,13-Pentaazacyclohexadecanenickel(III) ion *15.5*

Pentachloroplatinate(III) ion *19.27*

Pentacyanocobaltate(II) ion *6.43*

Pentacyanoferrate(II) ion *9.6*

Pentacyanonitrosylferrate(II) ion *9.7*

Pentakis(cyano-*C*)cobaltate(I) ion *6.2*

η^5-Pentamethylcyclopentadienyl(2,2′-bipyridine)hydridorhodium(III) ion *21.12*
η^5-Pentamethylcyclopentadienyl(2,2′-bipyridine)rhodium(I) ion *21.2*
η^5-Pentamethylcyclopentadienyl(2,2′-bipyridine)(hydroxy)rhodium(II) ion *21.5*
η^5-Pentamethylcyclopentadienyl(2,2′-bipyridine)(iodo)rhodium(II) ion *21.6*
4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]-tricosaneeuropium(III) ion *22.3.26, 22.29.1*
4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]-tricosaneeuropium(II) ion *22.50.46*
4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]-tricosanecadmium(I) ion *5.4*
Perhydroxyl *1.5.2, 15.44.1, 15.46.2, 15.50.1, 25.4.7*
Permanganate ion *1.2.3, 5.1.44, 6.1.18, 7.2.1, 8.5.5, 15.1.33*
Peroxido(ethylenediaminediacetato)manganate(III) ion *13.27*
Peroxidomanganese(III) formate *13.14*
Peroxidomanganese(III) ion *13.13*
Peroxidomanganese(III)-manganese(II) formate complex *13.16*
Peroxidomanganese(III)-manganese(II) sulfate complex *13.23*
Peroxidomanganese(III) phosphate complex *13.18*
Peroxidomanganese(III) sulfate complex *13.21*
Peroxodisulfate ion *5.1.53, 6.1.23, 15.1.39, 28.2.57*
Phenalen-1-one, 6-amino- *1.5.6, 25.4.12*
1,10-Phenanthrolinebis(oxalato)chromate(II) ion *7.23*
1,10-Phenanthroline-5,6-dione *25.5.21*
1,10-Phenanthroline-5,6-quinone *25.5.21*
Phenazinium, 3,7-diamino-2,8-dimethyl-5-phenyl- *25.5.23*
Phenazinium, 3,7-diamino-2,8-dimethyl-5-phenyl-, conjugate monoacid *25.4.46*
Phenol, 2,6-dimethoxy-, ion(1-) *9.36.2*
Phenol, 3,4-methylenedioxy-, conjugate base *9.34.5*
Phenothiazine, 2-chloro-10-dimethylaminopropyl-, conjugate acid *25.4.14, 25.5.6*
Phenothiazine, 10-methyl- *14.4.1*
Phenothiazine, 10-(2-methyl-2-dimethylaminoethyl)-, conjugate acid *25.4.44*
Phenothiazine-2-acetate ion, 10-methyl- *25.6.2*
Phenothiazinium, 3-amino-7-(dimethylamino)-2-methyl- *25.5.25*
Phenothiazinium, 3,7-bis(dimethylamino)- *25.5.19*
Phenothiazin-10-yl, 3,7-diamino-, conjugate monoacid *6.99.1, 13.11.1*
Phenoxide ion, 2,6-dimethoxy- *9.36.2*
Phenoxyl *22.3.63*
Phenoxyl, 4-methoxy- *22.3.60*
Phenoxyl, 2,4,6-trimethyl- *22.3.65*
p-Phenylenediamine, *N,N,N′,N′*-tetramethyl- *9.34.7, 9.35.1, 9.36.3, 9.37.1, 9.38.1*
Phenylmethylcopper(III) ion *8.74*
(Phenylmethyl)-1,4,8,12-tetraaza-cyclopentadecanechromium(III) ion *22.50.35*
4-Phenylphenoxyl *22.3.64*
Phenyl 3-pyridyl ketone *6.6.23, 15.8.17, 15.10.21*
Phenyl selenide *25.4.30*
Phenyl sulfide *25.4.31*
Phenylthiourea *25.4.43*
1-Phenyl-2-thiourea *25.4.43*
Phthalocyanine, tetrasulfo-, cobalt(II) *6.41, 22.50.12*
Phthalocyanine, trisulfo-, zinc(II), radical anion *28.9*
Pivalate ion *1.5.31, 1.7.9*
Porphine, 5,10,15,20-Tetrakis[2-(3-sulfonatopropyl)pyridyl]-, zinc(II), radical cation *28.19*
Porphine, dihydroxy-5,10,15,20-tetrakis(4-sulfonatophenyl)-, cobalt(II) *28.4.1, 28.5.1, 28.6.1*
Porphine, dihydroxytetrakis(1-methylpyridinium-4-yl)-, cobalt(II) *28.4.3, 28.5.3, 28.6.3*
Porphine, 2-hydroxy-2,2-dimethylethyl-5,10,15,20-tetrakis(4-sulfonatophenyl)-, manganese(III) *13.30*
Porphine, (1-hydroxy-1-methylethyl)-5,10,15,20-tetrakis(4-sulfonatophenyl)-, cobalt(III) *6.88*
Porphine, hydroxymethyl-5,10,15,20-tetrakis(4-sulfonatophenyl)-, cobalt(III) *6.87*
Porphine, (1-methylethyl)-5,10,15,20-tetrakis(4-sulfonatophenyl)-, cobalt(III) *6.86*
Porphine, 5,10,15,20-tetra(4-carboxyphenyl)-, manganese(II) *13.8*
Porphine, 5,10,15,20-tetrakis(2,6-dichloro-3-sulfonatophenyl)-, zinc(II), radical cation *28.22*
Porphine, 5,10,15,20-tetrakis(2-*N*-hexylpyridyl)-, zinc(II), radical cation *28.20*
Porphine, α,α,α,β-tetrakis(*N*-methylisonicotinamidophenyl)-, iron(II) *9.11*
Porphine, α,α,α,β-tetrakis(*N*-methylisonicotinamidophenyl)-, manganese(II) ion *13.7*
Porphine, 5,10,15,20-tetrakis(1-methylpyridinium-4-yl)-, iron(II) ion *9.10*
Porphine, 5,10,15,20-tetrakis(1-methylpyridinium-4-yl)-, manganese(II) ion *13.4*
Porphine, tetrakis(1-methylpyridinium-4-yl)-, zinc(II) *1.5.4, 25.4.11*
Porphine, 5,10,15,20-tetrakis(4-pyridyl)-, manganese(II) *13.5*
Porphine, 5,10,15,20-tetrakis(4-sulfonatophenyl)-, manganese(II) *13.3*
Porphine, 5,10,15,20-tetrakis(4-sulfonatophenyl)-, cobalt(II) *28.14.3, 28.15.3*
Porphine, 5,10,15,20-tetrakis(4-sulfonatophenyl)-, zinc(II) *5.1.54*

Porphine, 5,10,15,20-tetrakis(4-sulfonatophenyl)-, cobalt(I) *6.17*
Porphine, 5,10,15,20-tetrakis(4-sulfonatophenyl)-, silver(I) *1.4*
Porphine, 5,10,15,20-tetrakis[4-(*N,N,N*-trimethylammonio)-phenyl]-, manganese(II) *13.6*
Porphine, tetrakis[4-(*N,N,N*-trimethylammonio)phenyl]-, dihydroxycobalt(II) *28.4.2, 28.5.2, 28.6.2*
Porphine-2,7,12,17-tetrapropanoic acid, 3,8,13,18-tetrakis(carboxymethyl)-, (chloro)oxoantimony(V), radical anion *23.1*
Porphinetetrapropanoic acid, tetrakis(carboxymethyl)-, zinc(II), radical cation *28.23*
(4,4′,4″,4‴-Porphine-5,10,15,20-tetrayl)tetrakis[1-(3-sulfopropyl)pyridiniumato]zinc(II) radical cation *28.18*
Product of DTPA radical with Fe(III)DTPA *9.31*
Promethazine, conjugate acid *25.4.44*
Propanoic acid, 2-amino-2-methyl- *1.5.5, 1.7.2*
1-Propanol, 3,3′-thiodi- *25.4.49*
2-Propanol *6.75.1, 8.14.2, 25.4.45, 25.5.22*
2-Propanol radical *5.1.5, 6.106.2, 10.10.6, 11.2.5, 15.1.5, 19.37.5, 22.3.55*
2-Propanone *25.1.16, 28.2.58*
Propenamide *8.5.21*
2-Propen-1-ol *6.1.25, 15.1.40, 28.2.59*
Propionate ion, 2,2-dimethyl- *1.5.31, 1.7.9*
Propyl, 2-amino-2-methyl-, conjugate acid *9.7.4, 22.37.5*
Propyl, 2-carboxy-2-hydroxy-, anion *9.7.5, 22.37.6*
1,1′-Propylene-2,2′-bipyridinium radical cation *22.50.82*
(Propyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion *22.50.30*
Propyl viologen radical cation *28.14.9*
Pyrazine, 2-methyl- *9.6.1*
Pyridine, 3-benzoyl- *6.6.23, 15.8.17, 15.10.21*
Pyridinyl, 3-(aminocarbonyl)-1,?-dihydro-1-(phenylmethyl)- *28.23.2*
4-Pyrimidinecarboxylate ion *15.1.43*
μ-4-Pyrimidinecarboxylatobis-[hydroxotris(ammine)cobalt(III)] ion *15.1.28*
μ-5-Pyrimidinecarboxylatobis-[hydroxotris(ammine)cobalt(III)] ion *15.1.27*
2,4-Pyrimidinedione, 1,5-dimethyl- *25.5.20*
2-Pyrimidinone, 4-amino-1-methyl- *25.5.18*
Pyrocatechol *13.15.3, 13.18.3*
Quinone *1.2.7, 5.1.60, 6.1.28, 7.2.5, 8.15.10, 10.6.3, 10.7.1, 10.8.4, 10.9.1, 10.10.8, 10.11.3, 10.12.3, 10.13.1, 15.1.41, 15.8.16, 15.10.20, 17.2.3, 22.3.41, 22.35.3, 25.1.17, 28.2.61*
Resorcinol *13.15.4, 13.18.7*
Resorcinol dimethyl ether *1.5.10, 25.4.19*
Rhenate(VI) ion *20.1*
Rhodium, chlorotris[3-(diphenylphosphino)-benzenesulfonate] *21.1*
Rhodium(II) bis(2,2′-bipyridine) *21.10, 21.11.2*
Rhodium(II) tris(2,2′-bipyridine) *8.17.3, 21.11, 22.50.59*
Rhodium(I) chlorotris[3-(diphenylphosphino)-benzenesulfonate] *22.3.33*
Riboflavine *5.1.69, 6.1.31, 6.4.8*
Ruthenium(III), 2-(aminomethyl)pyridinebis(2,2′-bipyridine) *22.48*
Ruthenium(III), tris([2,2′-bipyridin]-4-yltriethylphosphonium)- *6.39.3, 22.54*
Ruthenium(III), tris(5-bromo-1,10-phenanthroline) *8.5.14, 22.56*
Ruthenium(III), tris(5-chloro-1,10-phenanthroline) *6.52.2, 6.54.3, 8.5.15, 10.3.4, 22.57*
Ruthenium(III), tris(4,7-dimethyl-1,10-phenanthroline) *6.39.5, 6.52.3, 6.54.4, 8.5.17, 10.3.6, 22.59*
Ruthenium(III), tris(5,6-dimethyl-1,10-phenanthroline) *8.5.18, 10.3.5, 22.58*
Ruthenium(III), tris[2-(1,2,4-thiadiazol-5-yl)pyridine] *22.67*
Ruthenium(III) dicyanobis(2,2′-bipyridine) *22.2.1, 22.47*
Ruthenium(III) tris(2,2′-bipyridine) *1.2.6, 5.1.52, 6.19.2, 6.39.2, 6.40.1, 6.41.2, 6.48.1, 6.53.1, 6.54.1, 6.55.1, 6.110.1, 6.111.1, 6.112.1, 6.113.1, 6.114.1, 7.4.12, 8.5.11, 8.6.1, 8.7.1, 8.8.1, 10.3.2, 22.3.36, 22.50, 25.10.2*
Ruthenium(III) tris(1,10-phenanthroline) *6.39.4, 6.51.1, 6.52.1, 6.54.2, 8.5.13, 10.3.3, 22.55*
Ruthenium(II) tris(2,2′-bipyridine) *5.1.51, 6.1.24, 22.55.10, 25.1.12, 25.2.12, 28.2.55*
Safranine T, conjugate acid *25.4.46*
Safranine cation *25.5.23*
Safranine cation, conjugate monoacid *25.4.46*
Samarium(III) ion *22.3.38*
Samarium(II) ion *25.1.13, 25.2.13*
Semithionine, conjugate monoacid *6.99.1, 13.11.1*
Serotonin, conjugate base *9.34.6*
Sesamol, conjugate base *9.34.5*
Silver(II) hydroxide *1.8*
Silver(II) ion *1.5, 7.39.1*
Silver(II)-succinate complex *1.14*
Silver(I) ion *1.1.2, 17.1.2, 25.1.1, 25.2.2*
Silver(I) ion, complex with Ag(0) *1.2, 22.50.1*
Silver(I) 5,10,15,20-tetrakis(4-sulfonatophenyl)porphyrin *1.4*
Silver atom *1.1*
Sulfacetamide *25.4.47*
Sulfanilamide, *N′*-acetyl- *25.4.47*
Sulfate(1-), tetraoxo- *8.5.2*
Sulfate(1-), trioxo- *22.3.37*
Sulfate ion *15.44.5*
Sulfate radical ion *8.5.2*

Sulfatoiron(III) ion *7.4.9, 7.6.6, 7.16.5, 7.17.3, 9.33, 21.4.2*
1,1′-Sulfinylbisethane *25.4.16*
Sulfinylbismethane *25.4.28*
1,1′-Sulfinylbispropane *25.4.33*
Sulfite ion *22.50.62*
Sulfite radical ion *22.3.37*
O-Sulfito(tetraethylenepentamine)cobalt(III) ion *6.109*
Sulfophthalocyaninatoaluminate(III) radical anion *2.1*
Sulfur dioxide *7.4.13, 7.8.6, 7.11.7, 7.15.5, 7.17.4, 11.3.1, 28.5.4*
Superoxide ion *15.44.2, 15.46.3, 15.50.2, 22.50.57, 28.15.2*
Superoxide radical anion *15.44.2, 15.46.3, 15.50.2, 22.50.57, 28.15.2*
Superoxido(ethylenediaminetetraacetato)cobaltate(III) ion *6.79*
Superoxido(ethylenediaminetetraacetato)cobaltate(II) ion *6.58*
Superoxido(iminodiacetato)cobaltate(III) ion *6.57*
Superoxo(1,4,8,11-tetraazacyclotetradecanecobalt(III) ion *6.63*
Terephthalonitrile *25.2.14*
Tetraacetatocuprate(I) ion *8.8, 22.50.45*
Tetraammine(aqua)hydroxyplatinum(III) ion *19.18*
trans-Tetraammine(aqua)nitrosylruthenium(II) ion, electron adduct *22.36*
Tetraamminebis(aqua)platinum(III) ion *19.20*
Tetraamminebis(hydroxy)platinum(III) ion *19.19*
Tetraamminecobalt(II) ion *6.23*
Tetraamminediaquacobalt(III) ion *6.1.10, 17.3.5*
Tetraamminedibromorhodium(III) ion *21.8.3*
Tetraammine(difluoro)platinum(IV) ion *7.4.11, 7.6.8, 7.11.6*
Tetraamminehydridoplatinum(III) ion *19.17*
Tetraammine(hydrido)rhodium(III) ion *21.13.1*
Tetraammineplatinum(II), $Cl_2^{\bullet-}$ reaction product *19.21*
Tetraamminerhodium(II) ion *21.8, 21.8.4*
Tetraamminesilver(II) ion *1.9*
Tetraammine(superoxido)rhodium(III) ion *21.13*
Tetraaqua(2,2′-bipyridine)chromium(III) ion *22.3.23*
Tetraaquabis(pyridine)chromium(III) ion *22.3.22*
1,4,8,12-Tetraazacyclopentadecanecobalt(II) ion *22.50.9*
1,4,8,12-Tetraazacyclopentadecanenickel(III) ion *15.51*
1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion *6.49, 22.50.5*
1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion, dioxygen adduct *6.63*
1,4,8,11-Tetraazacyclotetradecanecobalt(III) ion *7.4.5, 7.6.4, 7.8.3, 7.11.3, 7.15.2, 7.16.4, 7.17.1*
1,4,8,11-Tetraazacyclotetradecanecopper(I) ion *8.13*
1,4,8,11-Tetraazacyclotetradecanecopper(II) H-adduct *8.53*
1,4,8,11-Tetraazacyclotetradecane(dichloro)manganese(III) ion OH reaction product *13.33*
1,4,8,11-Tetraazacyclotetradecane(hydrido)copper(III) ion *8.53*
1,4,8,11-Tetraazacyclotetradecanenickel(I) ion *15.6*
1,4,8,11-Tetraazacyclotetradecanenickel(III) ion *15.42*
1,4,7,10-Tetraazacyclotridecanenickel(I) ion *15.4*
1,4,7,10-Tetraazacyclotridecanenickel(III) ion *15.35*
2′,4′,5′,7′-Tetrabromofluorescein dianion *15.10.22*
Tetrabromo(hydroxy)platinate(III) ion *19.32*
Tetrabromoplatinate(I) ion *19.4*
Tetrachloroferrate(II) ion *22.50.49*
Tetrachlorohydroxyplatinate(III) *19.30*
Tetrachloromethane *1.1.9, 1.2.9, 1.3.6*
Tetrachloroplatinate(II), $Cl_2^{\bullet-}$ reaction product *19.25*
Tetrachloroplatinate(I) ion *19.5*
Tetrachlorothallate(II) ion *25.10*
Tetracyano(2,2′-bipyridine)ferrate(III) ion *9.3.1, 9.32*
Tetracyanocobaltate(II) ion *6.44*
Tetracyano(4,4′-dimethyl-2,2′-bipyridine)ferrate(II) ion, electron adduct *9.4*
Tetracyanonickelate(II) ion *22.3.29*
Tetracyanonickelate(I) ion *15.2*
Tetracyanoplatinate(I) ion *19.6*
Tetraethyldiethylenetriaminecobalt(II) ion *6.35*
Tetraformatocuprate(I) ion *8.7, 22.50.44*
6,7,8,9-Tetrahydrodipyrido[1,2-*a*:2′,1′-*c*][1,4]diazocine, radical cation *22.50.80*
Tetrahydroxyplumbate(III) ion *17.9*
5,10,15,20-Tetrakis(4-benzoato)porphinatomanganate(II) ion *13.8*
Tetrakis(2,2′-bipyridine)-μ-amido-μ-peroxidodicobalt(III) ion *6.113, 22.50.17*
3,8,13,18-Tetrakis(carboxymethyl)porphine-2,7,12,17-tetrapropanoato(chloro)oxoantimony(V), radical anion *23.1*
Tetrakis(carboxymethyl)porphinetetrapropionatozinc(II), radical cation *28.23*
5,10,15,20-Tetrakis(4-carboxyphenyl)-porphinatomanganate(II) ion *13.8*
5,10,15,20-Tetrakis(2,6-dichloro-3-sulfonatophenyl)-porphinatozincate(II) radical cation *28.22*
Tetrakis[μ-(1,3-diisocyanopropane)]dirhodium(I)(II) ion *21.4*
Tetrakis(ethylenediamine)-μ-amido-μ-peroxidodicobalt(III) ion *6.112, 22.50.16*
Tetrakis(ethylenediamine)-μ-amido-μ-superoxidodicobalt(III) ion *5.1.28*
5,10,15,20-Tetrakis(2-*N*-hexylpyridyl)porphinatozinc(II) radical cation *28.20*
α,α,α,β-Tetrakis(*N*-methylisonicotinamidophenyl)-porphinatoiron(II) ion *9.11*

