LABORATORY SAFETY

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The laboratory can be an extremely dangerous place for inexperienced or careless technicians. Certainly, anyone working in the laboratory or observing lab work must remain safety conscious at all times. By being aware of the potential danger and using proper precautions to guard against them, the risk of injury can be eliminated or at least greatly reduced.

In this section you will find many basic rules that should be followed when working in the laboratory. This list is by no means complete but represents a minimum of safety precautions. Perhaps the most important concept to be stressed is the use of common sense whenever handling laboratory equipment.

Post Vital Information In A Prominent Place

Display the phone numbers of the Fire Department, Police Department, and Local Ambulance prominently next to the telephone. Also include the Poison Control Center in Burlington, (802) 658-3456.

Display all MSDS (Material Safety Data Sheets) in a place where they can and WILL be easily referred to. Make sure that everyone in the laboratory understands all the information provided on these sheets.

A written safety plan should be prepared and easily available for reference.

Have The Proper Safety Equipment Available And Make Sure Everyone Knows Where It Is And How To Use It

Lab safety equipment should include a fire extinguisher, eye wash station, shower, and a fully equipped First Aid case. A 1½ foot long rubber hose attached to the nozzle in a sink may be substituted if a shower isn't conveniently located. If possible, keep a fire blanket readily available as well. These safety devices should be easily accessible and in the immediate lab work area. Individuals working in the lab should be familiar with the location and operation of equipment. If there isn't an eye wash station built into the lab, portable, non-plumbed in eye wash set-ups can be purchased through lab equipment catalogs such as Fisher. At scheduled intervals, change water in eye wash, check the extinguisher and any other equipment, and initial and date a tag for each as well.

No Smoking, Eating Or Drinking In The Lab!!

There should never be smoking, eating, or drinking in the lab, and certainly lab glassware should never be used for food or drink. Laboratory muffle furnaces and drying ovens are NOT to be used for warming or cooking food items! Poisonous or carcinogenic substances are easily transmittable to the mouth and internally, often times without detection. Before smoking, eating, or drinking, it is absolutely necessary to carefully wash hands. Always wash faces, hands, and arms before leaving the lab area.

Discard Or Repair All Broken Equipment Immediately

Do not keep sharp surfaces such as damaged or broken glassware and equipment in the lab itself. Store all unrepaired items away from the work areas, to prevent cuts and the transfer of contaminants. Discard non-repairable glassware and equipment, and have other items repaired without delay. Emery paper can be used to smooth glass surfaces. A propane torch will round edges on glass tubing and round files are very useful for smoothing chipped BOD bottle wells.

Don't Take Chances With Faulty Electrical Devices

Report exposed wiring, minor shocks, and overheating equipment. Do not use extension cords for permanent equipment and take care to replace any damaged cords. Lab workers should know the location of circuit breakers and remedy the cause of the circuit breaker tripping before resetting it.

Always Wear A Lab Coat Or Lab Apron And Proper Footwear

Proper clothing and neatness are important to being protected in the lab. Loose hair and clothing should be tied back or secured. Always wear a lab apron or lab coat as well as acid resistant clothing such as pants (Dickies brand is found in most department stores and are surprisingly acid resistant) and footwear, which should be durable and completely cover the feet. No open toe shoes or sandals should be allowed for lab workers or visitors.

Always Wear Safety Glasses Or Goggles

Wear safety glasses or goggles in the lab when working with lab chemicals or equipment. Safety glasses protect the eyes and eye area from splashes and lab accidents. Do not wear contact lenses in the lab. Diffusion of gases through the lens will hold the gas in solute form, against the eye and may dissolve the lens and cause severe harm to the eye. The same situation occurs from chemical splashes. Having to take out lenses or find one that may have fallen out will decrease valuable time needed to flush eyes out with water. Chemical contamination of eyes requires 15 minutes of irrigation with lukewarm water from a gently flowing sources, with eye lids held open. Eyewash stations should be tested on a regular basis (both to ensure that they are working

properly and to flush out any rust that may have accumulated in the pipes), and a record kept of such tests. All laboratories must have eyewash stations. If for any reason an eyewash is unavailable, place the victim on his/her back and gently pour water into the eye.

