

University of Illinois Materials Research Lab (MRL)

December 2018



Important Dates and Reminders

IMPORTANT DATES:

January 23, 2019

- Carl Zeiss Microscopy, LLC
- Lunch and Learn
- More details to come

February 28, 2019

- Nano Safety Workshop
- More details to come

DAILY REMINDERS

- Use buddy system when working in labs
- Do not leave labs unlocked
- Be aware of your surroundings
- Remove lab PPE before leaving lab spaces. PPE is not allowed in public areas

Safety Newsletter

This month's topics are vacuum safety and flood prevention in the lab.

Vacuum Safety

Certain laboratory procedures require the use of a vacuum or the generation of a reduced pressure system. Weak points in the system can create implosion or explosion hazards. To ensure safe working conditions, follow the practices outlined below.

Personal protective equipment:

- Personal protective equipment should be used when working with systems under vacuum. Protect yourself from potential flying glass or debris by using safety glasses, goggles, face shield, and/or a blast shield when near an apparatus under vacuum.

Tubing and equipment:

- Always use tubing (e.g., metal, thick walled rubber) that is rated for the pressure or vacuum conditions you will be using. Use tubing that is in good condition and free of cracks, holes, corrosion, or other signs of degradation. Do not use glassware that is thin, scratched, or has star cracks. Small defects in glassware are weak points where it can break. Avoid using round bottom flasks over 1000 mL in volume or glassware/equipment that is not approved for vacuum work.

Check Connections:

- Connections (e.g., ball joint, ground glass) in the system under vacuum require clamping (e.g., keck, hose, pinch) to ensure system integrity. Make sure all connections are properly greased, lubricated, or sealed. Small leaks in the system can cause the vacuum source to break or cause oxygen condensation if the system is cooled by liquid nitrogen.

Traps:

- Use traps of appropriate size to prevent displaced chemical vapors from reaching the vacuum pump (portable or house vacuum). Make sure to properly secure all traps and Dewar flasks to avoid accidental movement that can cause glass breakage. Empty the trap when it becomes half full with condensed material or if the process is complete.
- House vacuum systems are not to be used for cleaning debris from work surfaces. All vapors must be trapped before entering the house vacuum system.

Portable Vacuum Pumps:

- Operate vacuum pumps only in places with good ventilation. Due to the heat generated by operating pumps, do not store volatile, corrosive, unstable, or flammable substances near them.
- Exhaust: Vacuum pump exhaust contains all chemicals that were displaced in the vacuum. If displacing hazardous substances, direct the pump exhaust into the fume hood or other building exhaust.
- Guards and secondary containment: All vacuum pumps that use a belt-driven motor must have belt guards. If possible, pumps should be placed in a secondary container to contain oil leaks/spills. The secondary container must be able to withstand the elevated temperatures given off by the pump.
- Maintenance: Change pump oil according to manufacturer recommendations and frequency of use to prevent damage to pumps. Rarely used pumps should still have pump oil changed every 6 months. Treat and dispose of used pump oil as contaminated waste (chemical waste UI# 9422 - Oil, vacuum pump).

Useful Contacts

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- Vacuum Gauges: Use of mercury manometers/McLeod gauges is discouraged due to toxic nature of mercury and safety issues involving the storage, use, and replenishing of mercury containing devices. Consider using electronic and mechanical gauges that offer continuous and convenient vacuum level monitoring

Flood Prevention

Here at MRL we use different types of water cooling equipment. We must avoid floods in our lab spaces because they are costly and can cause serious damage, disruption, and injuries. Potential hazards include electrical shock, holes, pits and tripping hazards obscured by water. Mud or other contaminants can make walking surfaces slippery. When circulating water escapes from hoses that burst or have failed connections, the result is a flood.

DO NOT enter a flooded area. Assume that flood water is energized.

Things to remember:

- Make sure the drain is not clogged or blocked
- Make sure exit hoses are well secured in the sink drains
- Install a pressure regulator on the inlet lines to equipment such as solvent stills that are used for extended periods
- Conduct visual inspections

Do:

- Do use braid-reinforced PVC hose or something equivalent
- Do conduct visual inspections of all cooling water hoses in the lab on a monthly basis and replace as necessary
- Do avoid running water overnight or on weekends

Do NOT:

- Do not use rubber tubing or wire to make connections on water cooled systems
- Do not use rubber tubing or wire to make connections to laser units
- Do not use rubber hoses, they are susceptible to chemicals and will crack or spit with time

Laser Units:

- Thick-walled, re-enforced tygon tubing or copper tubing must be used. Connections must be made with hose clamps, or compression fittings. Rubber tubing or connections held with wire are not permitted.
- Tygon drain hoses from water-cooled lasers must be firmly attached in the drain line.
- For situations where water-cooled lasers are run continuously, a pressure sensitive flow detector must be installed on the water outlet feeding the unit.
- New laser cooling systems must be installed according to manufacturer's specifications.