

Chemistry Basic Lab-Safety Guidelines

The Chemistry Basic Lab Safety Guidelines is aimed to minimize or eliminate hazards in the laboratories of Chemistry Department. Where the scope of hazards is not addressed by this general document, specific Standard Operating Procedures (SOPs) must be developed by the Principal Investigator. It is critical to know that each person that enters into the laboratory must understand the safety and health hazards associated with potential hazardous materials and equipment in the laboratory. It is expected that each individual will practice and adhere to the following general safety guidelines at all times while in the lab. Abiding by these guidelines will help you handle substances safely and minimize your exposure to them.

1. PERSONAL SAFETY

1.1. Footwear:

- Non-slip, closed-in footwear must be worn while working in a laboratory. Open footwear such as open-toed shoes is not allowed.

1.2. Clothing:

- Loose or torn clothing can fall into chemicals or entangle with equipment.
- Cotton is the preferred laboratory clothing fabric since many synthetic fabrics can adhere to the skin when burning, and would therefore increase the severity of a burn.
- Lab coats, aprons, and other protective clothing, should be worn when working in the lab.
- Shorts or cutoffs must be covered. Thobe, goutrah and loose clothing are not allowed while working in lab.
- Lab coats should not be worn outside of the laboratory, except when going from one lab to another. Contaminated lab coats should not be washed with regular clothes.

1.3. Eye protection:

- Working in the lab would necessitate regular safety glasses, chemical safety goggles or a full face shield protection, which entirely depends on the nature and need of a specific procedure.
- Contact lenses should be avoided while working in a laboratory with chemicals but for therapeutic reason, they may be allowed.

1.4. Hand protection:

- Gloves are required to protect your hands against abrasions, cuts, punctures, snags, chemical burns, thermal burns, and temperature extremes in the work environment.
- A series of different types of protective gloves are available which should be selected carefully to cater the best protection for specific procedures and chemicals.
- In general, nitrile and neoprene gloves provide good protection against chemicals but it should always be bear in mind that different glove materials have different chemical permeability.
- Always wash your hands with soap and water before leaving the lab. This applies even if you have been wearing gloves.

1.5. Safe Behavior:

- Chemistry lab is a place that has many potential hazards. Personal safety needs to be coupled with safe behavior in the lab.

- Good common sense is needed for safety in a laboratory. It is expected that each student will work in a responsible manner and exercise good judgement and common sense. If at any time you are not sure how to handle a particular situation, ask your professor or Instructor for advice. **DO NOT TOUCH ANYTHING WITH WHICH YOU ARE NOT COMPLETELY FAMILIAR!!!** It is always better to ask questions than to risk harm to yourself or damage to the equipment.
- Do not engage in horseplay, pranks or other acts of mischief in a chemistry lab.
- Never eat or drink in the lab and especially don't use any lab containers for food.
- Do not chew gum or bite on pens, pencils or finger nails in the lab.
- Similarly, never taste any chemicals nor inhale a whiff directly from the containers. If you are required to smell a particular chemical, wave your hand over the container to waft the scent towards your nose.
- All bulky bags, coats and other personal items must be stored away from your work bench / station. Beware that some chemicals can destroy your personal belongings.

1.6. Safe Practices:

- Adhering to safe lab practices will prevent accidents from happening and keep the laboratory safe for you and your lab mates.
- Make sure you know the location of emergency equipments -fire alarm, fire extinguisher, emergency eye wash and safety shower.
- Be familiar with the appropriate emergency response procedures.
- Never carry out hazardous work in isolation in a laboratory.
- Do not mouth pipet chemicals when transferring solutions. Instead, you should always use a pipet bulb to transfer solutions.
- Do not undertake any work unless the potential hazards of the procedure are known as precisely as possible, and the appropriate safety precautions are adopted.
- While transporting chemicals in a glass or plastic container, always use safety carriers.
- Never carry containers of mutually reactive substances at the same time.
- Support all beakers and flasks with clamps. Do not use cracked or chipped glassware.
- Keep only the minimum required quantities of hazardous substances in the laboratory work station / bench.
- Always use a fume hood or glove box when working with highly toxic, volatile or odoriferous substances.
- All fire-escape routes should be completely clear at all times.
- Make sure that all safety equipment are in working order and remain accessible to the laboratory personnel at all times.

2.LABORATORY SAFETY EQUIPMENT

2.1. Fume Hoods:

- Properly functioning of fume hoods are critical safety device in a laboratory. When handling more volatile, odorous or flammable chemicals, you are required to work in a fume hood instead of your lab bench. When used correctly, fume hoods prevent flame and hazardous gases from escaping into the lab.
- Keep the sash of fume hood at the lowest level that allows you carry out the experiment.
- Ensure working condition of exhaust fan prior to fume hood use.
- Remove all items from the fume hood which are not required for the immediate operation or experiment.

- Wherever possible, place all the necessary equipment in the fume hood before commencing a procedure.
- Keep all chemicals and equipment 6 inches behind the sash during experiments.
- At completion of the procedure, remove all waste from the fume hood and decontaminate.
- In emergency situations such as fires, gaseous emissions or spills in a fume hood always pull the sash down completely and ensure hood fans are turned on.
- Fume hoods should be checked annually for: exhaust volume, motor speed and condition of ventilation system. The required face velocity is 0.5 meter/second.

