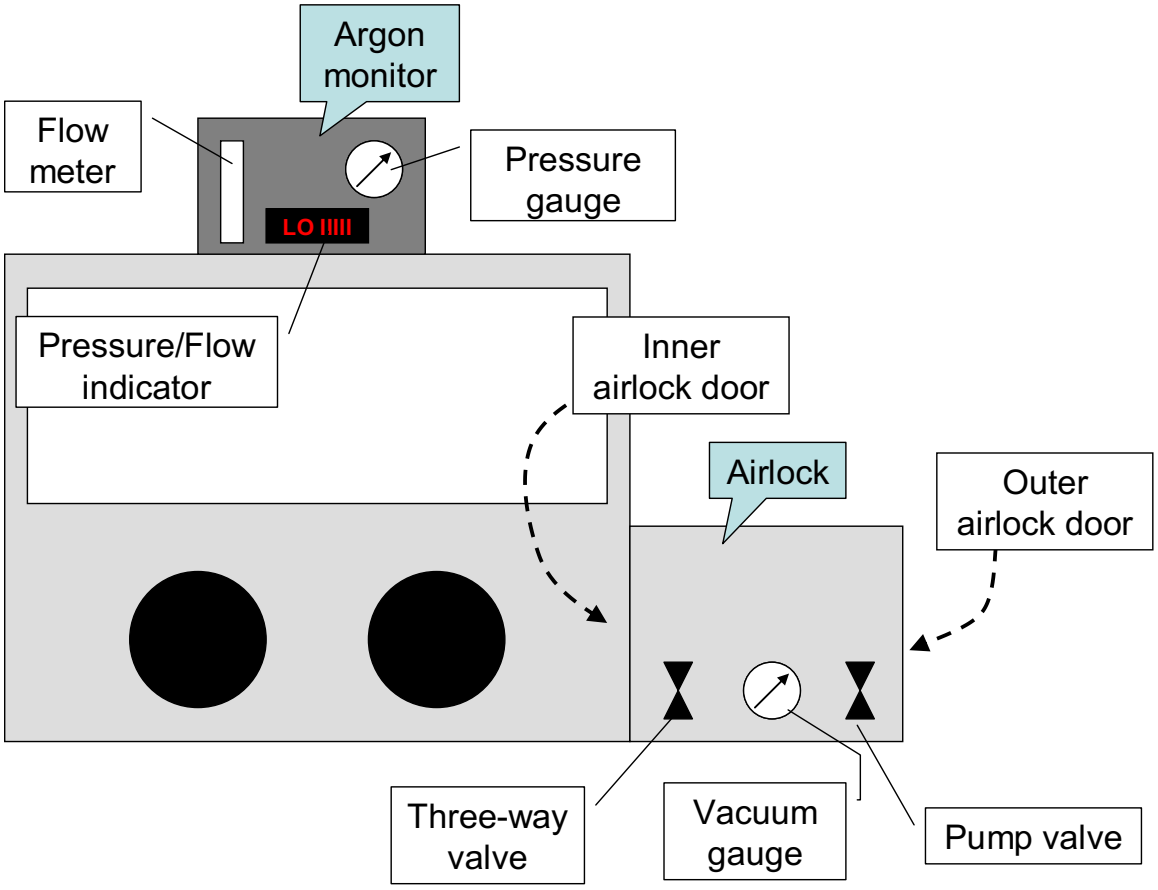
STANDARD OPERATING PROCEDURE
Glove Box in lab 221 in the York Center
Last Revision: 6/2/2009



General concerns

The glove box is intended for handling materials that are sensitive to air or moisture. It contains argon as protective atmosphere.

An *airlock* is used to insert and remove samples or equipment. The *airlock* is to be evacuated and refilled with argon before the *inner airlock door* (between airlock and glove box) can be opened. Therefore, anything in the *airlock* must withstand a vacuum. In particular: any liquids must not boil, and any containers must not be closed tightly so that gas exchange can occur. Be aware that snap-on lids will pop off in vacuum. Be aware that liquids may boil suddenly.

The *airlock's* function is to keep air away from the interior of the glove box. That means, if you are at all unsure what atmosphere is in the *airlock*, do not open the *inner airlock door*. Follow the *airlock* evacuation procedure in "Getting items in the glove box" below before opening the *inner airlock door*.

