

How to Fill with Liquid Helium

These instructions are an introduction (or a reminder) of how to transfer liquid helium from a dewar to an instrument such as a magnet or a cryostat. In many cases you will want to pre-cool with liquid nitrogen, which is much more efficient than helium for cooling from room temperature to 80 K. Specific details about the instrument are available in the appropriate instruction manuals.

1. Make sure to always wear **safety glasses and gloves** whenever transferring liquid helium or liquid nitrogen. Also make sure that anyone you are working with or who is in the area is wearing safety glasses and is aware of what you are doing.
2. On the dewar, open the top valve and close the pressure relief valve.
3. Slowly put the transfer tube into the dewar. Make sure the pressure gauge is firmly seated and slide the tube all the way to the bottom.
4. On the instrument, open the helium fill port and the helium exhaust port.
5. If the cryostat is warm (does not have any helium in it), you can put the transfer tube into the helium fill port at once. If you are refilling an instrument, do not put the transfer line in until liquid is coming out (otherwise you will blow out what liquid is in the instrument with high pressure gas from the dewar). Liquid is coming from the tube when you see a thick white plume of gas.
6. To force liquid through the transfer tube, you need to maintain a pressure of 3-5 psi on the dewar. At first, the dewar will be providing this pressure, since you just put a room temperature transfer stick into the helium, causing it to boil. After a while, though, you will need to maintain this pressure using helium gas from a bottle. Connect the dewar to a bottle of gas with a rubber hose and turn the small valve just above the nipple on the transfer tube.
7. Helium is collecting in the cryostat once a thick white plume is visible at the exhaust port. The helium reservoir is full when this plume suddenly becomes much more intense. You can also use a helium level sensor to tell when the reservoir is full, although these tend to read high during filling.
8. When the reservoir is full, turn off the helium gas to the dewar and disconnect the rubber hose.
9. Release the pressure on the dewar by opening the side valve and remove the transfer line from the cryostat.
10. Remove the transfer tube from the dewar. **At least one cryogenic glove is needed to do this.** Put away the tube.
11. Close the helium fill port and the helium exhaust port on the instrument.
12. Close the top and side valves on the dewar and open the pressure release valve.