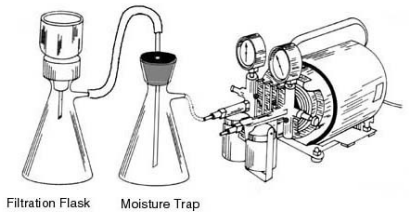
Vacuum Traps

Always place an appropriate trap between experimental apparatus and the vacuum source. The vacuum trap:

- protects the pump, pump oil and piping from the potentially damaging effects of the material;
- protects people who must work on the vacuum lines or system, and;
- prevents vapors and related odors from being emitted back into the laboratory or system exhaust.



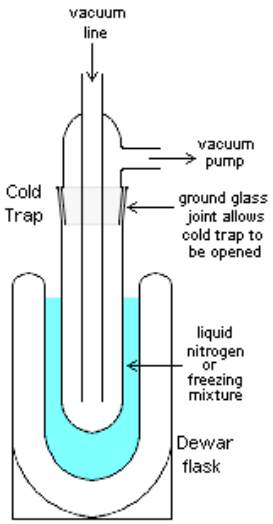
Improper trapping can allow vapor to be emitted from the exhaust of the vacuum system, resulting in either reentry into the laboratory and building or potential exposure to maintenance workers. Proper traps are important for both local pumps and building systems.

Proper Trapping Techniques

To prevent contamination, all lines leading from experimental apparatus to the vacuum source must be equipped with filtration or other trapping as appropriate.

- **Particulates**: use filtration capable of efficiently trapping the particles in the size range being generated.
- **Biological Material:** use a High Efficiency Particulate Air (HEPA) filter. Liquid disinfectant (e.g. bleach or other appropriate material) traps may also be required.
- **Aqueous or non-volatile liquids**: a filter flask at room temperature is adequate to prevent liquids from getting to the vacuum source.
- **Solvents and other volatile liquids:** use a cold trap of sufficient size and cold enough to condense vapors generated, followed by a filter flask capable of collecting fluid that could be aspirated out of the cold trap.
- **Highly reactive, corrosive or toxic gases**: use a sorbent canister or scrubbing device capable of trapping the gas.

Cold Traps



For most volatile liquids, a cold trap using a slush of dry ice and either isopropanol or ethanol is sufficient (to -78 deg. C). Avoid using acetone. Ethanol and isopropanol are cheaper and less likely to foam.

Liquid nitrogen can only be used with sealed or evacuated equipment. If the system is opened while the cooling bath is still in contact with the trap, oxygen may condense from the atmosphere and react vigorously with any organic material present.

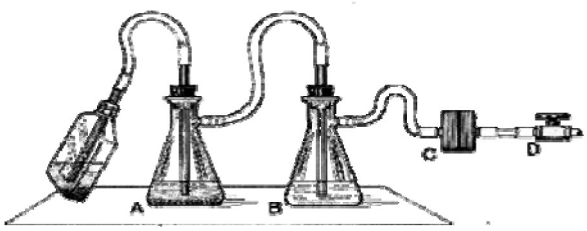
Water Aspirators

Water aspirators also provide a source of vacuum. While convenient, the use of water aspirators is discouraged for several reasons:

- They waste water, since you have to run the water at full blast to create a good vacuum.
- Volatile solvents are carried out from your flask and through the aspirator to the water that is running down the sink - this means you are contaminating the waste water with organic solvents.
- Aspirators often back water up into your glassware, whether it is a filtering flask or an evaporating flask.

Only use this set-up if your solvent is non-volatile and non-hazardous, such as water. Methylene chloride and similar solvents will be drawn out of the flask and end up in the water being flushed down the drain through the water aspirator.

Biological Material Traps



A suction flask is used to collect the contaminated fluids into a suitable decontamination solution. A second flask serves as a fluid overflow collection vessel and an in-line HEPA filter is used to protect the vacuum system from aerosolized microorganisms.