



Endless Possibilities ...



General Laboratory Safety

Who is responsible for safety in your laboratory? YOU! You are most responsible for your own safety and that of your coworkers. This Kirsch Note covers *general* lab safety with a list of common good habits that all lab personnel should observe. How to handle some of the most common chemicals found in an lab EM is also addressed. Chemicals mentioned include sodium cacodylate, aldehydes, osmium tetroxide, propylene oxide, embedment resins, lead and uranyl acetate, DMSO, and cryogenes. It also briefly covers how to handle sharp objects and compressed gas cylinders.

As always, become familiar with, and follow, your own company's laboratory guide book on lab safety.

Good Lab Habits

1. Read through the entire protocol before starting, so you know what to expect. Be sure to have the needed chemicals, equipment, and time to complete the task.
2. Identify the hazards and match your level of protection to meet them. Chemicals, toxins, and biological hazards can enter the body via inhalation, ingestion, absorption, and injection. Safety measures and safety wear include:
 - ◆ Fume hood
 - ◆ Safety glasses with side shields
 - ◆ Closed toe shoes
 - ◆ Gloves impervious to chemicals being used
 - ◆ Lab coat or apron
 - ◆ Long pants
3. Treat every chemical as potentially hazardous.
4. Read and pay attention to the Safety Data Sheet (SDS), especially when dealing with unfamiliar chemicals.
5. Make yourself familiar with the locations of safety equipment such as:
 - ◆ Showers
 - ◆ Fire extinguishers/alarms
 - ◆ Spill kits
 - ◆ Electrical control panels
 - ◆ Emergency phone numbers
6. Work carefully and cleanly! Pay attention to drips and spills and wipe them up appropriately before they get spread around.
7. Gloves protect your hands, but they do not protect other parts of you or other items you touch.
8. Dispose of wastes in designated containers. DO NOT mix hazards!
9. Trust your instincts, if something doesn't look, smell, or seem right, it probably isn't. Check!
10. Have only the chemicals you are currently using out and available. All others should be put away.
11. Do not play around or distract individuals who are handling chemicals or equipment in the lab.

Common Chemicals in the EM Lab

Sodium cacodylate – contains arsenic (As) and can be absorbed through the skin.

NOTE: Some buffers (e.g. cacodylate and veronal acetate) contain toxic components, and must be handled with caution. Use gloves at all times and dispose of in appropriate manner.

Aldehydes – mucus membrane irritant and fixative, shown to cause cancer in the nasal cavity & skin.

Osmium tetroxide – vapors and liquids are toxic, irritate, and fix mucus membranes.

- ◆ Handle in a well-ventilated room and open only in a fume hood.
- ◆ Handle ampoules with disposable gloves.
- ◆ Use double bottles and seal with parafilm.
- ◆ DO NOT hold your breath when using OsO_4 . Your nose is a very sensitive detector of dangerous fumes, and you may be able to detect potential problems, such as the fume hood isn't working, if you breathe normally.

Propylene oxide – Carcinogen similar to aldehydes.

- ◆ A very volatile solution. Must be opened and used at room temperature. NEVER HEAT.
- ◆ Store in a cool place.

Embedment resins – Irritants and possible carcinogens. Most embedding resins may cause dermatitis.

- ◆ When preparing the mixtures and during embedding procedures, ALWAYS use disposable gloves.
- ◆ Cover working areas with paper towel or diapers and wipe spills immediately with alcohol.
- ◆ DO NOT use alcohol to remove resins from your skin, it increases penetration. Use soap & water to remove resins.
- ◆ Get medical attention for any suspicious skin rash.
- ◆ Harden/polymerize all waste resin before disposal.
- ◆ For disposing, follow all local/regional requirements and wrap discarded containers, beakers, vials, pipettes, etc., carefully.
- ◆ Never pour any plastic containing solutions (e.g., propylene oxide-epon mixture) down the drain. They will harden.

Lead and uranyl acetate – Heavy metal poisoning.

DMSO – Facilitates absorption through the skin of any material contained in it.

Sharp Objects

Glass knives, razor blades and scalpel knives are still sharp after being used. Discard only in containers provided for that purpose, or well sealed, and labeled cardboard boxes, so cleaning personnel will not be injured.

Equipment

1. Never observe metal evaporation without welding goggles. The intense brightness can burn your retina.
2. Critical Point Dryers are potentially lethal. DO NOT observe them in use, unless you understand the danger.

Cryogenics – Liquid nitrogen and helium are the most common EM lab cryogens and pose several hazards.

1. Never use cryogens in an enclosed space. Cryogens displace oxygen from the room, causing asphyxiation.
2. Sealed containers can build up pressure resulting in explosions. Always check that the pressure relief valve is not frozen shut.
3. Direct contact with liquid or equipment exposed to cryogen can cause frostbite and burns.

Compressed Gas Cylinders

- ◆ ALWAYS secure all cylinders to wall or stable unit using straps or chains.
- ◆ NEVER move a cylinder without first securing the cap over the valve.