α,α,α,β-Tetrakis[2-(*N*-methylisonicotinamido)phenyl]-porphinatomanganese(II) ion *13.7*
5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)porphinatozinc(II) ion, radical cation *28.13*
5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)porphinatozinc(II) H-adduct *28.12*
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) ion *1.5.4, 25.4.11*
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatoiron(II) ion *9.10*
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatomanganese(II) ion *13.4*
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) ion, radical cation *6.48.2, 28.14*
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinezinc(II) radical anion *28.5*
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatocopper(II), radical anion *8.24*
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatotin(IV) radical anion *24.3*
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphineiron(III)-superoxide complex *9.41*
5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatomanganese(II) radical anion *13.2*
Tetrakis(1-methylpyridinium-3-yl)porphinatolead(II) radical cation *17.5*
Tetrakis(1-methylpyridinium-4-yl)porphinatolead(II) radical cation *17.4*
Tetrakis-*N*-methyl-2,3-pyridinoporphyrazinezinc(II) radical anion *28.8*
5,10,15,10-Tetrakis(1-methylpyridyl)porphinato(thiocyanato)cobalt(II) ion *6.64*
Tetrakis(4-*N*-methylpyridyl)porphineindium(III) radical anion *11.3*
Tetrakis(1,10-phenanthroline)-μ-amido-μ-peroxidodicobalt(III) ion *6.114, 22.50.18*
5,10,15,20-Tetrakis(4-pyridyl)porphinatomanganese(II) *13.5*
5,10,15,20-Tetrakis(4-pyridyl)porphinatomanganese(III) radical *13.5*
5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatoargentate(I) ion *1.4*
5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocadmate(II) radical anion *5.13*
5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocobaltate(II) ion *28.14.3, 28.15.3*
5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocobaltate(I) ion *6.17*
5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocobaltate(III), radical cation *6.115*
5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocuprate(II), radical anion *8.25*
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoferr[illegible] radical cation *9.47*
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoindate[illegible] radical cation *11.4*
5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatomanganate(II) ion *13.3*
5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatomanganate(II) radical anion *13.1*
5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatopalladate(II) radical anion *18.3*
5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatoplumbate(II) radical cation *17.6*
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate[illegible] ion *5.1.54*
5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatozincate(II), radical anion *28.6*
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate[illegible] radical cation *28.15*
5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate[illegible] ion, triplet state *5.1.55*
5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-4-yl]porphinatozinc(II) radical anion *28.7*
5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-4-yl]porphinatozinc(II) radical cation *28.18*
5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-2-yl]porphinatozinc(II) radical cation *28.19*
5,10,15,20-Tetrakis[4-(*N,N,N*-trimethylammonio)-phenyl]porphinatomanganese(II) ion *13.6*
Tetrakis-4-(*N,N,N*-trimethylammonio)-phenylporphinezinc(II), radical cation *28.21*
Tetrakis-4-(*N,N,N*-trimethylammonio)-phenylporphinezinc(II), radical anion *28.4*
Tetrakis-4-(*N,N,N*-trimethylammonio)-phenylporphinecopper(II), radical anion *8.26*
1,2,4,5-Tetramethoxybenzene *25.4.48*
Tetramethyl-1,4-benzoquinone *5.1.62, 5.2.4, 5.3.5, 5.4.3, 5.5.2, 22.3.49*
2,3,5,6-Tetramethylbenzoquinone *5.1.62, 5.2.4, 5.3.5, 5.4.3, 5.5.2, 22.3.49*
1,1′,2,2′-Tetramethyl-4,4′-bipyridinium radical cation *22.50.81*
1,1′-Tetramethylene-2,2′-bipyridinium radical cation *22.50.80*
N,N,N′,N′-Tetramethyl-*p*-phenylenediamine *9.34.7, 9.35.1, 9.36.3, 9.37.1, 9.38.1*
(1*R*,4*R*,8*S*,11*S*)-1,4,8,11-Tetramethyl-1,4,8,11-tetraaza-cyclotetradecanenickel(II) ion *22.3.28*
1,4,8,11-Tetramethyl-1,4,8,11-tetraaza-cyclotetradecanenickel(II) ion *22.3.28*
1,4,8,11-Tetramethyl-1,4,8,11-tetraaza-cyclotetradecanenickel(I) ion *15.7*
2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(I) ion *6.4*
2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(III) ion *15.10.6*

2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenenickel(II) ion *6.100.8*
2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion *6.55, 6.100.1, 13.25.1, 22.50.8*
2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecopper(I) ion *8.16*
2,3,9,10-Tetramethyl-1,4,8,11-tetraaza-cyclotetradecanecobalt(II) ion *22.50.6, 22.55.2, 22.59.2*
2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion, superoxide adduct *6.56, 6.56.1*
Tetranitromethane *7.2.6, 7.4.15, 8.5.26, 10.6.4, 10.8.5, 10.10.9, 10.11.4, 10.12.4, 15.1.44, 25.6.3*
1,4,10,13-Tetraoxa-7,16-diazacycloctadecanecadmium(I) ion *5.3*
Tetraquat radical cation *22.50.80*
3,10,17,24-Tetrasulfophthalocyaninecobaltate(I) ion *6.19, 22.50.13*
3,10,17,24-Tetrasulfophthalocyaninecobaltate(I) ion dimer *6.20*
3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) ion *6.41, 22.50.12*
3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) ion, superoxide adduct *6.62*
3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) radical cation *7.4.6*
3,10,17,24-Tetrasulfophthalocyaninecobaltate(III) radical anion (reduced ligand) *6.74*
3,10,17,24-Tetrasulfophthalocyaninecobaltate(III) radical anion (oxidized ligand) *6.75*
3,10,17,24-Tetrasulfophthalocyanine(superoxo)cobalt(II) *6.62*
1,4,8,11-Tetrazacyclotetradecanecadmium(I) ion *5.6*
1,4,8,11-Tetrazacyclotetradecanezinc(I) ion *28.3*
Thallium(0), complex with thallium(I) ion, dimer *25.3*
Thallium(0) *25.1*
Thallium(II) chloride *25.8*
Thallium(II) ion *22.50.63, 25.4, 25.4.10*
Thallium(II) ions *25.11*
Thallium(I) ion *25.1.14*
Thallium(I) ion, complex with Tl(0) *25.2*
Thallium hydroxide *25.6*
Thiocyanate ion *15.63.2, 15.67.1*
Thiocyanatomercury(I) *10.12*
Thiocyanatomercury(I)peroxyl *10.13*
3,3′-Thiodipropanol *25.4.49*
3,3′-Thiodipropionic acid *25.4.50*
Thionine semiquinone, conjugate monoacid *6.99.1, 13.11.1*
Thymidylyl-(3′→5′)-2′-deoxyguanosine *25.5.24*
Thymine, 1-methyl- *25.5.20*
Tin(III) *24.1*
Toluidine Blue cation *25.5.25*
Triammineaquaplatinum(I) ion *19.1*
Triammine(hydroxy)silver(II) ion *1.11*
Trichloromethyl *9.12.1*
Trichloromethylcopper(III) ion *8.66*
Trichlorothallate(II) ion *25.9*
Triethanolamine *22.50.83, 22.59.9*
Triethylenetetraminecobalt(II) ion *6.32*
(μ-Trifluoroacetato)bis(μ-hydroxo)bis[triamminecobalt(III)] ion *5.1.29, 15.9.2, 28.2.31*
Trifluoromethyliron(III) deuteroporphyrin (2-propoxy)(2-propanol) *9.26*
(4-Trifluoromethyl)phenylmethyl-1,4,8,12-tetraaza-cyclopentadecanechromium(III) ion *22.50.40*
Trihydroxycopper(III) *8.47*
1,2,3-Trimethoxybenzene *1.5.24, 25.4.53*
1,2,4-Trimethoxybenzene *1.5.25, 25.4.54*
1,3,5-Trimethoxybenzene *1.5.26, 25.4.55*
2,3,4-Trimethoxybenzoate ion *1.6.10*
2,4,5-Trimethoxybenzoate ion *1.6.12*
2,4,6-Trimethoxybenzoate ion *1.6.13*
3,4,5-Trimethoxybenzoate ion *1.6.11*
2,3,4-Trimethoxybenzoic acid *1.5.27, 25.4.56*
2,4,5-Trimethoxybenzoic acid *1.5.29, 25.4.58*
2,4,6-Trimethoxybenzoic acid *1.5.30, 25.4.59*
3,4,5-Trimethoxybenzoic acid *1.5.28, 25.4.57*
Trimethylacetate ion *1.5.31, 1.7.9*
1,1′-Trimethylene-2,2′-bipyridinium radical cation *22.50.82*
Trimethylhydroquinone *22.50.84*
2,4,6-Trimethylphenoxyl *22.3.65*
Trinitrotrisamminecobalt(III) *6.1.12, 17.3.6*
1,4,10-Trioxa-7,13-diazacyclopentadecanecadmium(I) ion *5.2*
Trioxalatocobaltate(III) ion *6.1.11, 17.3.8*
Triphosphatoferrate(II) ion *22.50.50*
Triquat radical cation *22.50.82*
Tris(acetylacetonato)chromate(II) ion *7.24*
Tris(acetylacetonato)cobaltate(II) ion *6.36*
Tris(acetylacetonato)ruthenate(II) ion *22.41*
Tris(ammine)cobalt(II) ion *6.24*
Tris(2,2′-bipyrazine)ruthenium(II) ion, OH-adduct *22.25*
Tris(2,2′-bipyrazine)ruthenium(II) ion, electron adduct *22.18*
Tris(2,2′-bipyrazine)ruthenium(II) ion, electron adduct, protonated *22.19*
Tris(2,2′-bipyridine)chromium(III) ion *5.1.33, 6.4.2, 6.6.11, 7.5.1, 8.15.3, 15.8.6, 15.10.8, 15.11.1, 15.13.1, 28.2.35*
Tris(2,2′-bipyridine)chromium(III), EDTA radical addn. product *7.5*
Tris(2,2′-bipyridine)chromium(II) ion *7.4*

Tris(2,2′-bipyridine)cobalt(III) ion *6.4.1, 6.6.6, 7.4.3, 7.6.2, 7.8.1, 7.11.1, 7.16.2, 8.15.2, 8.16.1, 8.17.1, 15.8.5, 15.10.4, 22.3.10, 28.2.11*
Tris(2,2′-bipyridine)cobalt(III) ion, OH adduct *6.98*
Tris(2,2′-bipyridine)cobalt(II) ion *6.10.1, 6.39, 22.50.10, 22.54.1, 22.55.1, 22.59.1, 22.62.1*
Tris(2,2′-bipyridine)cobalt(I) ion *6.11*
Tris(2,2′-bipyridine)iron(III) ion, H-adduct *9.40*
Tris(2,2′-bipyridine)iron(III) ion, OH-adduct *9.39*
Tris(2,2′-bipyridine)iron(III) ion *6.6.12, 15.8.7, 15.10.10*
Tris(2,2′-bipyridine)iron(II) ion, OH-adduct *9.13*
Tris(2,2′-bipyridine)osmium(III) ion *16.1*
Tris(2,2′-bipyridine)rhodium(II) ion *8.17.3, 21.11, 22.50.58*
Tris(2,2′-bipyridine)rhodium(I) ion *21.3*
Tris(2,2′-bipyridine)ruthenium(II) ion *5.1.51, 6.1.24, 22.55.10, 25.1.12, 25.2.12, 28.2.55*
Tris(2,2′-bipyridine)ruthenium(II) ion, H-adduct *22.44*
Tris(2,2′-bipyridine)ruthenium(II) ion, OH-adduct *22.24*
Tris(2,2′-bipyridine)ruthenium(II) ion, electron adduct *22.3*
Tris(2,2′-bipyridine)ruthenium(III) ion *1.2.6, 5.1.52, 6.19.2, 6.39.2, 6.40.1, 6.41.2, 6.48.1, 6.53.1, 6.54.1, 6.55.1, 6.110.1, 6.111.1, 6.112.1, 6.113.1, 6.114.1, 7.4.12, 8.5.11, 8.6.1, 8.7.1, 8.8.1, 10.3.2, 22.3.36, 22.50, 25.10.2*
Tris(2,2′-bipyridine)silver(II) ion *7.4.2*
Tris(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated *22.13*
Tris(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct *22.12*
Tris(2,2′-bithiazole)ruthenium(III) ion *22.66*
Tris(5-bromo-1,10-phenanthroline)chromium(II) ion *7.14*
Tris(5-bromo-1,10-phenanthroline)ruthenium(III) ion *8.5.14, 22.56*
Tris(5-chloro-1,10-phenanthroline)chromium(II) ion *7.11*
Tris(5-chloro-1,10-phenanthroline)chromium(III) ion *7.12.1, 7.13.1*
Tris(5-chloro-1,10-phenanthroline)chromium(III), EDTA radical addn. product *7.12*
Tris(5-chloro-1,10-phenanthroline)chromium(III), carboxyl radical addn. product *7.13*
Tris(5-chloro-1,10-phenanthroline)osmium(III) ion *16.4*
Tris(5-chloro-1,10-phenanthroline)ruthenium(II) ion, electron adduct *22.33*
Tris(5-chloro-1,10-phenanthroline)ruthenium(III) ion *6.52.2, 6.54.3, 8.5.15, 10.3.4, 22.57*
Tris(cyano)nickelate(I) ion *15.3, 15.3.1*
Tris(4,4′-dimethyl-2,2′-bipyridine)chromium(II) ion *7.6*
Tris(4,4′-dimethyl-2,2′-bipyridine)cobalt(II) ion *6.15.1, 22.3.7*
Tris(4,4′-dimethyl-2,2′-bipyridine)cobalt(III) ion *6.16.1*
Tris(5,5′-dimethyl-2,2′-bipyridine)osmium(III) ion *16.2*
Tris(4,4′-dimethyl-2,2′-bipyridinerhodium(III) ion *22.3.34*
Tris(4,4′-dimethyl-2,2′-bipyridine)ruthenium(II) ion, electron adduct *22.30*
Tris(4,4′-dimethyl-2,2′-bipyridine)ruthenium(III) ion *8.5.12, 22.51*
Tris(5,5′-dimethyl-2,2′-bipyridine)ruthenium(III) ion *22.5*
Tris(4,4′-dimethyl-2,2′-bispyridine)cobalt(I) ion *6.16*
Tris(4,7-dimethyl-1,10-phenanthroline)chromium(II) ion *7.16*
Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(II) ion, electron adduct *22.32*
Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion *6.39.5, 6.52.3, 6.54.4, 8.5.17, 10.3.6, 22.59*
Tris(5,6-dimethyl-1,10-phenanthroline)chromium(II) ion *7.17*
Tris(5,6-dimethyl-1,10-phenanthroline)ruthenium(III) ion *8.5.18, 10.3.5, 22.58*
Tris(4,4′-diphenyl-2,2′-bipyridine)chromium(II) ion *7.7*
Tris(4,7-diphenyl-1,10-phenanthroline)chromium(II) ion *7.19*
Tris(dipyrido[3,2-*c*:2′,3′-*e*]pyridazine)ruthenium(II) ion, electron adduct *22.35*
Tris(dipyrido[3,2-*c*:2′,3′-*e*]pyridazine)ruthenium(II) ion, electron adduct, protonated *22.34*
Tris(ethylenediamine)cobalt(II) ion *6.27*
Tris(ethylenediamine)cobalt(III) ion *5.1.9, 6.1.4, 6.6.7, 7.6.1, 7.15.1, 7.16.1, 8.16.2, 15.1.9, 15.8.2, 15.10.3, 17.3.7, 22.3.4, 28.2.12*
Tris(glycinato)cobaltate(II) ion *6.45*
Tris(5-methyl-1,10-phenanthroline)chromium(II) ion *7.15*
Tris(5-methyl-1,10-phenanthroline)ruthenium(III) ion *8.5.16, 10.3.7, 22.60*
Tris(2,4-pentanedionato)ruthenate(II) ion *22.41*
Tris(1,10-phenanthroline)chromium(II) ion *7.8*
Tris(1,10-phenanthroline)chromium(III) ion *5.1.34, 7.9.1, 7.10.1, 28.2.36*
Tris(1,10-phenanthroline)chromium(III), EDTA radical addn. product *7.9*
Tris(1,10-phenanthroline)chromium(III), carboxyl radical addn. product *7.10*
Tris(1,10-phenanthroline)cobalt(II) ion *6.40, 22.50.11*
Tris(1,10-phenanthroline)cobalt(III) ion *7.4.4, 7.6.3, 7.8.2, 7.11.2, 7.16.3*
Tris(1,10-phenanthroline)iron(III) ion *9.27*
Tris(1,10-phenanthroline)iron(II) ion *22.50.52*
Tris(1,10-phenanthroline)osmium(III) ion *16.3*
Tris(1,10-phenanthroline)ruthenium(II) ion, electron adduct *22.31*
Tris(1,10-phenanthroline)ruthenium(III) ion *6.39.4, 6.51, 6.52.1, 6.54.2, 8.5.13, 10.3.3, 22.55*
Tris(5-phenyl-1,10-phenanthroline)chromium(II) ion *7.1*
Tris(5-phenyl-1,10-phenanthroline)ruthenium(III) ion *8.5.20, 22.61*
Tris(1,4,5,8-tetraazaphenanthrene)ruthenium(II) ion, electron adduct *22.35*

