

SAFE OPERATING PROCEDURE PERSONAL PROTECTIVE EQUIPMENT (PPE)

Introduction and Hazards

Personnel should prepare for a safe laboratory experience by dressing appropriately for laboratory work. This is *not* a dress code. The goal is to increase your safety by covering as much skin as possible. This way, should you spill or drop something, your clothes will act as a barrier to skin contact. Therefore your clothing is your first protection against hazards. Your laboratory principal investigator (PI) is responsible for ensuring all personnel are safely attired.

Note: PPE is not a substitute for safe work practices. PPE will only protect you if you use it.

Personal Attire

1. Shoes should fully cover your feet to protect against spills. No open-toed shoes, clogs, flip-flops, Crocs, or sandals are permitted, even in the summer. Leather shoes are the best at protecting your feet.
2. Trousers or skirts falling below the knees are required. Shorts are strongly discouraged, but if you must wear shorts, you must wear a lab coat or apron of below-knee length. Preferred materials for attire, aprons, and lab coats are resistant polyester, cotton, or wool, since common laboratory solvents dissolve ordinary polyester and acrylic; fire also melts the latter materials so that they adhere to your skin.
3. Wear long sleeves or a lab coat for the same reasons.
4. If you wear a necktie, firmly clip it to your shirt or confine it inside a lab coat or apron.
5. Avoid loose, flowing garments and scarves. They may easily pick up spills, trail through a burner flame, or get caught in equipment.
6. Confine long hair for the same reasons.
7. Avoid loose or excessive jewelry. It may catch on equipment. Also avoid ornate rings, bracelets, or watches that can damage protective gloves or make wearing or removing gloves difficult. Your jewelry can also react with common reagents.
8. Do not wear contact lenses in a laboratory because chemicals or particulates can get caught behind them and severely damage your eyes. You can also transfer contaminants from your hands to your lenses.

Personal Protective Equipment (PPE)

Every laboratory must have available, and your PI must train you in the use of, safety goggles, face shields, gloves, lab coats or aprons, and portable reaction shields.

Goggles and Safety Glasses

Goggles that completely enclose the area of your eyes are *required*, rather than spectacles, to avoid the possibility of splashes running down your forehead into your eyes. They **must** be worn at all times when *anyone* in the laboratory is working with chemicals, as well as when an



experiment is running unattended in the laboratory. You can choose specific types of goggles, except that chosen goggles must conform to the American National Standards Institute (ANSI) Z87.1 standard for splash and impact resistance. You may also wear impact-resistant safety glasses. Figure 1 below shows one type of goggles.

Ordinary prescription eyeglasses will not protect you in the laboratory! However, you can purchase prescription safety glasses with side shields meeting the ANSI Z87.1 standard from most opticians, such as Lens Crafters or Target. Also, the University has arranged with a vendor to supply prescription safety glasses to personnel at a reduced cost. Contact EH&S, 817-272-2185, for further information.



Figure 1. An example of safety goggles.

Several spare pairs of goggles should be available for visitors, who are *required* to wear eye protection while in the laboratory.

Face Shields

For work that poses a greater than ordinary danger of splashing, such as handling liquefied gases (cryogenic fluids) or violent reaction, you must wear a hard face shield that protects your entire face as well as your eyes. Wear the face shield over your goggles or safety glasses. Each laboratory must have at least one face shield available at all times. Laboratory personnel and PIs are responsible for determining when this protection is needed. Figure 2 below shows a typical face shield.



Figure 2. A Polycarbonate Face Shield.

Gloves

After your face and eyes, your hands are the most vulnerable parts of your body. Their protection should be routine. You may use disposable gloves for ordinary laboratory operations. Sturdier, less permeable gloves should be selected when working with strong acids or bases or other particularly hazardous materials. Nitrile gloves are preferred.

If you regularly work with sharps, you should wear leather gloves to protect your hands from cuts, abrasions, and scrapes.

Wear insulated gloves (cryoscopic gloves) when handling liquefied gases (cryogenic fluids) or Dry Ice. A laboratory that uses these materials extensively should purchase a pair for personnel.

You should note that disposable gloves are protection from *incidental* contact with reagents. Gloves do not protect your hands from immersion in a reagent. You should be able to remove gloves quickly in case of an emergency.

In addition to disposable gloves, each laboratory should have available at least one pair of natural rubber gloves and one pair of heavy, impermeable gloves such as Viton. Consult your MSDS or your glove safety chart (<http://www.allsafetyproducts.biz/site/323655/page/74172>) to select the appropriate pair for the materials with which you are working.

Some common-sense rules for wearing disposable gloves are:

- Select gloves which are resistant to the chemicals to which you may be exposed. Consult the relevant Material Safety Data Sheet (MSDS) which may recommend a particular glove material.
- Select gloves of the correct size and fitting. Gloves that are too small are uncomfortable and may tear, whereas overlarge gloves may interfere with dexterity. In some cases, such as use of HF, it may be advisable to select gloves that can be removed very rapidly in an emergency.
- Before use, check gloves (even new ones) for physical damage such as tears or pin holes and for previous chemical damage. This is especially important when dealing with dangerous materials such as HF.
- Double-glove when working with corrosives or dangerous reagents. This way, if the top pair becomes damaged or contaminated, the second pair will still protect you.
- When working, you may wash the external surface of the gloves frequently with water if necessary.
- Some gloves, especially lightweight disposables, may be flammable. Keep your hands well away from flames or other high-temperature heat sources.
- When removing gloves, do so in a way that avoids the contaminated exterior contacting your skin.
- *Wash your hands after removing gloves.*

- Dispose of contaminated gloves properly.
- Do not attempt to reuse disposable gloves.
- Never wear gloves outside of the laboratory or to handle telephones, computer keyboards, etc. You may easily transfer contaminants on your gloves to doorknobs and other common objects. Remove and discard disposable gloves when leaving the lab and select a fresh pair upon returning to the lab.
- Note that you should wash gloves that are not disposable before you remove them. These gloves also should be left in the laboratory.

Lab Coats and Aprons

Wear lab coats or aprons to absorb or deflect spills and prevent corrosive or toxic substances from reaching your skin. Coat vs. apron is largely a matter of personal preference; however, if you wear short sleeves you must wear a coat to protect your arms. Lab coats and aprons must be available to every individual working in a laboratory. A coat's material is important. Tyvek, a spun, bonded polyester, is the best (most impermeable) material for these garments. On the other hand, if you regularly work with flames or pyrophoric reagents, you must wear a non-flammable lab coat such as Nomex.

Because coats and aprons are uncomfortable in hot weather, lab personnel often avoid using them. Although the best policy is to wear such protection at all times, wearing coats or aprons may be limited to particularly hazardous operations such as use of corrosives, waste disposal, or accident cleanup.

Portable Reaction Shields

Reaction shields are curved sheets of polycarbonate resin with lead bases of such a size that you may set them up in front of a reaction to deflect violent splashes or glass fragments. You must use them whenever you use a potentially explosive reaction (such as one involving peroxides) or one involving especially corrosive materials (such as fluorosulfonic acid.) You can put a portable shield in front of a fume hood. Figure 3 below shows two examples of portable shields.



Figure 3. Two Examples of Portable Reaction Shields.



References:

<http://www.osha.gov/Publications/osha3151.html>

<http://www.osha.gov/SLTC/personalprotectiveequipment/index.html>

http://www.uta.edu/policy/forms/ehs/uta_lab_safety_manual.pdf

<http://www.allsafetyproducts.biz/site/323655/page/74172>

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