LABORATORY SAFETY

EYE PROTECTION

Federal law requires all laboratory workers to wear proper eye protection. The type of eye protection required depends on the type of work you are doing and must be determined and provided by the Principle Investigator in your lab.

Prescription glasses provide little protection in the lab and are not ideal when worn alone. The different types of safety eyewear are available in designs that fit over most prescription lenses. Or, prescription safety eyewear is also available, but must be provided by yourself. Regular safety glasses are good general eye protection for many lab applications, but not for chemical work. Side shields do help. For chemical work, splash proof goggles are required.

For a chemical splash in the eyes, go immediately to the closest eyewash, ask for help. If it’s someone else, assist them. Your workstation, when working with chemicals, should be no farther than a 10 second walk from an eyewash. If it’s farther than that, move your work area. Turn on the eyewash, hold both eyes open with fingers, place eyes in direct contact with the water and roll your eyes around in their sockets to rinse out all the chemical. Rinse for 15 minutes. Get medical assistance.

- Never neutralize chemicals splashed in the eyes – always flush with water only
- Never use an emergency eye wash bottle – not enough liquid, can only rinse one eye, solution could be old
- You must never work alone in the laboratory
- Activate every eyewash at least weekly to verify operation and clear liquid flow
- Keep areas around eyewashes clear from clutter to provide quick and easy access in the event of an emergency – if there are items around your eyewash, you may not be able to find it

PROPER LAB ATTIRE

Closed toe and heal shoes. Shoe material should be non-absorbent, such as leather. Canvas shoes, sandals, and shoes with ventilation should be avoided in the lab. If this type of shoe in unacceptable for everyday wear, keep a change of shoes at your desk and change before going into the lab to work. This also has the added benefit of keeping possibly chemical contaminated shoes out of your home and away from your children and pets.

Clothing – long pants or skirts should be worn in the lab, not shorts. Again, you can keep a change of clothes for lab work. Wear your lab coats and launder them frequently, somewhere other than your home washing machine.

Long hair should always be confined when working in a lab.
GLOVES

Chemical resistant gloves should be worn when working with chemicals. Latex gloves are usually a poor choice for chemical work as they do not provide adequate protection against many chemicals. Nitrile gloves are good, but are not resistant to all chemicals. To find out what type of glove is best for a particular chemical that you work with, there are online guides available or contact EHS for assistance.

MSDS

Every lab worker should have access to MSDS for every chemical in the lab while in the lab. You should read the MSDS before handling any chemical. Know what the hazards are, how the chemical can affect you, how you can become contaminated (inhalation, absorption, ingestion, etc.), and what to do if you do become contaminated. The MSDS will also tell you what the incompatibilities are for a particular chemical, synonyms, the LD50 or toxicology, and will give disposal information. The MSDS should be read BEFORE you handle the chemical.

SAFE HANDLING OF CHEMICALS

No food or drink in chemical labs. Period. Also, never, ever use food or drink containers to store chemicals. It’s too easy to mistake a chemical in a drink container for an actual drink. Also, the material that the container is made out of may not be compatible with the chemical that you are putting in it, which will result in a spill.

Use a fume hood if you need to. Always pull the sash down so that it protects your face from anything in the fume hood, and wear proper eye protection even with the sash pulled down. Aerosols can form when stirring or transferring liquids. Use a fume hood if the chemical is one that can be harmful if inhaled.

Always wear the appropriate gloves when handling chemicals and wash your hands after de-gloving. Deglove by pulling the glove inside out as you pull it off your hand. Dispose of contaminated gloves as hazardous waste if the chemical is toxic.

Always wear your lab coat and keep it fastened closed while handling chemicals.

Label all containers all the time, even if it’s water. It is very poor laboratory practice not to do so, and it’s also against federal regulations.

Never block access to safety showers, eye washes, or fire extinguishers. If you need these in an emergency, every second counts and you don’t want to have to move clutter, or worse, large items, out of your way to get to them.

When finished with them, return chemicals to their proper storage area. Ensure that your chemicals are stored with similar items. Never store oxidizing chemicals of any kind with flammables of any kind. Also, keep acids and bases separate from each other, and acids separate from flammables. Ensure that Nitric Acid, an oxidizing acid, is not stored with Glacial Acetic Acid, which is flammable. Keep any cyanide
containing compound away from acids. When storage space is limited, use of secondary containment to segregate chemicals of different hazard classes is perfectly acceptable, with one exception. When you store acids in a metal flammable storage cabinet, and particularly with metal containers of flammables, it will make the metal corrode or rust, which could lead to a spill of the flammable material. Keep acids out of metal flammable cabinets and away from metal flammable storage containers.