Tris(1,4,5,8-tetraazaphenanthrene)ruthenium(II) ion, electron adduct, protonated *22.34, 22.34.1*
Tris(3,4,7,8-tetramethyl-1,10-phenanthroline)ruthenium(III) ion *6.39.6, 8.5.19, 22.62*
Tris[2-(1,2,4-thiadiazol-5-yl)pyridine]ruthenium(III) ion *22.67*
Tris[2-(2-thiazolyl)pyridine]ruthenium(III) ion *22.65*
Tris(4-triethylphosphonio-2,2′-bipyridine)ruthenium(III) ion *6.39.3, 22.54*
Trisulfatocerate(IV) ion *8.5.1*
Trisulfophthalocyaninezincate(II) radical anion *28.9*
Trolox C anion *13.17.2, 13.18.4*
Tryptophan *15.34.1, 28.15.13*
Tryptophan, glycyl- *25.5.16*
Tryptophan, 5-hydroxy-, conjugate base *9.34.4*
12-Tungstate ion(7-), dihydrogen *27.1*
Tyrosine *28.15.14*
Tyrosine, 3,5-diiodo- *25.4.17*
Uranyl(VI) ion *7.4.14, 7.6.9, 7.8.7, 7.11.8*
Uridine 5′-monophosphate radical *22.35.4*
Vanadyl(III) ion *26.1*
Veratric acid *1.5.13, 25.4.23*
Veratrole *1.5.9, 25.4.18, 25.5.10*
Vitamin B_2 *5.1.69, 6.1.31, 6.4.8*
Vitamin B12a *6.18.2*
Vitamin B12s *6.18*
Ytterbium(III) ions *22.3.39*
Zinc(II) hematoporphyrin radical anion *28.24*
Zinc(II) tetrakis(2,6-dichloro-3-sulfonatophenyl)porphyrin radical cation *28.22*
Zinc(II) 5,10,15,20-tetrakis(2-*N*-hexylpyridyl)porphyrin radical cation *28.20*
Zinc(II) 5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphyrin *1.5.4, 25.4.11*
Zinc(II) tetrakis(4-*N*-methylpyridyl)porphyrin *1.5.4, 25.4.11*
Zinc(II) tetrakis(4-sulfonatophenyl)porphyrin *5.1.54*
Zinc(II) 5,10,15,20-tetrakis[2-(3-sulfonatopropyl)-pyridyl]porphyrin radical cation *28.19*
Zinc(II) trisulfophthalocyanine radical anion *28.9*
Zinc(II) uroporphyrin radical cation *28.23*
Zinc(I) ion *13.12.1, 28.1, 28.2*

10. Appendix I. Spectral Properties, pK_a's and Other Data

This section contains data which are relevant to the tables of rate constants. Table 22B contains the data set for the reaction in Table 22, entry 22.50.74, where a selected value is given. Figure 1 is a graphical display of the data. Data for optical absorption and acid-base equilibria of metal transients have been collected in tables having the same number as the rate constant tables, but with the suffix A. Thus, Table 13A contains spectral data for manganese transients. References in the tables which follow are listed by RCDC serial number and may be found in Sec. 7, References to Tables.

TABLE 1A. Spectral properties and pK_a's of silver transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	pK_a	Ref.	Entry No.[a]
Ag(0)	Ag^0	360	16000	93A166			1.1
	Ag_2^+	310	~14500[b]	93A166			1.2
	Ag_4^{2+}	265	30000-40000	93A166			1.2.1
	$Ag_2(NH_3)_n^+$	~340	~9000[b]	680435			1.3
	$Ag_4(NH_3)_n^{2+}$	~250	~6000[b]	680435			1.3.2
Ag(II)	Ag^{2+}	275	5400	78C006	5.35[c]	78C006	1.4
	Ag(trimethylacetate)$_n^{(2-n)+}$	~320[b]	~3700[b]	80A307			1.4.31
	$AgOH^+$	315	5500	78C006	8.35[c]	78C006	1.5
	Ag(2-aminoethanol)$^{2+}$	~300[b]	~5200[b]	82A098			1.6.1
	Ag(2-aminoethanol)$_2^{2+}$	~300[b]	~4300[b]	82A098			1.6.1
	Ag(α-aminoisobutyrate)(OH)	~310[b]	~7100[b]	80A307			1.6.2
	Ag(α-aminoisobutyrate)$_2$	~310[b]	~7800[b]	80A307			1.6.2
	Ag(ethylene glycol)$^{2+}$	~310[b]	~6000[b]	82A098			1.6.7
	Ag(ethylene glycol)$_2^{2+}$	~310[b]	~4600[b]	82A098			1.6.7
	AgGly(OH)/AgGly(OH)$_2^-$	~310[b]	~5900[b]	80A307			1.6.8
	Ag(Gly)$_2$	~315[b]	~7000[b]	80A307			1.6.8
	Ag(OH)$_2$	290	6500	78C006			1.7
	Ag(NH$_3$)$_4^{2+}$	265	~10500[b]	79A304			1.8
	Ag(NH$_3$)$_3$OH$^+$	290	~7900[b]	79A304			1.9
	$AgNTA^-$	~280[b]	~5700[b]	80A307			1.11
	$AgEDTA^{2-}$	~280[b]	~4100[b]	80A307			1.12
	Ag(II)($^-O_2CCH_2CH_2CO_2^-$)	~310[b]	~3700[b]	80A307			1.13

[a]In Table 1.
[b]Evaluated from graph.
[c]Refers to $Ag(H_2O)^{2+} \rightleftarrows AgOH^+ + H^+$, etc.

TABLE 2A. Spectral properties of aluminum transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	Entry No.[a]
Al(III)	[Al(pts)]$^{\cdot-}$	580	27000[b]	89R092	2.1
		635	27000[b]		

[a]In Table 2.
[b]Evaluated from graph.

TABLE 3A. Spectral properties and pK_as of gold transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	pK_a	Ref.	Entry No.[a]
Au(0)	$Au(CN)_2^{2-}$	410[b]	10500[b]	89A310			3.1
		410	7500	680302			
	$Au(CN)_2H^-$	430	6000	89A310	5.9	89A310	
	$Au(CN)_2H_2$	260[b]	4200[b]	89A310	5.2	89A310	3.3
		270	3200	680302			
Au(II)	$(OH)Au(CN)_2^-$	270	6300	91A018			3.4
		440[b]	2000[b]				
	$(OH)Au(CN)_2H$	270	1400	91A018	5.7	91A018	3.5
	d	270[b,c]	4700[b]	700580			3.6
	e	260[b,c]	6200[b]				
		310[b]	4000[b]				
		325	5800	680302			
	f	260[b]	7300[b]	700580			
		320[b]	4300[b]				
	g	265[b]	8800[b]				
		330[b]	5000[b]				
Au(III)	$(OH)_2Au(CN)_2H$	270	700	91A018	~6	91A018	3.5.1

[a]In Table 3.
[b]Evaluated from graph.
[c]Shoulder.
[d]Au^{II} in the absence of Cl^-.
[e]10^{-3} mol L^{-1} Cl^-.
[f]10^{-2} mol L^{-1} Cl^-.
[g]10^{-1} mol L^{-1} Cl^-.

TABLE 4A. Spectral properties of bismuth transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	Entry No.[a]
Bi(II)	Bi^{2+}	285	24000	88A493	4.1
Bi(IV)	$BiCH_2OH^{3+}$	420	20000	88A493	4.2
	$BiCH(CH_3)OH^{3+}$	420	9000	88A493	4.3
	$BiC(CH_3)_2OH^{3+}$	415	8000	88A493	4.4
	$BiCH_2C(CH_3)_2OH^{3+}$	410	7000	88A493	4.5
	$BiCOOH^{3+}$	400	3600	88A493	4.6

[a]In Table 4.

TABLE 5A. Spectral properties of cadmium transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	Entry No.[a]
Cd(0)	Cd^0	260	20000	92N098	5.1.7
Cd(I)	Cd^+	300	13940	92A182	5.1
		300	11800	88A124	
		301	14000	751153	
		~300[b]	~16500[b]	751064	
	Cd^+ 21	310	11500	93A362	5.2
	Cd^+ 22	285	10600	93A362	5.3
	Cd^+ 221	290	6000	88A124	5.4
	Cd^+ 222	240	6200	88A124	5.5
	$Cd(cyclam)^+$	340	11000	80A380	5.6
	Cd^IL^c	320-330	~8000	701228	5.7-5.10
	$CdEDTA^{3-}$	320	9700	80A072	5.7
		350	8000	690277	

[a]In Table 5.
[b]Evaluated from graph.
[c]L = en, Gly^-, NTA, EDTA.

TABLE 6A. Spectral properties and pK_a's of cobalt transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	pK_a	Ref.	Entry No.[a]
Co(I)	Co^+	315	2400	761136			6.1
		315	2100	751027			
		370	2080				
	$Co(CN)_5^{4-}$	280	~8000	710097			6.2
	$CoNTA^{2-}$	360	2300	79A255			6.3
	N-meso-Co(4,11-dieneN$_4$)$^+$	635	~10200[b]	91A513			6.5
	N-meso-Co(4,11-dieneN$_4$)(CO$_2$)$^+$	470	288	91A513			6.5.3
	N-meso-Co(4,11-dieneN$_4$)(H)$^{2+}$	440	445	91A513	13.9	91A513	6.5.5
	N-rac-Co(4,11-dieneN$_4$)$^+$	630	~10600[b]	91A513			6.6
	prim-N-rac-Co(4,11-dieneN$_4$)(H)$^{2+}$	440	520	91A513	11.8[c]	91A513	6.8
					11.6[d]	91A513	
	sec-N-rac-Co(4,11-dieneN$_4$)(H)$^{2+}$	440	300	91A513	11.5[d]	91A513	
					10.3[f]	91A513	
					9.3[g]	91A513	
	prim-N-rac-Co(4,11-dieneN$_4$)(CO)$^+$	860	125	89A098			6.6.3
		400[h]	700				
	prim-N-rac-Co(4,11-dieneN$_4$)(CO$_2$)$^+$	440[i]	510	91A513			6.6.4
	sec-N-rac-Co(4,11-dieneN$_4$)(CO$_2$)$^+$	470	210	91A513			6.6.4
	$Co(bpy)_n^+$	620	5100	79A034			6.10
	$Co(bpy)^+$	670	4100	85A034			6.11
	$Co(bpy)_2^+$	570	5400	85A034			6.12
	$Co(bpy)_2(H)^{2+}$				6.9	84A112	6.12.2
	$Co(bpy)_3^+$	610	6200	85A034			6.13
	$Co(4,4'\text{-}Me_2bpy)^+$	660	4500	85A034			6.14
	$Co(4,4'\text{-}Me_2bpy)_2^+$	500	5400	85A034			6.17
	$Co(4,4'\text{-}Me_2bpy)_3^+$	610	6300	85A034			6.18
Co(II)	$Co(bpy)_3^{2+}$	300	42000	79A034			6.41
	$Co(phen)_3^{2+}$	270	56000	79A034			6.42
	$CoEDTA(O_2)^{3-}$	290	~13000	84A249			6.60
	$Co(NTA\text{-}H)^-$	<250	6400[j]	79A255			6.62
	$Co(cyclam)(O_2)^{2+}$	360	2600	90A079			6.65
	$CoCp_2$	360	1750	88A066			6.67
Co(III)	$[Co(NH_3)_5(mbpy)]^{\bullet 3+}$	380	11000	89A115			6.68
		580	6500				
	$[Co(NH_3)_5(O_2CCH_2py\text{-}4\text{-}CONH_2)]^{\bullet 2+}$	310	800	83B029			6.70
		410	400				
	$[Co(NH_3)_5(HO_2CCH_2py\text{-}4\text{-}CONH_2)]^{\bullet 3+}$	313	3200	83B029			6.71
		412	2000				
	$[Co(NH_3)_5(O_2CCH(CH_3)py\text{-}4\text{-}CONH_2)]^{\bullet 2+}$	310	>800	83B029			6.72
		400	>370				
	$[Co(NH_3)_5(HO_2CCH(CH_3)py\text{-}4\text{-}CONH_2)]^{\bullet 3+}$	320	1000	83B029			6.73
		415	500				
	$[Co(NH_3)_5(O_2C(CH_2)_3py\text{-}4\text{-}CONH_2)]^{\bullet 2+}$	315	650	83B029			6.74
		400	300				
	$[Co(NH_3)_5(HO_2C(CH_2)_3py\text{-}4\text{-}CONH_2)]^{\bullet 3+}$	320	1650	83B029			6.75
		413	1200				
	$CoEDTA(O_2)^{2-}$	260	10000	84A249			6.81
	$[Co(NH_3)_5pyOH]^{\bullet 3+}$	325	1700	79A213			6.95
		~330	~1500	76A265			
	$[Co(NH_3)_5naOH]^{\bullet 3+}$	~380	~2800	76A265			6.96
	$[Co(NH_3)_5isnOH]^{\bullet 3+}$	~330	~2000	76A265			6.97
	$CH_3CoNTA(H_2O)^-$	245	14000	88A343			6.101
		390	170				
		600	90				

TABLE 6A. Spectral properties and pK_a's of cobalt transients —Continued

Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	pK_a	Ref.	Entry No.[a]
$HOCH_2CoNTA(H_2O)^-$	256	9300	88A343			6.102
	396	310				
	600	30				
$HOCH(CH_3)CoNTA(H_2O)^-$	262	9000	88A343			6.103
	410	580				
	570	40				
$O_2CCH_2CoNTA(H_2O)^{2-}$	266	7000	88A343			6.104
	380[h]	200				
	610	90				
$C_2H_5OCH(CH_3)CoNTA(H_2O)^{2-}$	275	8700	88A343			6.105
	420	790				
	580	40				
$HOC(CH_3)_2CoNTA(H_2O)^-$	263	11000	88A343			6.106
	412	530				
	550	80				
$CoNTA(Br)(H_2O)^-$	290	12000	88A343			6.107
	410[h]	200				
	580	150				
$HOCH_2CoHEDTA(H_2O)^-$	270	14000	88A343			6.108
	380	230				

[a]In Table 6.
[b]Evaluated from graph.
[c]In 0.5 mol L^{-1} phosphate.
[d]In 0.1 mol L^{-1} phosphate.
[e]At 25°C.
[f]At 45°C.
[g]At 65°C.
[h]Shoulder.
[i]Spectrum is temperature dependent, λ_{max} = 440 nm at 0°C (six-coordinated), λ_{max} = 520 nm (ε = 1100 L mol^{-1} cm^{-1}) at 60°C (five-coordinated).
[j]ε at 250 nm.

