

Instructions for using vacuum pumps:

1. Inspect the vac line and make sure you understand how the vacuum line is connected together and how the two- and three-way valves work (in which positions they are opened and closed).
2. Empty any liquid left in the vac trap (there shouldn't be any, but if there is more than a few drops, empty it into the appropriate waste container). Put a small amount of fresh vac grease on the ground glass joint, and close up the vac trap.
3. Close off all connections to the vac trap (except the line to the pump). Place the trap into the Dewar flask.
4. Fill the Dewar flask with either dry ice & isopropanol or with liquid nitrogen (CAUTION: wear gloves and eye protection).
5. Turn on the pump. Gurgling sound should stop within a minute or so (if not check to see if one of the valves is open) or if the hose is leaking.
6. See instructions on how to use the pressure gauge. Most importantly, make sure the bulb with mercury in it is DOWN before opening the vacuum to the pressure gauge.
7. Open the valves to make connections with your apparatus as necessary. Periodically check the Dewar and refill with liquid nitrogen or dry ice as necessary.
8. Both argon and oxygen will condense (as liquids) in a liquid nitrogen trap, so avoid pulling large amounts of either through the trap. A small amount, such as the amount contained in your apparatus when you evacuate, is OK; it will over time reevaporate from the trap and continue on through the pump.
9. When done, first open one of the valves on the vac line to air (to get gurgling), then *immediately* turn off the pump. Within a minute, pull the vac trap out of the Dewar (so it is no longer at liquid nitrogen temperature). If you leave the vac trap in, it may condense oxygen from the air (BAD NEWS*).
10. Be sure to empty the vac trap when the contents have thawed.

* Continuous bleeding of argon or air into your apparatus while you are evacuating could result

in liquified argon or oxygen in the trap, which could explode when the trap is removed from the liquid nitrogen. Liquid oxygen is pale blue. If you suspect a trap is full of liquid oxygen, let it warm up slowly by pulling it partially up within the Dewar (so the bottom is out of the liquid nitrogen) and leave a sign to warn others not to use until the oxygen has evaporated. Be sure there is an escape route for the oxygen that evaporates (an open valve on the vac line).