Specific operation

Before starting

1. Verify that there is enough argon in the tank. If the tank is empty, replace it.
2. If the *pressure/flow indicator* on the *argon monitor* flashes LO PRES, the tank is empty, or the tank valve is closed. Replace the tank, or open the valve.
3. Check that the *pressure gauge* on the *argon monitor* is in the 30-40 psi range.
4. The knob beneath the *flow meter* should be closed, and the *flow meter* should read zero.
5. The *pressure/flow indicator* should read LO and occasionally – less than once per minute – switch to HI.
6. Inspect the gloves and the sleeves for wear or damage.
7. Check that the seals in the *airlock doors* are not damaged or dirty.
8. Check that the inside of the *airlock* is clean and dry.
9. Check that the vacuum pump is off, and all valves are closed.

Getting items in the glove box

1. Make sure the *inner airlock door* is closed and latched properly. The *three-way valve* should point upward, and the pressure on the *vacuum gauge* should be zero. The *pump valve* on the right hand side should be closed.
2. Open *outer airlock door* and insert sample. Move sample as far towards *inner airlock door* as possible. Close and latch *outer airlock door*.
3. Turn the *three-way valve* fully to the right to apply the in-house vacuum to the *airlock*.
4. Turn on the rotary pump. Turn the valve on the pump to the vertical position.
5. Open the *pump valve* on the right hand side of the *airlock*.
6. Wait until the pressure is below 15" Hg, then turn the *three-way valve* to the center position (closed, pointing upward).
7. Wait until the pressure is below 25" Hg, then close the *pump valve* on the right of the airlock.
8. Turn the *three-way valve* to the left to let argon from the glove box into the *airlock*. There should be clicking sounds from the *pressure monitor*, and the *pressure/flow indicator* should alternate between LO and HI.
9. Wait for the pressure on the vacuum gauge to return to zero.
10. Close *three-way valve* (vertical position).
11. Repeat steps 5-10 one more time.
12. Open the *inner airlock door* and retrieve the sample.
13. Close and latch inner airlock door while you work in the glove box.
14. You can keep the vacuum pump running if you will use the airlock repeatedly. When you are ready to turn off the pump, first close the valve on the pump (horizontal position), then switch off the pump.

Taking items out of the glove box

1. IMPORTANT: If you are not **absolutely positive** that the airlock contains argon, then **do not open the inner airlock door**. Instead, follow steps 5-11 in "Getting items in the glove box" above.

2. Open *inner airlock door*.
3. Put items in *airlock*. Close and latch *inner airlock door*.
4. Open *outer airlock door* and retrieve items. Close and latch *outer airlock door*.

Working with samples or equipment in the glove box

1. While working in the glove box, the *pressure/flow indicator* will occasionally switch from LO to HI. This is normal.
2. Keep the interior of the glove box clean. In particular, keep the gloves and sleeves clean.
3. If you work with organic liquids such as hexane, keep these solvents away from the gloves and sleeves.

Using the airlock vacuum to dry samples

If you use the airlock to apply vacuum to your samples, keep the following points in mind:

1. You have to achieve a vacuum below the vapor pressure of whatever you are trying to evaporate. The house vacuum is usually not good enough. If the pump oil is clean, the vacuum pump should achieve a vacuum better than 27" Hg.
2. Whatever you evaporate from your sample will over time accumulate in the oil of the vacuum pump. Therefore the performance of the pump will degrade over time, and you won't be able to pull a good vacuum any more. Therefore, if you dry samples regularly in the glove box, you should monitor the performance of the pump and replace the pump oil as needed.

Changing the argon tank

The tank should never be empty, or closed. Generally, High Purity Argon gas is used for the glove box. Higher grades are acceptable. In an emergency, nitrogen can be used instead of argon.

1. Get full tank from basement storage.
2. Close the tank and regulator valves.
3. Remove the regulator from the empty tank.
4. Put cap on empty tank.
5. Unchain empty tank and exchange with full tank.
6. Chain full tank and secure empty tank on tank cart.
7. Remove cap from new tank. Remove cover from thread.
8. Connect regulator. Make sure that the regulator points towards glove box, and that the gauges are readable for someone working at the glove box.
9. Open tank valve.
10. Open regulator valve.
11. Put empty tank in empty tank storage in basement.