TABLE 7A. Spectral properties of chromium transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	Entry No.[a]
Cr(II)	$Cr(bpy)_3^{2+}$	475	4100	87A309	7.4
		565	3700		
		465	3900	81A060	
		490	3400		
		562	4600		
	$Cr(4,4'\text{-}Me_2bpy)_3^{2+}$(pH ~1)	470	4600	81A060	7.6
		560	4500		
	$Cr(4,4'\text{-}Ph_2bpy)_3^{2+}$ [b]	485	4900	81A060	7.7
	$Cr(phen)_3^{2+}$(pH 2)	475	4200	87A309	7.9
		560	3900		
		430[c]	3600	81A060	
		700	2500		
	$Cr(5\text{-}Clphen)_3^{2+}$(pH 2)	480	3300	81A060	7.11
	$Cr(5\text{-}Brphen)_3^{2+}$(pH ~1)	485	3900	81A060	7.14
	$Cr(5\text{-}Mephen)_3^{2+}$(pH ~1)	485	3500	81A060	7.15
	$Cr(4,7\text{-}Me_2phen)_3^{2+}$ [b]	440	3700	81A060	7.16
	$Cr(5,6\text{-}Me_2phen)_3^{2+}$(pH ~1)	420[c]	4200	81A060	7.17
		480	3000		
	$Cr(5\text{-}Phphen)_3^{2+}$ [b]	480	2600	81A060	7.18
	$Cr(4,7\text{-}Ph_2phen)_3^{2+}$ [b]	430	6800	81A060	7.19
	$Cr(bpy)_2(C_2O_4)$	350	3200	87A309	7.20
		495	2400		
		580	2000		
	$Cr(bpy)(C_2O_4)_2^{2-}$	350	4300	87A309	7.21
		485	1700		
		610	1100		
	$Cr(phen)_2(C_2O_4)$	340	2900	87A309	7.22
		480	2500		
		575	1600		
	$Cr(phen)(C_2O_4)_2^{2-}$	340	3500	87A309	7.23
		470	2000		
		600	600		
Cr(III)	CrH^{2+}	380	190	741142	7.27
	CrO_2^{2+}	245	7800	751063	7.2.3
		290	3200		
		248	6900	751215	
		290	3000		
	$CrCH_2CH_2OH^{2+}$	390	380	91A477	7.29
		390	450	82A030	
	$CrCH(CH_3)CH_2OH^{2+}$	285	2100	91A477	7.30
		390	310		
	$CrCH(CH_3)CH(CH_3)OH^{2+}$	280	2600	91A477	7.31
		400	450		
	$CrCH_2C(CH_3)_2CH_2OH^{2+}$	270[c]	>2100	741146	7.32
		410	>170		
	$CrCOH(CH_3)CO_2H^{2+}$	305	1500	741146	7.34
		385	230		
	$CrCH_2C(CH_3)_2CO_2H^{2+}$	<270	>2200	741146	7.35
		410	>310		
	$CrCH_2C(CH_3)_2NH_3^{3+}$	~280[d]	~1300[d]	92A073	7.36
		~400[d]	~200[d]		

[a]In Table 7.
[b]In methanol.
[c]Not λ_{max}.
[d]Evaluated from graph.

TABLE 8A. Spectral properties and pK_a's of copper transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	pK_a	Ref.	Entry No.[a]
Cu(0)	Cu^0	375	5600	84A439			8.2
Cu(I)	$Cu(Me_2pyo[14]trieneN_4)^+$	~350	~1100	86A210			8.17
	$Cu(bpy)_2^+$	430	4800	85A059			8.18
	$Cu(phen)_2^+$	430	7800	88A392			8.19
		430	5400	87G275			
		435	6900	83A299			
	$Cu(5\text{-}Clphen)_2^+$	440	6000	85A059			8.20
	$Cu(5\text{-}NO_2phen)_2^+$	450	7320	85A059			8.21
	$Cu(5\text{-}CH_3phen)_2^+$	430	5960	85A059			8.22
	$Cu(2,9\text{-}Me_2phen)_2^+$	454	7500	85A059			8.23
Cu(II)	$CuCH_3^+$	~390[b]	~2100[b]	86A115			8.28
	$CuCH(CH_2NH_3)CO_2^+$	360	1500	92A134			8.30
	$CuCH_2C(CH_3)_2OH^+$	400	1400	88A410			8.32
	$CuCH_2C(CH_3)_2NH_3^{2+}$	385	5500	92A073			8.33
	$CuCH(CH_2NH_3)_2^{3+}$	355	2100	93A473			8.34
	$CuCH(CH_2NMe_2H)_2^{3+}$	370	780	93A473			8.35
	$CuCH_2C(CH_3)_2CO_2H^+$	380	1850	90A474			8.37
	$CuCH_2C(CH_3)(NH_3)CO_2^+$	355	2100	92A215			8.38
	$CuCHCH(OH)(CH_2)_4^+$	360	880	91A152			8.39.1
	$Cu(OC_6H_4\text{-}4\text{-}O)$	425	4300	78A449			8.40
	Cu(acrylamide)$^+$	250	6200	761186			8.5.21
		315	1400				
	Cu(fumaric acid)$^+$	335	3000	751092			8.5.26
	Cu(maleic acid)$^+$	345	2800	751092			8.5.29
Cu(III)	$Cu(Me_2pyo[14]trieneN_4)(OH)^{2+}$	~350	~2300	86A210			8.44
	$Cu(OH)_2^+$	290	3500	78C006	4.0[c]	78C006	8.46
	$Cu(OH)_3$	280	7400	78C006			
	$Cu^{III}(NH_3)_n$	290	5600	710775			8.48
	$Cu^{III}(en)_n$(pH=8.0)	300	2100	710775			8.49
	$Cu^{III}(en)_n$(pH=11.3)	300	2500				
	$Cu(4,11\text{-}dieneN_4)^{3+}$	315	5500	79A080			8.52
	$Cu^{III}(Gly)_2$	310	7800	710775			8.57
	$Cu^{III}(Ala)_2$	300	5500	89G017			8.58
		305	4700	710775			
	$Cu^{III}(\beta\text{-}Ala)_2$	310	4700	710775			8.59
	Cu^{III}(α-aminobutyric acid)$_2$	310	3000	710775			8.60
	Cu^{III}(β-aminobutyric acid)$_2$	310	3300	710775			8.61
	Cu^{III}(γ-aminobutyric acid)$_2$	310	3500	710775			8.62
	Cu^{III}(α-aminoisobutyric acid)$_2$	310	3200	710775			8.63
	$CuOC_6H_4\text{-}2\text{-}OH^{2+}$	380	410	78A449			8.76
	$CuOC_6H_4\text{-}3\text{-}OH^{2+}$	420	4500	79A272			8.77
	$CuOC_6H_4\text{-}4\text{-}O^+$	425	870	78A449			8.78
	$CuOC_6H_3\text{-}5\text{-}Me\text{-}3\text{-}OH^{2+}$	450	3500	79A272			8.79
	cis-$[HOCH_2Cu(NTA)(H_2O)]^-$	430	200	86B151			8.84

[a]In Table 8.
[b]Evaluated from graph.
[c]For $Cu(OH)_2(H_2O)^+ \rightleftarrows Cu(OH)_3 + H^+$.

TABLE 9A. Spectral properties and pK_a's of iron transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	pK_a	Ref.	Entry No.[a]
Fe(II/?)	$Fe(bpy)(CN)_4^{3-}$	~365[b]	~16000[b]	91A067			9.3
		~530[b]	~7000[b]				
		370	13000	90A171			
	$Fe(4,4'\text{-}Me_2bpy)(CN)_4^{3-}$	~375[b]	~14000[b]	90A499			9.4
		~520[b]	~6000[b]				
		370	10000	90A171			
	$Fe(CN)_5N(O)R^{3-}$ [c]	~250	~9000	79A134			9.7
		475	5000				
Fe(II)	$Fe(tim)(H_2O)_2^{2+}$	650	4400	84A403			9.9
Fe(II/?)	$Fe(bpy)_2(bpyOH)^{2+}$	350	~5000	90A015			9.13
		530	~4000				
Fe(II,III)	$FeHO_2Fe^{4+}$	450[d]	1240	730038			9.15
Fe(III)	FeH^{2+}	325	650	690434			9.16
	$FeHO_2^{2+}$	450[d]	140	730038			9.17
		430[d]	280	690434			
	Fe(III)PP(H)	550	10000	86A511			9.20
	$HOCH_2Fe(III)PP$	575	9000	85A006			9.21
		680	4800				
	$HOCH(CH_3)Fe(III)PP$	560	13000	85A006			9.22
		680	4200				
	$(CH_3)_2C(OH)Fe(III)PP$	570	11000	85A006			9.23
		660	5300				
	$HOCH_2CH_2Fe(III)PP$	560	7000	86A511			9.24
	$HOCH_2CH(CH_3)Fe(III)PP$	550	8000	86A511			9.25
	$CH_3FeNTA(H_2O)^-$	~310[b]	~8500[b]	88A426			9.28
	CO_2FeNTA^{2-}	405	620	88A184			9.29
	$CO_2FeHEDTA^{2-}$	420	950	88A184			9.30
Fe(IV)	$FeO(OH)_n^{2-n}$	240	~5500	86A018			9.46
		420	520				
	$FeO(P_2O_7)_2^{6-}$	420	1200	90A373			9.49
	$HOFe^{IV}SiW_{11}O_{39}^{5-}$	355	8600	90A253			9.50
Fe(V)	$H_2FeO_4^-$				9.5	89A354	9.51
	$HFeO_4^{2-}$	270[d]	4700	91Z208	10.1	89A354	9.52
		368	990				
	FeO_4^{3-}	270[d]	5300	91Z208			9.53
		368	990				
		390	1500	86A018			

[a]In Table 9.
[b]Evaluated from graph.
[c]R = $^{\bullet}CH_2C(CH_3)_2OH$, $^{\bullet}CH_2C(CH_3)(NH_3^+)CO_2^-$, $^{\bullet}CH_2N(CH_3)C(O)CH_3$, $^{\bullet}CH_2C(CH_3)_2NH_3^+$, $^{\bullet}CH_2C(CH_3)(OH)CO_2^-$, $^{\bullet}CH_2C(CH_3)_2CO_2^-$
[d]Not λ_{max}.

TABLE 10A. Spectral properties and pK_a's of mercury transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	pK_a	Ref.	Entry No.[a]
Hg(0)	Hg^0	254	2800	751203			10.1
Hg(0,I)	Hg_2^+	285	13000	79A063			10.2
		300[b]	6700				
Hg(I)	Hg^+	250	14000[c]	731080	5.1[d]	751044	10.3
	HgOH	233	~10000[e]	751044			10.4
		260[f]	5300				
	Hg_2O [g]	215	8700[h]	751044			10.4.1
	HgBr	350	4300	761042			10.6
	HgCl	330	2300	730043			10.8
	HgCN	285	3500	761042			10.10
		285	3800	751203			
	HgI	355	≥3200	761042			10.11
	HgSCN	415	4400	761042			10.12

[a]In Table 10.
[b]λ at half-height.
[c]ε at 255 nm.
[d]For $Hg^+ + H_2O \rightleftarrows HgOH + H^+$.
[e]Evaluated from graph.
[f]Shoulder.
[g]Or $Hg_2(OH)_2$.
[h]ε at 220 nm.

TABLE 11A. Spectral properties and pK_a's of indium transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	pK_a	Ref.	Entry No.[a]
In(0)	In^0	500	≥1800	89A492			11.1
In(I)	In_2^+	310	≥8000	89A492			11.1.1
		460	≥2100				
In(II)	In^{2+}	250[b]	~20000[c]	84A008	4.5[d]	84A008	11.2

[a]In Table 11.
[b]Not λ_{max}.
[c]Evaluated from graph.
[d]Refers to $In(H_2O)^{2+} \rightleftarrows InOH^+ + H^+$.

TABLE 12A. Spectral properties of iridium transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	Entry No.[a]
Ir(II)	Ir(II)[b]	280	1740	731066	12.1
Ir(III/?)	$Ir(bpy)_2(C^3,N'\text{-Hbpy})^{2+}$	395	10600	85A160	12.2

[a]In Table 12.
[b]From $IrCl_6^{3-} + e_{aq}^-$.

TABLE 13A. *Spectral properties of manganese transients*

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	Entry No.[a]
Mn(II)	$Mn[NTA-H]^-$	~300[b]	~3000[b]	78A436	13.9
	$Mn[EDTA-H]^{2-}$	290	2800	78A436	13.10
		430	820		
Mn(III)	$MnOH^{2+}$	310	420	78A041	13.12
		~420[b]	~200[b]	761109	
	MnO_2^+	~420[b]	~300[b]	761109	13.13
	MnO_2^+-formate	270	3200	84A189	13.14
	Mn(III)-phosphate	~270[b]	~2800[b]	84A384	13.17
	MnO_2^+-phosphate	270	3100	84A384	13.18
	Mn(III)-pyrophosphate	260	6200	84A189	13.19
	MnO_2^+-sulfate	270	2200	84A189	13.21
	$MnEDDA(O_2)^-$	~445[b]	~360[b]	90A116	13.27
	$MnEDDA(OH)_2^-$	~440[b]	~300[b]	90A116	13.27
	$CH_3Mn(NTA)(H_2O)^-$	310	4700	88A426	13.28
Mn(IV)	$[HOMn(cyclam)Cl_2]^+$	480	260	87A488	13.33
	$[HO\text{-}meso\text{-}Mn(aneN_4)Cl_2]^+$	320	920	87A488	13.34
		450	190		
	$[HO\text{-}rac\text{-}Mn(aneN_4)Cl_2]^+$	260	1700	87A488	13.35
		450	150		

[a]In Table 13.
[b]Evaluated from graph.

TABLE 14A. Spectral properties of molybdenum transients

Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	Entry No.[a]
$HP_2Mo_8O_{62}^{6-}$	750	2800	82A107	14.1
$[Mo_2O_4(EDTA)]^{3-}$	~520[b]	~550[b]	85A363	14.2

[a]In Table 14.
[b]Evaluated from graph.