Wear Gloves When Working With Hazardous Chemicals

Wear rubber gloves, Playtex gloves or a similar type, that protect the wrist and forearm when using acids to prepare glassware and when pouring or using hazardous chemicals. Remember, skin is a natural protection zone to contaminants. It is important to never work with unprotected cuts or abrasions.

Never Mouth Pipette!!

Always use a pipet bulb when pipetting substances rather than mouth pipetting. There is a chance of contamination from a number of sources in the lab that might be picked up on pipets even after cleaning, from bench surfaces, hands and chemical splashes.

Avoid Toxic Chemicals When Possible

Avoid using carcinogens and toxins whenever possible and store substances well if kept in the lab. Orthotolidine, used for chlorine residuals as an indicating or color comparative, has been known for over 40 years to cause cancer (bladder cancer) in lab workers, not just mice and rats. Brucine-sulfanilic acid (nitrate-nitrite method), Sodium Azide, NaN_3 (DO#2), TKN reagents and other containing mercury (Hg), are also very toxic and should be treated with special care. These chemicals should be used only in a hood.

Use Special Care When Handling Strong Acids And Bases

Special attention should be given to the treatment of acids and bases due to the potentially violent splashing and heating reactions of acids or bases with water.

The following safety measures should be observed:

- Always add acid or base to water. **Never** add water to concentrated acids or bases.
- Pour substances down the side of a Pyrex beaker, or other mixing container of a similar quality. Stir with either a glass stirring rod or magnetic stirrer apparatus.
- Use a hood for work with concentrated acids or bases or mixing any chemicals that might tend to heat or give off fumes in the process. The hood allows for gases to escape and for chemicals to cool safely. Use a Pyrex baking dish in the hood in which to place beakers and other glassware to contain the spill area if glassware breaks or is tipped.

- If an **acid** is spilled, dilute immediately with lots of water. Then use Sodium Bicarbonate to neutralize the acid. If a **base** is spilled, dilute with lots of water. Then use Boric acid.

- Avoid heating or cooling acids, bases or any solutions in volumetric glassware. Volumetric glassware does not allow enough room for substances to boil or for gases to escape. If the substance needs to be warmed in a volumetric flask, it may be done by using a hot water bath, slowly.

Store Chemicals Properly

Always try to store chemicals below eye level, with the more dangerous (strong acids, etc.) at the lowest level. Acids should always be stored in a cool, well vented area. Pay close attention to the warning labels on chemical bottles and store accordingly (example: strong oxidizers should not be stored in close proximity to strong reducing agents, etc.). Flammable should be stored in a separate cool area.

Improper Use Of Autoclaves Can Kill You!!

Follow directions for the proper use of the autoclave. Always allow for a cool-down period before opening the door, especially when solutions are involved. After the cool-down period, open door about an inch or so for 10 minutes or more before taking anything out. Always use the heat-resistant gloves to remove items from the autoclave or any heat source. Asbestos pads should be used on ring stands when heating substances. The pads offer protection and force flame to more evenly heat glass surfaces. When sterilizing screw cap containers, place caps or lids on loosely during the entire cycle. When container has cooled sufficiently (cool enough to handle), tighten down cap or lid. A tightly screwed-on lid during a cycle will not allow steam to escape or expand in the container, and the container may burst. This may happen especially when the door is opened at the end of the cycle. Several deaths, due to scalding, have occurred due to improper use of the autoclave.

Don't Work Alone

Avoid working alone, if possible, and do not allow procedures to run unattended. Remember, it is your safety and that of the people around you that is at stake. Use every precaution possible to ensure your safety. Do not take unnecessary risks and always pay attention to what you are doing.