Properly dispose of all chemical wastes. Call EHS at 4-5084 if you are unsure.

Promptly clean up any spills. This must be done correctly. If you are unsure or have not been trained in how to clean up chemical spills, then call EHS at 4-5084 and we will clean up your spill for you and properly dispose of the spill clean-up materials. There is no charge for this service and we have been trained in the proper methods of cleaning up chemical spills.

You must know all the hazards associated with the chemicals that you handle. It is your health and life that will be affected, and possibly the health of your children. There is also the potential to seriously affect the health of the people working around you.

You must know how to protect yourself from contamination and what to do if you do become contaminated. With some chemicals, there is not time to find out what to do after you become contaminated. You must be prepared beforehand. If you will be handling hydrofluoric acid (HF) at any time and in any concentrations, be sure to go through our Hydrofluoric Acid Safety Powerpoint located on our website: http://web.utk.edu/~ehss/pdf/has.pdf

COMPRESSED GAS CYLINDER SAFETY

Always use a cylinder cart to move compressed gas cylinders from one location to another, and always secure the cylinder to the cart with a chain or strap and buckle.

Do not drop cylinders. Do not allow cylinders to strike each other. Keep all compressed gas cylinders capped until ready to use, then place the correct regulator on the valve, recap when work is finished. Always keep the cap on the cylinder while moving it and keep it in place until the cylinder is secured. Always cap empty cylinders. Do not tamper with the valves or safety devices or attempt to use a regulator that is not designed for use with the gas you are using. Never use an adapter to make a regulator fit your cylinder. Use the regulator that fits.

Never use oil or grease or other combustible substances with oxygen cylinders, valves or regulators. Never deface or remove the product identification label on a cylinder. Do not use unlabeled cylinders. When you empty a cylinder, leave some positive pressure in the cylinder, close the valve, replace the cap, and mark the cylinder empty. Cylinder Status Tags are very convenient for marking cylinders as full, in use or empty. The Fisher catalog number for these is 18-999-792. Or use a piece of label tape, write “empty” on it and place it on the cylinder.

When using compressed gas cylinders, you should know the properties and safety precautions of the gas before using it. Some gases can be particularly harmful. Never use oxygen as a substitute for
compressed air. It is not the same thing! Oxygen will make any combustible material burn much more readily. Also, keep all electrical appliances and cords away from compressed gas cylinders.

Always use a regulator when connecting cylinders to anything with a lower pressure service rating. Use only the regulator approved for the specific gas you are using and open the cylinder valve before adjusting the pressure on the regulator.

Always close the valve and release all pressure on equipment connected to the cylinder at the end of a work shift and any time there will be an extended time of non-use (weekends, holidays; unless it’s a piece of equipment under continuous operation such as an incubator).

Always bond and ground cylinders containing flammable gases.

Compressed gas cylinders should always be stored in the upright position, they should never be laid over on their sides. Keep empty cylinders separate from full cylinders. Keep compressed gas cylinders away from sources of heat. Keep compressed oxygen cylinders separate from flammables by at least 20 ft or by a firewall, when in storage.

Compressed gas cylinders must be secured at all times. The most cost-effective way to do this is to purchase a length of chain, 2 eyebolts and some type of fastener from the local hardware store. Secure the chain in one eyebolt and secure the eyebolts into a sturdy object such as a wall (make sure they are in the studs) or a lab bench. Anything moveable is not adequate. Loop the chain around the cylinder tightly and use the fastener to secure to the other eyebolt. If you purchase the cylinder clamps or brackets that have the nylon strap, use the buckle, do not tie the strap. Never secure cylinders to stairs, under stairs or anywhere near stairs or any other exit. Do not keep cylinders for years on end. Cylinders must have hydrostatic testing performed every 5-10 years (depending on the gas) to ensure the integrity of the cylinder. If you keep cylinders past their hydrostatic testing due date, the integrity of the cylinder may not be ensured. UT pays rent on cylinders, so it makes no difference if you return it before it’s empty.

Remember, one major hazard with compressed gases is asphyxiation due to a slow leak that goes undetected. An otherwise harmless gas can displace enough oxygen in a room to kill.

CRYOGENICS

Always use goggles, face shield and cold resistant gloves when handling cryogenic liquids. Make sure that any container used to hold cryogenic liquids are suitable for use with extreme cold.