TABLE 15A. Spectral properties and pK_a's of nickel transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	pK_a	Ref.	Entry No.[a]
Ni(I)	Ni^+	300	4800	751027			15.1
		300	6000	741037			
	$Ni(CN)_4^{3-}$	270	13300	741072			15.2
	$Ni([13]aneN_4)^+$	~380[b]	~3100[b]	85A145			15.4
	$Ni(MeNO_2[13]aneN_4)^+$	290	3800	88A391			15.5
	$Ni(cyclam)^+$	375	4500	85A032			15.6
	$Ni(Me_4[14]aneN_4)^+$	355	3150	85A032			15.7
	$Ni(aneN_4)^+$	380	5150	761039			15.8
	$Ni(Me_{10}cyclam)^+$	335	3600	85A032			15.9
	$Ni(4,11\text{-dieneN}_4)^+$	460	3900	761039			15.10
	$Ni(MeNO_2[18]aneN_6)^+$	290	640	88A391			15.14
	$Ni(MeNH_2[18]aneN_6)^+$	360	720	88A391			15.15
	NiL^+ [c]	360	540	88A391			15.16
	$NiNTA^{2-}$	300	1980	80A194			15.17
Ni(II)	$NiCH_2OH^+$	250[d]	~7000[b]	741037			15.19
	$NiCO_2$	250[d]	~500[b]	741037			15.20
	$NiCHOHCH_3^+$	~270[b]	~6500[b]	741037			15.21
	$NiCOH(CH_3)_2^+$	250[d]	~5000[b]	741037			15.22
	$NiCH(CH_3OC_2H_5^+$	~300[b]	~6500[b]	741037			15.23
	Ni(IDA-H)	~245	3000	81A023			15.27
	$Ni(IDA)(IDA\text{-}H)^{2-}$	255	5800	81A023			15.28
	$Ni(NTA\text{-}H)^-$	290	2050	80A194			15.29
		290	2050(pH 4)	78A436[e]			
		290	1600(pH 9)	78A436[e]			
Ni(III)	$Ni(NH_3)_n^{3+}$	295	1400	720460			15.31
	$Ni(en)_n^{3+}$	295	2000	720461			15.32
	$Ni(Gly)_n^{(3-n)+}$	285	2800	720461			15.33
	$Ni([13]aneN_4)^{3+}$	~520[b]	~2500[b]	86A470			15.35
	$Ni(MeNO_2[13]aneN_4)^{3+}$	520	3400	88A391			15.36
		360	~800				
		310	~2400				
	$Ni(10,13\text{-diene-H})^{2+}$	330	6850	82A060			15.38
		600	2500				
	$Ni(trifluoro\text{-}10,13\text{-dieneN}_4\text{-H})(H_2O)_2^{2+}$	355	4600	84A277	5.1[f]	84A277	15.40
		580	1800				
	$CH_3Ni(cyclam)(H_2O)^{2+}$	~300[b]	~2000[b]	88A444			15.41
		~530[b]	~100[b]				
	$Ni(cyclam)^{3+}$ [g]	~525[b]	~1000(pH 6)	80A350			15.42
		~280[b]	~2300[b](pH 6)				
		~300[b]	~5600[b](pH 3.1)				
	$Ni(cyclam)^{3+}$ [h]	~300[b]	~12000[b](pH 6)	85A032			
	$\beta\text{-}Ni(aneN_4)^{3+}$ [g]	~550[b]	~1200[b](pH 3.2)	81A285			15.43
		~300[b]	~2600[b](pH 3.2)				
	$Ni(aneN_4)^{3+}$	~550[b]	~1100[b]	79A249			15.44
	$Ni(aneN_4)SO_4^+$	~320[b]	~9500[b]	79A249			15.44.5
		~400[b]	~5000[b]				
	$Ni(4,11\text{-dieneN}_4)^{3+}$ [h]	~320[b]	~8500[b](pH 1)	79A038			15.45
	$Ni(4,11\text{-dieneN}_4)^{3+}$ [g]	535	1500	771151			
		~320[b]	~8500[b](pH 0.2)	79A038			
		~550[b]	~3000[b](pH 5.3)				

TABLE 15A. Spectral properties and pK_a's of nickel transients —Continued

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	pK_a	Ref.	Entry No.[a]
	$Ni(tetraeneN_4)^{3+}$	~330[b]	~6000[b]	79A038			15.50
	$Ni([16]aneN_5)^{3+}$	290	6900	83A322			15.52
	$Ni(MeNO_2[18]aneN_6)^{3+}$	545	410	88A391			15.53
		370sh	~600				
		310	~1100				
	$Ni(MeNH_2[18]aneN_6)^{3+}$	545	2900	88A391			15.54
		390sh	~1200				
		340	~1800				
	NiL^{3+} [c]	530	620	88A391			15.55
		300sh	~400				
	$Ni(Me_2pyo[14]trieneN_4)(H_2O)_2^{3+}$				4	81A144	15.60
	$Ni(Me_2pyo[14]hexaeneN_4)Br^{2+}$	265	15000	82A087			15.69
		360	4500				
	$NiEDTA^-$ [i]	~570[b]	2600	91A292			15.70
	$NiEDTA^-$ [g]	~290[b]	~1700[b]	751135			
	$NiEDTA(H_2O)^-$	~580[b]	2010	91A292			15.72
Ni(IV)	NiO_2^+	265	2700	761134	3.2[j]	761134	15.73

[a]In Table 15.
[b]Evaluated from graph.
[c]L = 3,7-Bis(2-aminoethyl)-1,3,5,7-tetraazabicyclo[3.3.1]nonane.
[d]Not λ_{max}.
[e]Species suggested to be Ni(III).
[f]pK_a for L → L-H.
[g]Obtained from $^{\bullet}OH$.
[h]Obtained from $Br_2^{\bullet-}$.
[i]Obtained from $CO_3^{\bullet-}$.
[j]For $NiO_2H^{2+} \rightleftarrows NiO_2^+ + H^+$.

TABLE 17A. Spectral properties of lead transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	Entry No.[a]
Pb(0)	Pb^0 [b]	300	12000	92A206	17.1
		660	970		
Pb(I)	Pb^+	320	2500	92A206	17.2
	Pb(I) [c]	275	6400	78A206	17.3
		315	11000		
Pb(III)	Pb(III) [d]	430	6500	84A446	17.7
	$Pb(OH)_2^+$	~370[e]	~2700[e]	90A095	17.8
	$Pb(OH)_4^-$	~275[e]	~9700[e]	90A095	17.9
		~350[e]	~6400[e]		

[a]In Table 17.
[b]Species could be Pb_2^{2+}.
[c]In the presence of Cl^-.
[d]In the presence of 11 mol L^{-1} HCl.
[e]Evaluated from graph.

TABLE 18A. Spectral properties of palladium transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	Entry No.[a]
Pd(I)	Pd^+	290	6400	94A210	18.1
	$Pd(HypO)_2^-$	260	1800	93A224	18.2
Pd(III)	Pd^{3+}	250	4700	94A210	18.1.1

[a]In Table 18.

TABLE 19A. Spectral properties and pK_a's of platinum transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	pK_a	Ref.	Entry No.[a]
Pt(I)	*cis*-$Pt(NH_3)_2Cl_2^-$	<250	>1200[b]	85A090			19.2
	$PtBr_4^{3-}$	320	3000	92A259			19.4
	$PtCl_4^{3-}$	310	2900	680169			19.5
	$Pt(en)_2^+$	300	1650	751188			19.77
	Pt(dien)Cl	335	2780	751188			19.8
	cis-$Pt(Gly)_2^-$	240	~5100	771053			19.9
	trans-$Pt(Gly)_2^-$	250	~5500	771053			19.10
Pt(II/?)	$Pt(en)_2^{2+}$/H	420	220	751188			19.11
	$Pt(dien)Cl^+$/H	410	520	751188			19.12
	$Pt(Et_4dien)Cl^+$/H	290	2620	751188			19.13
	cis-$Pt(Gly)_2$/H	~250	~4100	771053			19.14
	trans-$Pt(Gly)_2$/H	260	~5800	771053			19.15
Pt(I,II)	$Pt_2(P_2O_5H_2^{2-})_4^{5-}$	~420	~13000	84A241			19.16
		~600	~1700				
Pt(III)	$Pt(NH_3)_4(H_2O)(OH)^{2+}$	270	>2900	82A074	9.8	82A074	19.18
	$Pt(NH_3)_4(H_2O)_2^{3+}$	270[c]		86A017	6.4	82A074	19.20
	$Pt(NH_3)_4(H_2O)Cl^{2+}$	270	3300	86A017			19.20.2
	$PtCl_6^{3-}$	440	2800	89A250			19.26
	$PtCl_4(H_2O)_2^-$	410	3500	87A472	3.5	87A472	19.28.1
	$PtCl_4(OH)(H_2O)^{2-}$	450	2780	89A250			19.29
		455	3500	89A203	9-10	89A203	
		450	2800	680169			
	$PtCl_4(OH)_2^{3-}$ [d]	410	3960	89A250			19.30
	$PtCl_2(OH)_2^-$ [d]	410	4400	89A203			19.31
	$PtBr_4(OH)^{2-}$	530	1420	92A259			19.32
	$PtBr_4(OH)_2^{3-}$	420	2260	92A259			19.32.1
	$PtBr_6^{3-}$	540	1650	92A259			19.33
	$PtBr_5(OH)^{3-}$	440	2350	92A259			19.33.1
	$Pt(en)_2Cl^{2+}$	260	8000	80A286			19.35
		265	7120	751188			
	$Pt(en)_2(H_2O)(OH)^{2+}$	270	~4500	80A286			19.36
	$Pt(en)_2(H_2O)_2^{3+}$	<250[c]		80A286	6.8	82A074	
	$Pt(en)(en\text{-}H))^{2+}$	340	2900	80A286			19.37
		480	1500				
Pt(II,III)	$Pt_2(P_2O_5H_2^{2-})_4^{3-}$	310	7600	86A578			19.47

[a]In Table 19.
[b]At 250 nm.
[c]ε value not given.
[d]These are probably the same species; the authors have interpreted the structure differently.

TABLE 20A. Spectral properties of rhenium transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	Entry No.[a]
Re(VI)	ReO_4^{2-}	290	1700	85A234	20.1

[a]In Table 20.

TABLE 21A. Spectral properties of rhodium transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	Entry No.[a]
Rh(I)	$Rh(bpy)_2^+$	510	10000	81A134	21.11.2
Rh(I,II)	$Rh_2(1,3\text{-diisocyanopropane})_4^{3+}$	438 705	34500 2000	79A167	21.4
Rh(II)	$Rh(bpy)_2^{2+}$	~300[b] ~350[b]	~23000[b] ~3500[b]	83A046	21.10
	$[Rh(bpy)_2]_2^{4+}$	350[c]	~8000[b]	83A046	21.10.1
	$Rh(bpy)_3^{2+}$	~300[b] ~350[b]	~30000[b] ~5000[b]	83A046	21.11

[a]In Table 21.
[b]Evaluated from graph.
[c]Not λ_{max}.

TABLE 22A. Spectral properties and pK_a's of ruthenium transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	pK_a	Ref.	Entry No.[a]
Ru(I)	$Ru(NH_3)_5N_2^+$	310	700	710234			22.1
Ru(II/?)	$Ru(bpy)_2(CN)_2^-$	~350[b]	~12500[b]	84A177			22.2
		~590[b]	~5500[b]				
	$Ru(bpy)_3^+$	350	18300	91A198			22.3
		490	13900				
		490	14000	767412			
		510	12000	720381			
	$Ru(bpy)_2(bpm)^+$	340	21500	91A198			22.6
		460	13400				
		480[d]	12700				
	$Ru(bpy)_2(bpmH)^{2+}$	330	18800	91A198	7.7	91A198	22.7
		420	12100				
		440[d]	11700				
	$Ru(bpy)_2(bpz)^+$	470	11000	91A198			22.8
	$Ru(bpy)_2(bpzH)^{2+}$	450	12100	91A198	9.2	91A198	22.9
		530	3700				
	$Ru(bpy)(bpm)(bpz)^+$	350[d]	15900	91A198			22.10
		470[d]	8200				
	$Ru(bpy)(bpm)(bpzH)^{2+}$	410	10000	91A198	8.8	91A198	22.11
		480[d]	6400				
	$Ru(bpm)_3^+$	330	19000	91A198			22.12
		450	11500				
		480	11100				
	$Ru(bpm)_2(bpmH)^{2+}$	330	18600	91A198	6.3	91A198	22.13
		370[d]	12200				
		430	9200				
	$Ru(bpm)_2(bpy)^+$	340	21200	91A198			22.14
		440	13300				
		480[d]	10600				
	$Ru(bpm)(bpmH)(bpy)^{2+}$	340	21200	91A198	6.9	91A198	22.15
		390	13000				
	$Ru(bpm)_2(bpz)^+$	360	18400	91A198			22.16
		460	8900				
		490[d]	8700				
	$Ru(bpm)_2(bpzH)^{2+}$	330[d]	17900	91A198	7.7	91A198	22.17
		450[d]	7900				
		500[d]	5200				
	$Ru(bpz)_3^+$	460	12700	91A198			22.18
	$Ru(bpz)_2(bpzH)^{2+}$	440	11800	91A198	7.1	91A198	22.19
		470[d]	10500				
	$Ru(bpz)_2(bpy)^+$	370	16100	91A198			22.20
		490	9200				
	$Ru(bpz)(bpzH)(bpy)^{2+}$	400	9100	91A198	8.0	91A198	22.21
		460	8300				
		500	7500				
	$Ru(bpz)_2(bpm)^+$	360	18100	91A198			22.22
		460	10100				
		490	10000				
	$Ru(bpz)(bpzH)(bpm)^{2+}$	450	9500	91A198	7.2	91A198	22.23
		480[d]	7800				
	$Ru(bpy)_3\text{-}OH^{2+}$	750	1800	86A034			22.24
	$Ru(bpz)_3\text{-}OH^{2+}$	~440[b]	~10600	88A091			22.25
		~550	~3400				
		~750	~900				

TABLE 22A. Spectral properties and pK_a's of ruthenium transients —Continued

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	pK_a	Ref.	Entry No.[a]
	$Ru(NH_3)_5NO^{2+}$	280	3700	78A110			22.37
		350	750				
	$Ru(NH_3)_5N(O)CH_2C(CH_3)_2OH^{2+}$	343	4500	751077			22.37
		740	22				
	$Ru(NH_3)_5N(O)R^{2+}$[e]	342	4500	79A134			
		740	22				
Ru(I,II)	$[(NH_3)_5RuN_2Ru(NH_3)_5]^{3+}$	500	1460	82A135			22.38
Ru(II,II/?)	$[(NH_3)_5RuN_2Ru(NH_3)_5]\text{-}OH^{4+}$	220[c]	~15000	82A135			22.39
		235[c]	~13500				
		250[c]	~29000				
		260[c]	~15000				
		435	1870				
Ru(II,III)	$[(NH_3)_5RuN_2Ru(NH_3)_5]^{5+}$	250	28000	82A135			22.40
Ru(III)	$Ru(NH_3)_5N_2^{3+}$	430	2250	710234			22.45
Ru(III/?)	$(NH_3)_5Ru(C_4O_4\text{-}OH)$	~460	~400	88A030			22.70

[a]In Table 22.
[b]Evaluated from graph.
[c]Not λ_{max}.
[d]Shoulder.
[e]R = $^{\bullet}CH_2C(CH_3)_2OH$, $^{\bullet}CH_2C(CH_3)(NH_3^+)CO_2^-$, $^{\bullet}CH_2N(CH_3)C(O)CH_3$, $^{\bullet}CH_2C(CH_3)_2NH_3^+$, $^{\bullet}CH_2C(CH_3)(OH)CO_2^-$, $^{\bullet}CH_2C(CH_3)_2CO_2^-$.

TABLE 22B. Values of the bimolecular rate constant for the reaction
$Ru(bpy)_3^{3+} + MV^{\cdot+} \rightarrow Ru(bpy)_3^{2+} + MV^{2+}$
in aqueous solution

k[a,b]	pH	I[c]	k_N[a,d]	t(°C)	ε[e]	Ref.
4.0e9	5.5	0.1	4.0e9		13600	91A143
3.8e9		0.015[f]	3.8e9		13700	91N125
2.6e9		0.0017	2.6e9	23	13700	90A389
2.6e9		0.0032	2.6e9	23	13700	90A389
2.7e9		0.0062	2.7e9	23	13700	90A389
2.8e9		0.012	2.8e9	23	13700	90A389
4.2e9		0.15	4.2e9	23	13700	90A389
4.8e9		0.30	4.8e9	23	13700	90A389
5.5e9		0.57	5.5e9	23	13700	90A389
5.5e9		1.0	5.5e9	23	13700	90A389
1.1e10[h]		2.4	1.1e10	23	13700	90A389
5.0e9		0.3[f]	5.0e9		13600	89E329
2.8e9		0.02	3.4e9	20	11300	88A025
3.4e9		0.08	4.1e9	20	11300	88A025
4.2e9		0.16	5.2e9	20	11300	88A025
4.8e9		0.35	5.8e9	20	11300	88A025
5.3e9		0.80	6.4e9	20	11300	88A025
5.6e9[h]		1.60	6.8e9	20	11300	88A025
4.3e9	7	0.4	4.9e9		12000	85F435
1.4e10[h]	0.3	1.5[g]	1.8e10		11000	82A111
7.1e9[h]		1.5	8.9e9		11000	82A111
6.6e9[h]		3.0	8.3e9		11000	82A111
9.8e9[h]	4.7	3.1	12.3e9		11000	82A111
2.0e9	6.9	0.04	2.4e9		11300	81A042
4.4e9	7-9	0.5	5.5e9	25	11000	81N003
2.4e9		0.03[f]	2.9e9		11300	78A351

[a]All values obtained from flash photolysis experiments.
[b]L mol^{-1} s^{-1}.
[c]mol L^{-1}.
[d]Normalized assuming $\varepsilon(MV^{\cdot+})$ = 13700 L mol^{-1} cm^{-1} [82B053].
[e]$MV^{\cdot+}$ at ~600 nm, L mol^{-1} cm^{-1}.
[f]Calculated from data given by authors.
[g]Value of I probably incorrect, 0.5 mol L^{-1} H_2SO_4.
[h]These values do not appear in Figure 1.

TABLE 24A. Spectral properties of tin transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	Entry No.[a]
Sn(III)	Sn(III)	280	5300	86A208	24.1

[a]In Table 24.

