



Mechanical vacuum pumps in laboratories pose many hazards. These include mechanical hazards associated with the moving parts, and chemical hazards of contaminating the pump oil with volatile substances and thus, subsequently releasing them into the laboratory. Pumps can also malfunction or overheat and ignite nearby flammable or combustible materials. Pressure systems must be safely handled as they are fragile and can form explosive by-products.

Special Hazards: Condensed Oxygen

A light blue gas/liquid that is highly explosive could be condensed in the trap. If this is observed:

1. Immediately replace the liquid nitrogen to keep the traps cold for 1-2 minutes
2. Inform others of the situation and evacuate the lab area except for a buddy at a safe distance
3. Place a blast shield around the traps and remove any nearby organic materials
4. Remove the liquid nitrogen dewar, quickly vent the system, and if possible, lower the hood sash completely
5. Immediately leave the vicinity of the lab and warn others to not reenter
6. After the system has warmed to room temperature, consider the traps still dangerous. Liquid oxygen will not be present, but organic peroxides may have formed. Pour liquid into clean beaker and flush assembled trap 5 times with water, making sure to stay behind the blast shield and with sash lowered.
7. Check the solvent for peroxides using potassium iodine test strip. If purple color forms, peroxides are present. In that case, reduce solution by adding sodium thiosulfate or sodium sulfite before disposing of waste.

Safety Precautions for Vacuum Pumps

- Pumps require belt guards to be in place during operation to prevent hands or loose clothing from getting caught in the belt pulley.
- Ensure that electrical cords and switches are free from defects.
- Do not place pumps in enclosed, unventilated cabinets.
- Do not operate pumps near containers of flammable or combustible materials.
- Use correct vacuum tubing and replace tubing if it becomes old or crumbly.
- Use the shortest length of tubing necessary.
- Do not use solvents that damage the pump.
- Always close the valve between vacuum vessel and pump before shutting off the pump to avoid sucking vacuum oil into the system.
- Place a pan under pumps to catch oil drips.
- Check oil levels and change the oil when necessary
- Vent the pump exhaust properly.

Cleaning Pressure Systems

- Carefully disassemble the system and clean it with hexanes, disposing of it as organic waste.
- If necessary, soak glass manifold in a base bath of isopropanol with added potassium hydroxide.
- Re-grease joints with Apiezon M vacuum grease, using a heat gun to gently heat the joints before applying grease.

Personnel Responsibilities

- Conduct all vacuum operations behind a table shield or in a fume hood.
- Always wear safety glasses, a lab coat, and gloves.
- Track oil change dates and maintenance schedules.

Waste Disposal

Used pump oil must be disposed of as hazardous waste. Contact EHS for more information