TABLE 25A. Spectral properties and pK_a's of thallium transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	pK_a	Ref.	Entry No.[a]
Tl(0)	Tl^0	420	2840	89C001			25.1
	Tl_2^+	420	11700	89C001			25.2
Tl(II)	Tl^{2+}	270[b]	~3800[c]	741017	4.78[d]	84C015	25.4
	$TlOH^+$	360	3160	84C015			25.5
		360	3000	761192	7.7[d]	761192	
	$Tl(OH)_2$	370	3800	761192			25.6
	$TlCl^+$	263	~7700[c]	741038			25.7
		342	~4300[c]				
	$TlCl_2$	280	~6400[c]	741038			25.8
		342	~7000[c]				
	$TlCl_3^-$	304	~10300[c]	741038			25.9
		362	~9400[c]				

[a]In Table 25.
[b]Not λ_{max}.
[c]Evaluated from graph.
[d]Refers to $Tl(H_2O)^{2+} \rightleftarrows Tl(OH)^+ + H^+$ and $Tl(OH)(H_2O)^+ \rightleftarrows Tl(OH)_2 + H^+$.

TABLE 27A. Spectral properties of tungsten transients

Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	Entry No.[a]
$H_2W_{12}O_{40}^{7-}$	680	2100	90A069	27.1

[a]In Table 27.

TABLE 28A. Spectral properties of zinc transients

	Species	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})	Ref.	Entry No.[a]
Zn(I)	Zn^+	305	12,800	92A182	28.2
		310	13,000	771011	
	Zn(cyclam)$^+$	330	7800	80A380	28.3
Zn(II)	$[ZnTZP]^{\cdot -}$	438	210000	83C026	28.7
	$[ZnNTA\text{-}H]^{\cdot -}$ [b]	280	2400(pH 4)	78A436	28.10
		290	5200(pH 9)	78A436	
	$[ZnEDTA\text{-}H]^{2-}$ [c]	290	2650(pH 4.5)	78A436	28.11
		290	5200(pH 9)	78A436	
	$[Zn(3\text{-}TMpyP)]^{\cdot 5+}$	700	31000	85A430	28.13
				84A264	
	$[ZnTMpyP]^{\cdot 5+}$	700	9000	82N168	28.14
		700	7000	81S157	
	$[ZnTPPS]^{\cdot 3-}$	460	8500	81C041	28.15
		600	3100		
	$[ZnTZP]^{\cdot +}$	560	15000	83C026	28.18
		605	5000		

[a]In Table 28.
[b]Also represented in Table 28 as A or B.
[c]Also represented in Table 28 as C or D.

11. Appendix II. List of Metal Transients

Table 1. Silver

1.1 Silver atom
1.2 Silver(I) ion, complex with Ag(0)
1.3 Amminesilver(0)-silver(I) complex
1.4 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatoargentate(I) ion
1.5 Silver(II) ion
1.6 Hydroxysilver(II) ion
1.7 Mono- and dihydroxysilver(II)
1.8 Dihydroxysilver(II)
1.9 Tetraamminesilver(II) ion
1.10 Diammine(hydroxy)silver(II)
1.11 Triammine(hydroxy)silver(II) ion
1.12 Nitrilotriacetatoargentate(II)
1.13 Ethylenediaminetetraacetatoargentate(II)
1.14 Silver(II)-succinate complex

Table 2. Aluminum

2.1 Aluminum(III) sulfophthalocyanine, radical anion

Table 3. Gold

3.1 Dicyanoaurate(0) ion
3.2 Hydrogen dicyanoaurate(0) ion
3.3 Dihydrogen dicyanoaurate(0)
3.4 Dicyanohydroxyaurate(II) ion
3.5 Dicyano(hydroxy)aurate(II) ion, protonated
3.6 Gold(II)

Table 4. Bismuth

4.1 Bismuth(II) ion
4.2 Hydroxymethylbismuth(IV) ion
4.3 1-Hydroxyethylbismuth(IV) ion
4.4 1-Hydroxy-1-methylethylbismuth(IV) ion
4.5 2-Hydroxy-2-dimethylethylbismuth(IV) ion
4.6 Carboxybismuth(IV) ion

Table 5. Cadmium

5.1 Cadmium(I) ions
5.2 1,4,10-Trioxa-7,13-diazacyclopentadecane-cadmium(I) ion
5.3 1,4,10,13-Tetraoxa-7,16-diazacycloctadecane-cadmium(I) ion
5.4 4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]tricosanecadmium(I) ion
5.5 4,7,13,16,21,24-Hexaoxa-1,10-diazabicyclo[8.8.8]-hexacosanecadmium(I) ion
5.6 1,4,8,11-Tetrazacyclotetradecanecadmium(I) ion
5.7 Ethylenediaminetetraacetatocadmate(I) ion
5.8 Ethylenediaminecadmium(I) ion
5.9 Glycinatocadmium(I) ion
5.10 Nitrilotriacetatocadmium(I) ion
5.11 1-Hydroxyethylcadmium(II) ion
5.12 1-Hydroxy-1-methylethylcadmium(II) ion
5.13 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocadmate(II) radical anion

Table 6. Cobalt

6.1 Cobalt(I) ion
6.2 Pentakis(cyano-*C*)cobaltate(I) ion
6.3 Nitrilotriacetatocobaltate(I) ion
6.4 2,3,9,10-Tetramethyl-1,4,8,11-tetraaza-cyclotetradeca-1,3,8,10-tetraenecobalt(I) ion
6.5 *N-meso*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion
6.6 *N-rac*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion
6.7 5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,14-dienecobalt(I) ion
6.8 2,2′-Bipyridinecobalt(I) ion
6.9 2,2′-Bipyridinecobalt(I) ion
6.10 Bis(2,2′-bipyridine)cobalt(I) ion
6.11 Tris(2,2′-bipyridine)cobalt(I) ion
6.12 4,4′-Dimethyl-2,2′-bipyridinecobalt(I) ion
6.13 4,4′-Dimethyl-2,2′-bipyridinecobalt(I) ions
6.14 4,4′-Dimethyl-2,2′-bipyridinecobalt(I) ion, protonated
6.15 Bis(4,4′-dimethyl-2,2′-bipyridine)cobalt(I) ion
6.16 Tris(4,4′-dimethyl-2,2′-bispyridine)cobalt(I) ion
6.17 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocobaltate(I) ion
6.18 Cobal(I)amin
6.19 3,10,17,24-Tetrasulfophthalocyaninecobaltate(I) ion
6.20 3,10,17,24-Tetrasulfophthalocyaninecobaltate(I) ion dimer
6.21 *N*-Methyltetrakis(4-sulfonatophenyl)--porphinatocobaltate(II) radical anion
6.22 Pentaamminecobalt(II) ion
6.23 Tetraamminecobalt(II) ion
6.24 Tris(ammine)cobalt(II) ion
6.25 Bis(ammine)cobalt(II) ion
6.26 Amminecobalt(II) ion
6.27 Tris(ethylenediamine)cobalt(II) ion
6.28 Bis(ethylenediamine)cobalt(II) ion
6.29 Ethylenediaminecobalt(II) ion
6.30 Bis(diethylenetriamine)cobalt(II) ion
6.31 Diethylenetriaminecobalt(II) ion
6.32 Triethylenetetraminecobalt(II) ion
6.33 Hydroxytriethylenetetraminecobalt(II) ion
6.34 Nitrito(triethylenetetramine)cobalt(II) ion
6.35 Tetraethyldiethylenetriaminecobalt(II) ion
6.36 Tris(acetylacetonato)cobaltate(II) ion
6.36 Tris(acetylacetonato)cobaltate(II) ion
6.37 Bis(acetylacetonato)cobalt(II)
6.38 Acetylacetonatocobalt(II) ion
6.39 Tris(2,2′-bipyridine)cobalt(II) ion
6.40 Tris(1,10-phenanthroline)cobalt(II) ion
6.41 3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) ion
6.42 Chloro(pentacyano)cobaltate(II) ion
6.43 Pentacyanocobaltate(II) ion
6.44 Tetracyanocobaltate(II) ion
6.45 Tris(glycinato)cobaltate(II) ion
6.46 Bis(glycinato)cobalt(II)
6.47 Glycinatocobalt(II) ion
6.48 Ethylenediaminetetraacetatocobaltate(II) ion
6.49 1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion

6.50 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecobalt(II) ion
6.51 1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosanecobalt(II) ion, conjugate diacid
6.52 1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosanecobalt(II) ion
6.53 8-Methyl-1,3,13,16-tetraaza-6,10,19-trithiabicyclo[6.6.6]eicosanecobalt(II) ion
6.54 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]-eicosanecobalt(II) ion
6.55 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion
6.56 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion, superoxide adduct
6.57 Iminodiacetatocobaltate(II) ion, superoxide adduct
6.58 Ethylenediaminetetraacetatocobaltate(II) ion, superoxide adduct
6.59 Iminodiacetatocobalt(II), H-abstraction product
6.60 Nitrilotriacetatocobaltate(II) ion, H-abstraction product
6.61 Ethylenediaminetetraacetatocobaltate(II) ion, H-abstraction product
6.62 3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) ion, superoxide adduct
6.63 1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion, dioxygen adduct
6.64 5,10,15,10-Tetrakis(1-methylpyridyl)porphinato-(thiocyanato)cobalt(II) ion
6.65 Cobaltocene
6.66 Pentaammine(1-methyl-4,4′-bipyridinium)cobalt(III) ion, electron adduct
6.67 Pentaammine(4-nitrobenzoato)cobalt(III) ion, electron adduct
6.68 Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) radical anion
6.69 Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) radical, protonated
6.70 Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) radical anion
6.71 Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) radical, protonated
6.72 Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) radical anion
6.73 Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) radical, protonated
6.74 3,10,17,24-Tetrasulfophthalocyaninecobaltate(III) radical anion (reduced ligand)
6.75 3,10,17,24-Tetrasulfophthalocyaninecobaltate(III) radical anion (oxidized ligand)
6.76 Dibromo(iminodiacetato)cobaltate(III) ion
6.77 Bromo(iminodiacetato)cobalt(III)
6.78 Hydroxy(iminodiacetato)cobalt(III)
6.79 Ethylenediaminetetraacetatocobaltate(III) ion, superoxide adduct
6.80 Hydrido-*N-rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(III) ion
6.81 Hydrido-*prim-N-rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(III) ion
6.82 Hydroxymethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion
6.83 1-Hydroxyethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion
6.84 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene(2,2,2-trifluoro-1-hydroxyethyl)cobalt(III) ion
6.85 1,2-Dihydroxyethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion
6.86 1-Methylethyltetrakis(4-sulfonatophenyl)-porphinatocobaltate(III) ion
6.87 Hydroxymethyltetrakis(4-sulfonatophenyl)-porphinatocobaltate(III) ion
6.88 1-Hydroxy-1-methylethyltetrakis(4-sulfonatophenyl)porphinatocobaltate(III) ion
6.89 (Methyl)-3,10,17,24-tetrasulfophthalocyanine-cobaltate(III) ion
6.90 (2-Hydroxy-2,2-dimethylethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion
6.91 (2-Hydroxy-1-methylpropyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion
6.92 (2-Hydroxyethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion
6.93 (2-Hydroxy-1-methylethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion
6.94 Bromocob(III)alamin
6.95 Pentaammine(pyridine)cobalt(III) ion, OH adduct
6.96 Pentaammine(nicotinamide)cobalt(III) ion, OH adduct
6.97 Pentaammine(isonicotinamide)cobalt(III) ion, OH adduct
6.98 Tris(2,2′-bipyridine)cobalt(III) ion, OH adduct
6.99 Cobalt(III) ion
6.100 Chlorocobalt(III) ion
6.101 Aqua(methyl)nitrilotriacetatocobaltate(III) ion
6.102 Aqua(hydroxymethyl)nitrilotriacetatocobaltate(III) ion
6.103 Aqua(1-hydroxyethyl)nitrilotriacetatocobaltate(III) ion
6.104 Aqua(carboxymethyl)nitrilotriacetatocobaltate(III) ion
6.105 Aqua(1-ethoxyethyl)nitrilotriacetatocobaltate(III) ion
6.106 Aqua(1-hydroxy-1-methylethyl)nitrilotriacetato-cobaltate(III) ion
6.107 Aqua(bromo)nitrilotriacetatocobaltate(III) ion
6.108 Aqua(hydroxymethyl)[*N*-(2-hydroxyethyl)-*N*,*N*′,*N*′-ethylenediaminetriacetato]cobaltate(III) ion
6.109 *O*-Sulfito(tetraethylenepentamine)cobalt(III) ion
6.110 Decaammine-μ-peroxidodicobalt(III) ion
6.111 μ-Amido-μ-peroxidooctakisamminedicobalt(III) ion
6.112 μ-Amido-μ-peroxidotetrakis(ethylenediamine)-dicobalt(III) ion
6.113 μ-Amido-μ-peroxidotetrakis(2,2′-bipyridine)-

dicobalt(III) ion
6.114 μ-Amido-μ-peroxidotetrakis(1,10-phenanthroline)-dicobalt(III) ion
6.115 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocobaltate(III), radical cation

Table 7. Chromium

7.1 Chromium(I) ion
7.2 Chromium(II) ion
7.3 *trans*-Diaqua-1,4,8,11-tetraazacyclotetradecane-chromium(II) ion
7.4 Tris(2,2′-bipyridine)chromium(II) ion
7.5 Tris(2,2′-bipyridine)chromium(III), EDTA radical addn. product
7.6 Tris(4,4′-dimethyl-2,2′-bipyridine)chromium(II) ion
7.7 Tris(4,4′-diphenyl-2,2′-bipyridine)chromium(II) ion
7.8 Tris(1,10-phenanthroline)chromium(II) ion
7.9 Tris(1,10-phenanthroline)chromium(III), EDTA radical addn. product
7.10 Tris(1,10-phenanthroline)chromium(III), carboxyl radical addn. product
7.11 Tris(5-chloro-1,10-phenanthroline)chromium(II) ion
7.12 Tris(5-chloro-1,10-phenanthroline)chromium(III), EDTA radical addn. product
7.13 Tris(5-chloro-1,10-phenanthroline)chromium(III), carboxyl radical addn. product
7.14 Tris(5-bromo-1,10-phenanthroline)chromium(II) ion
7.15 Tris(5-methyl-1,10-phenanthroline)chromium(II) ion
7.16 Tris(4,7-dimethyl-1,10-phenanthroline)chromium(II) ion
7.17 Tris(5,6-dimethyl-1,10-phenanthroline)chromium(II) ion
7.18 Tris(5-phenyl-1,10-phenanthroline)chromium(II) ion
7.19 Tris(4,7-diphenyl-1,10-phenanthroline)chromium(II) ion
7.20 Bis(2,2′-bipyridine(oxalato)chromate(II)
7.21 2,2′-Bipyridinebis(oxalato)chromate(II) ion
7.22 Bis(1,10-phenanthroline)(oxalato)chromate(II)
7.23 Bis(oxalato)phenanthrolinechromate(II) ion
7.24 Tris(acetylacetonato)chromate(II) ion
7.25 Bis(acetylacetonato)chromate(II)
7.26 Acetonylacetonatochromium(II) ion
7.27 Hydridochromium(III) ion
7.27a Hydroxymethylchromium(III) ion
7.28 Dihydroxymethylchromium(III) ion
7.28a 1-Hydroxyethylchromium(III) ion
7.29 2-Hydroxyethylchromium(III) ion
7.29a 1-Hydroxy-1-methylethylchromium(III) ion
7.30 2-Hydroxy-1-methylethylchromium(III) ion
7.31 2-Hydroxy-1,2-dimethylethylchromium(III) ion
7.32 2-Hydroxy-2,2-dimethylethylchromium(III) ion
7.33 2-Ethoxyethylchromium(III) ion
7.34 1-Carboxy-1-hydroxyethylchromium(III) ion
7.35 2-Carboxy-2,2-dimethylethylchromium(III) ion
7.36 2-Ammonio-2,2-dimethylethylchromium(III) ion
7.37 *cis*-Diammine(aqua)(1,4,8,11-tetraazacyclo-tetradecane)chromium(III) ion
7.38 *trans*-Dihydroxy-1,4,8,11-tetraazacyclotetradecane-chromium(III), OH reaction product
7.39 Chromate(V)
7.40 Chromate(V) ion

Table 8. Copper

8.1 Copper(0) chloride complex
8.2 Copper atom
8.3 Copper(I) chloride complex with copper(0)
8.4 Copper(I) ion complex with copper(0)
8.5 Copper(I) ion
8.6 Copper(I) chloride
8.7 Tetraformatocuprate(I) ion
8.8 Tetraacetatocuprate(I) ion
8.9 Ethylenediaminetetraacetatocuprate(I) ion
8.10 Bis(alaninato)cuprate(I)
8.11 Bleomycin-copper(I) complex
8.12 3,6,10,13,16,19-Hexaazabicyclo[6.6.6]eicosane-copper(I) ion
8.13 1,4,8,11-Tetraazacyclotetradecanecopper(I) ion
8.14 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane-copper(I) ion
8.15 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(I) ion
8.16 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclo-tetradeca-1,3,8,10-tetraenecopper(I) ion
8.17 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenecopper(I) ion
8.18 Bis(2,2′-bipyridine)copper(I) ion
8.19 Bis(1,10-phenanthroline)copper(I) ion
8.20 Bis(5-chloro-1,10-phenanthroline)copper(I) ion
8.21 Bis(5-nitro-1,10-phenanthroline)copper(I) ion
8.22 Bis(5-methyl-1,10-phenanthroline)copper(I) ion
8.23 Bis(2,9-dimethyl-1,10-phenanthroline)copper(I) ion
8.24 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)-porphinatocopper(II), radical anion
8.25 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocuprate(II), radical anion
8.26 Tetrakis-4-(*N*,*N*,*N*-trimethylammonio)-phenylporphinecopper(II), radical anion
8.27 Hydridocopper(II) ion
8.28 Methylcopper(II) ion
8.29 Carboxylatocopper(II)
8.30 2-Ammonio-1-carboxyethylcopper(II) ion
8.31 2-Ammonioethylcopper(II) ion
8.32 2-Hydroxy-2,2-dimethylethylcopper(II) ion
8.33 2-Ammonio-2,2-dimethylethylcopper(II) ion
8.34 1,3-Diammonio-2-propylcopper(II) ion
8.35 2-(Dimethylammonio)-1-(dimethylammoniomethyl)ethylcopper(II) ion
8.36 2-(Dimethylammonio)ethylcopper(II) ion
8.37 2-Carboxy-2,2-dimethylethylcopper(II) ion
8.38 2-Ammonio-2-carboxypropylcopper(II) ion
8.39 Copper(II) ion, complex with cyclohexene
8.40 4-Hydroxyphenoxycopper(II) ion, conjugate base
8.41 (1-Hydroxybutyl)ethylenediamine-tetraacetatocuprate(II) ion
8.42 Bis(1,10-phenanthroline)(2-hydroxyethyl)copper(II) ion
8.43 Bis(1,10-phenanthroline)(2-hydroxy-2,2-dimethylethyl)copper(II) ion

8.43a Aminomethyl(glycinato)copper(II)
8.44 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenecopper(II) ion OH-adduct
8.45 Copper(III)
8.46 Dihydroxycopper(III) ion
8.47 Trihydroxycopper(III)
8.48 Amminecopper(III) complex
8.49 Ethylenediaminecopper(III) complex
8.50 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane-copper(III) ion
8.51 Chloro-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(III) ion
8.52 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(III) ion
8.53 1,4,8,11-Tetraazacyclotetradecane(hydrido)copper(III) ion
8.54 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecane(hydrido)copper(III) ion
8.55 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-diene(hydrido)copper(III) ion
8.56 2,2,4,11,11,13-Hexamethyl-1,5,10,14-tetraaza-cyclooctadeca-4,13-diene(hydrido)copper(III) ion
8.57 Bis(glycine)copper(III) complex
8.58 Bis(alanine)copper(III) complex
8.59 Bis(β-alanine)copper(III) complex
8.60 Bis(α-aminobutyric acid)copper(III) complex
8.61 Bis(β-aminobutyric acid)copper(III) complex
8.62 Bis(γ-aminobutyric acid)copper(III) complex
8.63 Bis(α-aminoisobutyric acid)copper(III) complex
8.64 Hydroperoxocopper(III) ion
8.65 Methylcopper(III) ion
8.66 Trichloromethylcopper(III) ion
8.67 2-Hydroxyethylcopper(III) ion
8.68 Carboxymethylcopper(III) ion
8.69 1-Carboxyethylcopper(III) ion
8.70 2-Hydroxy-2,2-dimethylethylcopper(III) ion
8.71 1,2-Dicarboxy-2-hydroxyethylcopper(III) ion
8.72 2-Carboxy-2,2-dimethylethylcopper(III) ion
8.73 2-Ammonio-2-carboxypropylcopper(III) ion
8.74 Benzylcopper(III) ion
8.75 (4-Chlorophenyl)methylcopper(III) ion
8.76 2-Hydroxyphenoxycopper(III) ion
8.77 3-Hydroxyphenoxycopper(III) ion
8.78 4-Hydroxyphenoxycopper(III) ion, conjugate base
8.79 3-Hydroxy-5-methylphenoxycopper(III) ion
8.80 (4-Methoxyphenyl)methylcopper(III) ion
8.81 (4-Methylphenyl)methylcopper(III) ion
8.82 Bis(glycinato)methylcopper(III) ion
8.83 β-Alaninato(2-aminoethyl)copper(III)
8.84 *cis*-Aqua(hydroxymethyl)(nitrilotriacetato)-cuprate(III) ion
8.85 *cis*-Aqua(1-hydroxyethyl)(nitrilotriacetato)-cuprate(III) ion
8.86 *cis*-Aqua(1-hydroxy-1-methylethyl)(nitrilo-triacetato)cuprate(III) ion

Table 9. Iron

9.1 Bis(2,2′-bipyridine)dicyanoferrate(II), electron adduct
9.2 Dicyanobis(4,4′-dimethyl-2,2′-bipyridine)ferrate(II), electron adduct
9.3 2,2′-Bipyridinetetracyanoferrate(II) ion, electron adduct
9.4 Tetracyano(4,4′-dimethyl-2,2′-bipyridine)ferrate(II) ion, electron adduct
9.5 Iron(II) oxalate
9.6 Pentacyanoferrate(II) ion
9.7 Pentacyanonitrosylferrate(II) ion
9.8 Acetonitrile(aqua)-2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraeneiron(II) ion
9.9 Diaqua(2,3,9,10-tetramethyl-1,4,8,11-tetraaza-cyclotetradeca-1,3,8,10-tetraeneiron(II) ion
9.10 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatoiron(II) ion
9.11 α,α,α,β-Tetrakis(*N*-methylisonicotinamidophenyl)-porphinatoiron(II) ion
9.12 Iron(II) deuteroporphyrin (2-propanol)$_2$
9.13 Tris(2,2′-bipyridine)iron(II) ion, OH-adduct
9.14 Bis(2,2′-bipyridine)dicyanoferrate(II), OH reaction product
9.15 Hydroperoxide-iron(III) iron(II) complex
9.16 Hydridoiron(III) ion
9.17 Hydroperoxide-iron(III) complex
9.18 Hydroperoxide-sulfatoiron(III) complex
9.19 Hydroperoxide-sulfatoiron(III) iron(II) complex
9.20 Hydridoiron(III) protoporphyrin
9.21 Hydroxymethyliron(III) protoporphyrin
9.22 1-Hydroxyethyliron(III) protoporphyrin
9.23 1-Hydroxy-1-methylethyliron(III) protoporphyrin
9.24 2-Hydroxyethyliron(III) protoporphyrin
9.25 2-Hydroxy-1-methylethyliron(III) protoporphyrin
9.26 Trifluoromethyliron(III) deuteroporphyrin (2-propoxy)(2-propanol)
9.27 Tris(1,10-phenanthroline)iron(III) ion
9.28 Aqua(methyl)nitrilotriacetatoferrate(III) ion
9.29 Carboxylato(nitrilotriacetato)ferrate(III) ion
9.30 Carboxylato(2-hydroxyethylethylenediamine-triacetato)ferrate(III) ion
9.31 Diethylenetriaminepentaacetatoferrate(III), DTPA radical adduct
9.32 Tetracyano(2,2′-bipyridine)ferrate(III) ion
9.33 Sulfatoiron(III) ion
9.34 Ferricyanide ion
9.35 Carboxyferricenium
9.36 1,1′-Dicarboxyferricenium
9.37 Hydroxymethylferricenium
9.38 (Dimethylaminomethyl)ferricenium
9.39 Tris(2,2′-bipyridine)iron(III) ion, OH-adduct
9.40 Tris(2,2′-bipyridine)iron(III) ion, H-adduct
9.41 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphineiron(III)-superoxide complex
9.42 Methyliron(IV) deuteroporphyrin (2-propanol)$_2$
9.43 Iron(III) deuteroporphyrin (2-propanol)$_2$, $^{\bullet}CHCl_2$ radical adduct
9.44 Iron(III) deuteroporphyrin (2-propoxy)(2-propanol), $^{\bullet}CF_3$ reaction product

9.45 Iron(III) deuteroporphyrin dimethyl ester (2-propanol)$_2$, 1-hydroxy-1-methylethylperoxyl adduct
9.46 Ferrate(IV) ion
9.47 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatoferrate(III) radical cation
9.48 Carbonatoiron(IV)
9.49 Iron(IV) pyrophosphate
9.50 Iron(IV) (hydroxo)undecatungstosilicate ion
9.51 Dihydrogenferrate(V) ion
9.52 Hydrogenferrate(V) ion
9.53 Ferrate(V) ion

Table 10. Mercury

10.1 Mercury atom
10.2 Mercury(I) ion, complex with mercury(0)
10.3 Mercury(I) ion
10.4 Mercury(I) hydroxide
10.5 Mercury(I)
10.6 Mercury(I) bromide
10.7 Bromomercury(I)peroxyl
10.8 Mercury(I) chloride
10.9 Chloromercury(I)peroxyl
10.10 Mercury(I) cyanide
10.11 Mercury(I) iodide
10.12 Mercury(I) thiocyanate
10.13 Thiocyanatomercury(I)peroxyl

Table 11. Indium

11.1 Indium atoms
11.2 Indium(II) ion
11.3 Tetrakis(4-*N*-methylpyridyl)porphineindium(III) radical anion
11.4 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatoindate(III) radical cation

Table 12. Iridium

12.1 Hexachloroiridate(III) ion, electron adduct
12.2 Bis(2,2′-bipyridine)([2,2′-bipyridin]-3-yl-*C,N′*)-iridium(III) ion, conjugate acid, electron adduct
12.3 Bis(2,2′-bipyridine)([2,2′-bipyridin]-3-yl-*C,N′*)-iridium(III) ion, electron adduct
12.4 Bis(2,2′-bipyridine)([2,2′-bipyridin]-3-yl-*C,N′*)-iridium(IV) ion, conjugate monoacid
12.5 Hexachloroiridate(IV) ion

Table 13. Manganese

13.1 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatomanganate(II) radical anion
13.2 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)-porphinatomanganese(II) radical anion
13.3 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatomanganate(II) ion
13.4 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)-porphinatomanganese(II) ion
13.5 5,10,15,20-Tetrakis(4-pyridyl)-porphinatomanganese(II)
13.6 5,10,15,20-Tetrakis[4-(*N,N,N*-trimethylammonio)phenyl]porphinatomanganese(II) ion
13.7 α,α,α,β-Tetrakis[2-(*N*-methylisonicotinamido)-phenyl]porphinatomanganese(II) ion
13.8 5,10,15,20-Tetrakis(4-carboxyphenyl)-porphinatomanganate(II) ion
13.9 Nitrilotriacetatomanganate(II) ion, H-abstraction product
13.10 Ethylenediaminetetraacetatomanganate(II) ion, H-abstraction product
13.11 Manganese(III) ion
13.12 Hydroxymanganese(III) ion
13.13 Peroxidomanganese(III) ion
13.14 Peroxidomanganese(III) formate
13.15 Hydroperoxidomanganese(III) formate complex
13.16 Peroxidomanganese(III)-manganese(II) formate complex
13.17 Manganese(III) phosphate complex
13.18 Peroxidomanganese(III) phosphate complex
13.19 Manganese(III) pyrophosphate complex
13.20 Manganese(III) sulfate complex
13.21 Peroxidomanganese(III) sulfate complex
13.22 Hydroperoxidomanganese(III) sulfate complex
13.23 Peroxidomanganese(III)-manganese(II) sulfate complex
13.24 Dibromomanganese(III) ion
13.25 Chloromanganese(III) ion
13.26 Dichloromanganese(III) ion
13.27 Peroxido(ethylenediaminediacetato)manganate(III) ion
13.28 Aqua(methyl)nitrilotriacetatomanganate(III) ion
13.29 Bromo[5,10,15,20-tetrakis(4-sulfonatophenyl)-porphinatomanganate(III) ion
13.30 2-Hydroxy-2,2-dimethylethyltetrakis(4-sulfonatophenyl)porphinatomanganate(III) ion
13.31 Bromo[5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(III) ion
13.32 2-Hydroxy-2,2-dimethylethyl[5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(III) ion
13.33 Dichlorohydroxy(1,4,7,11-tetraazacyclotetradecane)manganese(IV) ion
13.34 Dichloro-*meso*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydroxy)-manganese(IV) ion
13.35 Dichloro-*rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydroxy)-manganese(IV) ion
13.36 Manganese(V)

Table 14. Molybdenum

14.1 18-Molybdodiphosphate ion(7-), conjugate acid
14.2 Bis(μ-oxo)(ethylenediaminetetraacetato)-bis[oxomolybdate(IV)(V)] ion
14.3 Bis(μ-oxo)bis[aqua(oxalato)oxomolybdate(IV)(V) ion
14.4 Octacyanomolybdate(V) ion
14.5 *cis*-Octaaqua-μ-oxo-bis(oxo)dimolybdenum(IV) ion
14.6 Hexaaquadi-μ-oxodioxodimolybdenum(V,VI) ion

Table 15. Nickel

15.1 Nickel(I) ion
15.2 Tetracyanonickelate(I) ion
15.3 Tris(cyano)nickelate(I) ion
15.4 1,4,7,10-Tetraazacyclotridecanenickel(I) ion
15.5 9-Methyl-9-nitro-1,4,7,11-tetraazacyclotridecane-nickel(II) ion, electron adduct
15.6 1,4,8,11-Tetraazacyclotetradecanenickel(I) ion
15.7 1,4,8,11-Tetramethyl-1,4,8,11-tetraaza-cyclotetradecane-nickel(I) ion
15.8 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecane-nickel(I) ion
15.9 1,4,5,7,7,8,11,12,14,14-Decamethyl-1,4,8,11-tetraazacyclotetradecane-nickel(I) ion
15.10 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienenickel(I) ion
15.11 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-1,4,8,11-tetraenenickel(I) ion
15.12 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),13,15-trienenickel(I) ion
15.13 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenenickel(I) ion
15.14 8-Methyl-8-nitro-1,3,6,10,13,15-hexaaza-tricyclo[13.1.1.1^{13,15}]octadecanenickel(II) ion, electron adduct
15.15 8-Amino-8-methyl-1,3,6,10,13,15-hexaaza-tricyclo[13.1.1.1^{13,15}]octadecanenickel(I) ion
15.16 3,7-Bis(2-aminoethyl)-1,3,5,7-tetraaza-bicyclo[3.3.1]nonanenickel(I) ion
15.17 Nitrilotriacetatonickelate(I) ion
15.18 *N*-Methyl-5,10,15,20-tetrakis(4-sulfonatophenyl)-porphinatonickelate(II), radical anion
15.19 Hydroxymethylnickel(II) ion
15.20 Carboxylatonickel(II)
15.21 1-Hydroxyethylnickel(II) ion
15.22 1-Hydroxy-1-methylethylnickel(II) ion
15.23 1-Ethoxyethylnickel(II) ion
15.24 Cyclopentylnickel(II) ion
15.25 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanenickel(II) ion, OH reaction product
15.26 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienenickel(II) ion, OH reaction product
15.27 Iminodiacetatonickelate(II), H-abstraction product
15.28 Bis(iminodiacetato)nickelate(II), H-abstraction product
15.29 Nitrilotriacetatonickelate(II), H-abstraction product
15.30 Ethylenediaminetetraacetatonickelate(II), H-abstraction product
15.31 Amminenickel(III) ions
15.32 Ethylenediaminenickel(III) ions
15.33 Glycinatonickel(III) ion
15.34 Bis(1,4,7-triazacyclononane)nickel(III) ion
15.35 1,4,7,10-Tetraazacyclotridecanenickel(III) ion
15.36 9-Methyl-9-nitro-1,4,7,11-tetraazacyclotridecane-nickel(III) ion
15.37 11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion
15.38 11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion, conjugate base
15.39 Aquabromo-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion
15.40 Diaqua-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion, conjugate base
15.41 Aquamethyl(1,4,8,11-tetraazacyclotetradecane)-nickel(III) ion
15.42 1,4,8,11-Tetraazacyclotetradecanenickel(III) ion
15.43 β-*rac*-(5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane)nickel(III) ion
15.44 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanenickel(III) ion
15.45 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanedi(phosphato)nickel(III) ion
15.46 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienenickel(III) ion
15.47 5,7,7,12,14,14-Hexamethyl-1,4,7,11-tetraaza-cyclotetradeca-4,11-diene(hydroxo)nickel(III) ion
15.48 Bromo(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)nickel(III) ion
15.49 Dichloro(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)nickel(III) ion
15.50 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-1,4,8,11-tetraenenickel(III) ion
15.51 1,4,8,12-Tetraazacyclopentadecanenickel(III) ion
15.52 1,4,7,10,13-Pentaazacyclohexadecanenickel(III) ion
15.53 8-Methyl-8-nitro-1,3,6,10,13,15-hexaaza-tricyclo[13.1.1.1^{13,15}]octadecanenickel(III) ion
15.54 8-Amino-8-methyl-1,3,6,10,13,15-hexaaza-tricyclo[13.1.1.1^{13,15}]octadecanenickel(III) ion
15.55 3,7-Bis(2-aminoethyl)-1,3,5,7-tetraaza-bicyclo[3.3.1]nonanenickel(III) ion
15.56 Diaqua-α-2,12-Dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion
15.57 Hydroxy-α-2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion
15.58 Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion
15.59 Aqua-α-2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),13,15-triene(thiocyanato)nickel(III) ion
15.60 α-2,12-Dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene(hydroxo)nickel(III) ion
15.61 α-2,12-Dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenebis(hydroxo)nickel(III) ion
15.62 Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenenickel(III) ion
15.63 Aqua-α-2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene(thiocyanato)nickel(III) ion

15.64 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenebis(thiocyanato)nickel(III) ion
15.65 Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenickel(III) ion
15.66 Dibromo-α,2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenickel(III) ion
15.67 Aqua-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaene(thiocyanato)nickel(III) ion
15.68 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenebis(thiocyanato)nickel(III) ion
15.69 Bromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenickel(III) ion
15.70 Ethylenediaminetetraacetatonickelate(III) ion
15.71 Hydroxy(ethylenediaminetetraacetato)nickelate(III) ion
15.72 Aqua(ethylenediaminetetraacetato)nickelate(III) ion
15.73 Dioxonickel(IV) ion
15.74 Dioxonickel(IV) ion, protonated

Table 16. Osmium

16.1 Tris(2,2′-bipyridine)osmium(III) ion
16.2 Tris(5,5′-dimethyl-2,2′-bipyridine)osmium(III) ion
16.3 Tris(1,10-phenanthroline)osmium(III) ion
16.4 Tris(5-chloro-1,10-phenanthroline)osmium(III) ion

Table 17. Lead

17.1 Lead atom
17.2 Lead(I) ion
17.3 Lead(I)
17.4 Tetrakis(1-methylpyridinium-4-yl)porphinatolead(II) radical cation
17.5 Tetrakis(1-methylpyridinium-3-yl)porphinatolead(II) radical cation
17.6 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatoplumbate(II) radical cation
17.7 Lead(III)
17.8 Dihydroxylead(III) ion
17.9 Tetrahydroxyplumbate(III) ion
17.10 Hydroxy(oxo)lead(IV) ion

Table 18. Palladium

18.1 Palladium(I) ion
18.2 Bis(hydroxyprolinato)palladate(I) ion
18.3 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatopalladate(II) radical anion

Table 19. Platinum

19.1 Triammineaquaplatinum(I) ion
19.2 *cis*-Diamminedichloroplatinate(I) ion
19.3 *trans*-Diamminedichloroplatinate(I) ion
19.4 Tetrabromoplatinate(I) ion
19.5 Tetrachloroplatinate(I) ion
19.6 Tetracyanoplatinate(I) ion
19.7 Bis(ethylenediamine)platinum(I) ion
19.8 Chloro(diethylenetriamine)platinum(I)
19.9 *cis*-Bis(glycinato)platinate(I) ion
19.10 *trans*-Bis(glycinato)platinate(I) ion
19.11 Bis(ethylenediamine)platinum(II), H reaction product
19.12 Chloro(diethylenetriamine)platinum(II), H reaction product
19.13 Chloro(tetraethyldiethylenetriamine)platinum(II), H reaction product
19.14 *cis*-Bis(glycinato)platinum(II), H reaction product
19.15 *trans*-Bis(glycinato)platinum(II), H reaction product
19.16 Octahydrogen tetrakis(μ-diphosphito)diplatinate(I)(II) ion
19.17 Tetraamminehydridoplatinum(III) ion
19.18 Tetraammine(aqua)hydroxyplatinum(III) ion
19.19 Tetraamminebis(hydroxy)platinum(III) ion
19.20 Tetraamminebis(aqua)platinum(III) ion
19.21 Tetraammineplatinum(II), $Cl_2^{\bullet-}$ reaction product
19.22 *cis*-Diamminedichloroplatinum(II), OH reaction product
19.23 *trans*-Diamminedichloroplatinum(II), OH reaction product
19.24 *cis*-Dichlorobis(isopropylamine)-*trans*-dihydroxyplatinate(III) ion
19.25 Tetrachloroplatinate(II), $Cl_2^{\bullet-}$ reaction product
19.26 Hexachloroplatinate(III) ion
19.27 Pentachloroplatinate(III) ion
19.28 Aquapentachloroplatinate(III) ion
19.29 Aquatetrachlorohydroxyplatinate(III) ion
19.30 Tetrachlorohydroxyplatinate(III)
19.31 Dichlorobis(hydroxy)platinate(III) ion
19.32 Tetrabromo(hydroxy)platinate(III) ion
19.33 Hexabromoplatinate(III) ion
19.34 Bis(ethylenediamine)platinum(II), $Cl_2^{\bullet-}$ reaction product
19.35 Chlorobis(ethylenediamine)platinum(III) ion
19.36 Aquabis(ethylenediamine)hydroxyplatinum(III) ion
19.37 Bis(ethylenediamine)platinum(III) ion, deprotonated
19.38 Diaquabis(ethylenediamine)platinum(III) ion
19.39 Chloro(diethylenetriamine)platinum(II), $Cl_2^{\bullet-}$ reaction product
19.40 Chloro(diethylenetriamine)platinum(II), OH reaction product
19.41 Diethylenetriamine(pyridine)platinum(II) ion OH-adduct
19.42 Chloro(tetraethyldiethylenetriamine)platinum(II), $Cl_2^{\bullet-}$ reaction product
19.43 Chloro(tetraethyldiethylenetriamine)platinum(II), OH reaction product
19.44 1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosaneplatinum(III) ion
19.45 *cis*-Bis(glycinato)platinum(II), OH reaction product
19.46 *trans*-Bis(glycinato)platinum(II), OH reaction product
19.47 Octahydrogen tetrakis(μ-diphosphito)diplatinate(II)(III) ion
19.48 *cis*-[Dichlorobis(1-(2-hydroxyethyl)-2-methyl-5-

nitroimidazole-N^3)]platinum(III) ion

19.49 *cis*-Dichlorobis(isopropylamine)-*trans*-dihydroxyplatinum(IV), OH reaction product

Table 20. Rhenium

20.1 Rhenate(VI) ion

Table 21. Rhodium

21.1 Chlorotris[3-(diphenylphosphino)-benzenesulfonato]rhodate(0) ion

21.2 η^5-Pentamethylcyclopentadienyl(2,2′-bipyridine)rhodium(I) ion

21.3 Tris(2,2′-bipyridine)rhodium(I) ion

21.4 Tetrakis[μ-(1,3-diisocyanopropane)]dirhodium(I)(II) ion

21.5 η^5-Pentamethylcyclopentadienyl(2,2′-bipyridine)(hydroxy)rhodium(II) ion

21.6 η^5-Pentamethylcyclopentadienyl(2,2′-bipyridine)(iodo)rhodium(II) ion

21.7 Aquatriamminerhodium(II) ion

21.8 Tetraamminerhodium(II) ion

21.9 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]-eicosanerhodium(II) ion

21.10 Bis(2,2′-bipyridine)rhodium(II) ion

21.11 Tris(2,2′-bipyridine)rhodium(II) ion

21.12 η^5-Pentamethylcyclopentadienyl(2,2′-bipyridine)hydridorhodium(III) ion

21.13 Tetraammine(superoxido)rhodium(III) ion

Table 22. Ruthenium

22.1 Pentaammine(dinitrogen)ruthenium(I) ion

22.2 Bis(2,2′-bipyridine)bis(cyano)ruthenate(II) ion, electron adduct

22.3 Tris(2,2′-bipyridine)ruthenium(II) ion, electron adduct

22.4 Bis(2,2′-bipyridine)(4-carboxy-4′-methyl-2,2′-bipyridine)ruthenium(II) ion, electron adduct

22.5 Bis(2,2′-bipyridine)ruthenium(II)(4-carboxy-4′-methyl-2,2′-bipyridine)(prolylprolinato)-pentaamminecobalt(III), electron adduct

22.6 Bis(2,2′-bipyridine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct

22.7 Bis(2,2′-bipyridine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated

22.8 (2,2′-Bipyrazine)bis(2,2′-bipyridine)ruthenium(II) ion, electron adduct

22.9 (2,2′-Bipyrazine)bis(2,2′-bipyridine)ruthenium(II) ion, electron adduct, protonated

22.10 (2,2′-Bipyrazine)(2,2′-bipyridine)(2,2′-bipyrimidine) ruthenium(II) ion, electron adduct

22.11 (2,2′-Bipyrazine)(2,2′-bipyridine)(2,2′-bipyrimidine) ruthenium(II) ion, electron adduct, protonated

22.12 Tris(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct

22.13 Tris(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated

22.14 (2,2′-Bipyridine)bis(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct

22.15 (2,2′-Bipyridine)bis(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated

22.16 (2,2′-Bipyrazine)bis(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct

22.17 (2,2′-Bipyrazine)bis(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated

22.18 Tris(2,2′-bipyrazine)ruthenium(II) ion, electron adduct

22.19 Tris(2,2′-bipyrazine)ruthenium(II) ion, electron adduct, protonated

22.20 Bis(2,2′-bipyrazine)(2,2′-bipyridine)ruthenium(II) ion, electron adduct

22.21 Bis(2,2′-bipyrazine)(2,2′-bipyridine)ruthenium(II) ion, electron adduct, protonated

22.22 Bis(2,2′-bipyrazine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct

22.23 Bis(2,2′-bipyrazine)(2,2′-bipyrimidine)ruthenium(II) ion, electron adduct, protonated

22.24 Tris(2,2′-bipyridine)ruthenium(II) ion, OH-adduct

22.25 Tris(2,2′-bipyrazine)ruthenium(II) ion, OH-adduct

22.26 Bis(2,2′-bipyridine)(dipyrido[3,2-*a*:2′,3′-*c*]phenazine)ruthenium(II) ion, electron adduct, diprotonated

22.27 Bis(2,2′-bipyridine)(dipyrido[3,2-*a*:2′,3′-*c*]phenazine)ruthenium(II) ion, electron adduct, protonated

22.28 Bis(2,2′-bipyridine)(dipyrido[3,2-*a*:2′,3′-*c*]phenazine)ruthenium(II) ion, electron adduct

22.29 Bis(2,2′-bipyridine)(6,7-dihydro-5,8-dimethyldibenzo[*b*,*j*][1,10]phenanthroline) ruthenium(II) ion, electron adduct

22.30 Tris(4,4′-dimethyl-2,2′-bipyridine)ruthenium(II) ion, electron adduct

22.31 Tris(1,10-phenanthroline)ruthenium(II) ion, electron adduct

22.32 Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(II) ion, electron adduct

22.33 Tris(5-chloro-1,10-phenanthroline)ruthenium(II) ion, electron adduct

22.34 Tris(1,4,5,8-tetraazaphenanthrene)ruthenium(II) ion, electron adduct, protonated

22.35 Tris(1,4,5,8-tetraazaphenanthrene)ruthenium(II) ion, electron adduct

22.36 *trans*-Tetraammine(aqua)nitrosylruthenium(II) ion

22.37 Pentaamminenitrosylruthenium(II) ion

22.38 Decaammine(dinitrogen)diruthenium(I-II) ion

22.39 Decaammine(dinitrogen)diruthenium(II) ion, OH-adduct

22.40 Decaammine(dinitrogen)diruthenium(II-III) ion

22.41 Tris(acetylacetonato)ruthenate(II) ion

22.42 Pentaammine(chloro)ruthenium(II) ion

22.43 Pentaammine(aquo)ruthenium(II) ion

22.44 Tris(2,2′-bipyridine)ruthenium(II) ion, H-adduct

22.45 Pentaammine(dinitrogen)ruthenium(III) ion

22.46 Hexacyanoruthenate(III) ion

22.47 Bis(2,2′-bipyridine)bis(cyano)ruthenium(III) ion

22.48 2-(Aminomethyl)pyridinebis(2,2′-bipyridine) ruthenium(III) ion

22.49 2-(Aminomethyl)pyridinebis(2,2′-bipyridine) ruthenium(III) ion, deprotonated

22.50 Tris(2,2′-bipyridine)ruthenium(III) ion
22.51 Tris(4,4′-dimethyl-2,2′-bipyridine)ruthenium(III) ion
22.52 Tris(5,5′-dimethyl-2,2′-bipyridine)ruthenium(III) ion
22.53 Ammine(2,2′-bipyridine)(2,2′:6′,2″-terpyridine)ruthenium(III) ion
22.54 Tris(4-triethylphosphonio-2,2′-bipyridine)ruthenium(III) ion
22.55 Tris(1,10-phenanthroline)ruthenium(III) ion
22.56 Tris(5-bromo-1,10-phenanthroline)ruthenium(III) ion
22.57 Tris(5-chloro-1,10-phenanthroline)ruthenium(III) ion
22.58 Tris(5,6-dimethyl-1,10-phenanthroline) ruthenium(III) ion
22.59 Tris(4,7-dimethyl-1,10-phenanthroline) ruthenium(III) ion
22.60 Tris(5-methyl-1,10-phenanthroline) ruthenium(III) ion
22.61 Tris(5-phenyl-1,10-phenanthroline) ruthenium(III) ion
22.62 Tris(3,4,7,8-tetramethyl-1,10-phenanthroline) ruthenium(III) ion
22.63 Bis(2,2′-bipyridine)[2-(2-thiazolyl]pyridine]ruthenium(III) ion
22.64 2,2′-Bipyridinebis[2-(2-thiazolyl)pyridine] ruthenium(III) ion
22.65 Tris[2-(2-thiazolyl)pyridine]ruthenium(III) ion
22.66 Tris(2,2′-bithiazole)ruthenium(III) ion
22.67 Tris[2-(1,2,4-thiadiazol-5-yl)pyridine]ruthenium(III) ion
22.68 Hexaammineruthenium(III) ion, OH reaction product
22.69 Pentaammine(chloro)ruthenium(III) ion, OH reaction product
22.70 Pentaammine(acetylenedicarboxylato)ruthenium(III), OH-adduct

Table 23. Antimony

23.1 3,8,13,18-Tetrakis(carboxymethyl)porphine-2,7,12,17-tetrapropanoato(chloro)-oxoantimony(V) radical anion

Table 24. Tin

24.1 Tin(III)
24.2 Dichloro[5,10,15,20-tetrakis(4-sulfonatophenyl)-porphinatostannate(IV) radical anion
24.3 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)-porphinatotin(IV) radical anion

Table 25. Thallium

25.1 Thallium(0)
25.2 Thallium(I) ion, complex with Tl(0)
25.3 Thallium(0), complex with thallium(I) ion, dimer
25.4 Thallium(II) ion
25.5 Hydroxythallium(II) ion
25.6 Dihydroxythallium(II)
25.7 Chlorothallium(II) ion
25.8 Dichlorothallium(II)
25.9 Trichlorothallate(II) ion
25.10 Tetrachlorothallate(II) ion
25.11 Thallium(II) ions

Table 26. Vanadium

26.1 Vanadyl(III) ion

Table 27. Tungsten

27.1 12-Tungstate ion(7−), dihydrogen

Table 28. Zinc

28.1 Zinc(I)
28.2 Zinc(I) ion
28.3 1,4,8,11-Tetrazacyclotetradecanezinc(I) ion
28.4 Tetrakis-4-(*N*,*N*,*N*-trimethylammonio)phenyl-porphinezinc(II) radical anion
28.5 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)-porphinezinc(II) radical anion
28.6 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatozincate(II) radical anion
28.7 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)-pyridinium-4-yl]porphinato-zinc(II) radical anion
28.8 Tetrakis-*N*-methyl-2,3-pyridinoporphyrazinezinc(II) radical anion
28.9 Trisulfophthalocyaninezincate(II) radical anion
28.10 Nitrilotriacetatozinc(II), H-abstraction product
28.11 Ethylenediaminetetraacetatozinc(II), H-abstraction product
28.12 5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)-porphinatozinc(II), H-adduct
28.13 5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)-porphinatozinc(II) radical cation
28.14 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)-porphinatozinc(II) radical cation
28.15 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatozincate(II) radical cation
28.16 Hydroxy(tetrakis(2-hydroxyphenyl)porphinato)-zinc(II) radical cation, deprotonated
28.17 Hydroxy(tetrakis(3-hydroxyphenyl)porphinato)-zinc(II) radical cation, deprotonated
28.18 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)-pyridinium-4-yl]porphinatozinc(II) radical cation
28.19 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)-pyridinium-2-yl]porphinatozinc(II) radical cation
28.20 5,10,15,20-Tetrakis(2-*N*-hexylpyridyl)-porphinatozinc(II) radical cation
28.21 Tetrakis-4-(*N*,*N*,*N*-trimethylammonio)-phenylporphinezinc(II) radical cation
28.22 5,10,15,20-Tetrakis(2,6-dichloro-3-sulfonato-phenyl)porphinatozincate(II) radical cation
28.23 Zinc(II) uroporphyrin radical cation
28.24 Zinc(II) hematoporphyrin radical anion