2.2. Safety Showers:

- Safety showers can be used to extinguish fire on people. They are provided to wash off hazardous substances that may be splashed on the skin of personnel.
- These showers should be located no more than 10 seconds in time or greater than 100 feet from the hazard.
- The shower must be readily accessible, be kept clear of obstructions, and clearly labeled.
- The valve must open readily and remain open until intentionally closed.

2.3. Eye Wash Stations:

- Eye wash station can be used to rinse out chemicals that have gotten into your eyes. They are located in laboratories to flush the eyes if hazardous substances are splashed into them.
- In such an event, the stream of water from the spray should be directed into the eye for a period of 15 minutes before seeking medical attention.
- The stations must be easily accessible from any location in the laboratory.
- Eyewashes, like safety showers, must be located no more than 10 seconds in time or greater than 100 feet in distance from the hazard. Their location should be clearly labeled. It is recommended that safety showers and eyewashes be located at least five feet apart in the same room.
- Ideally eyewashes should be activated weekly.
- It is the responsibility of the Principal Investigator to ensure that all eyewash units are checked on a weekly basis.

2.4. Fire Extinguishers:

- Fire extinguishers are very important components of safe laboratory operation. Each laboratory should be equipped with the appropriate type of Fire Extinguisher for the expected fire emergency and be capable of immediate utilization.
- They are used to extinguish or control small scale fire
- Fire extinguishers need to be appropriate to the local risks as identified after a risk assessment. As a guide:
- CLASS A fires involve ordinary combustible materials such as wood, cloth, paper, rubber and many plastics.
- CLASS B fires involve flammable liquids and gases, oils, greases, tars, oil-base paints, lacquers and some plastics.
- CLASS C fires involve Class A and/or B materials in the presence of live electrical equipment, motors, switches and wires.
- CLASS D fires involve combustible metals such as magnesium, titanium, sodium, potassium, zirconium, lithium and any other finely-divided metals which are oxidizable.

Our labs in Chemistry Department are equipped mostly with Dry Power ABC Type Fire Extinguishers, which are very effective in controlling Class A, B and C types of fire.

2.5. Fireproof Blankets:

- Fireproof blankets are used to wrap a burning victim to smother a fire or to control small scale fire in the lab.
- Do not wrap fire blanket to a standing person, because of a chimney effect rather lay the victim down to extinguish the fire.
- The blanket should be removed once the fire is out in order to disperse the heat and thus minimize tissue damage. These blankets may also be used to keep injured persons warm.

3. Electrical safety

- Obtain permission before operating any high voltage equipment.
- Maintain an unobstructed access to all electrical panels.
- Wiring or other electrical modifications must be referred to the Electronics Shop maintenance department.
- Avoid using extension cords whenever possible. If you must use one, obtain a heavy-duty one that is electrically grounded, with its own fuse, and install it safely.
- Extension cords should not go under doors, across aisles, be hung from the ceiling, or plugged into other extension cords.
- Never, ever modify, attach or otherwise change any high voltage equipment.
- Always make sure all capacitors are discharged (using a grounded cable with an insulating handle) before touching high voltage leads or the "inside" of any equipment even after it has been turned off. Capacitors can hold charge for many hours after the equipment has been turned off.
- When you are adjusting any high voltage equipment or a laser which is powered with a high voltage supply, **USE ONLY ONE HAND**. Your other hand is best placed in a pocket or behind your back. This procedure eliminates the possibility of an accident where high voltage current flows up one arm, through your chest, and down the other arm.

4. Mechanical safety

- When using compressed air, use only approved nozzles and never direct the air towards any person.
- Guards on machinery must be in place during operation.
- Exercise care when working with or near hydraulically- or pneumatically-driven equipment. Sudden or unexpected motion can inflict serious injury.

5. Lasers safety

- **NEVER, EVER LOOK INTO ANY LASER BEAM**, no matter how low power or "eye safe" you may think it is.
- Always wear Laser safety goggles while working with LASER.
- The most common injury using LASER is an eye injury resulting from scattered laser light reflected off of mountings, sides of mirrors or from the "shiny" surface of an optical table. The best way to avoid these injuries is to always wear your goggles and **NEVER**

LOWER YOUR HEAD TO THE LEVEL OF THE LASER BEAM! The laser beam should always be at or below chest level.

- Always use "beam stops" to intercept laser beams. Never allow them to propagate into the laboratory. Never walk through a laser beam. Some laser beams of only a few watts can burn a hole through a shirt in only a few seconds.
- If you suspect that you have suffered an eye injury, notify your professor or colleague **IMMEDIATELY!** Your ability to recover from an eye injury decreases the longer you wait for treatment.

6. EMERGENCY MANAGEMENT

In the event of fire or other emergency the following procedures apply:

- When you have fire on your clothes or body
 1. You should immediately either drop to the floor and role or go to the emergency shower.
 2. Once the fire is extinguished you should chill any burns with cool water and seek
 3. medical attention.
 4. Remember if one of your class mates catches on fire and decides to drop and roll you can use the fire blanket to help extinguish the fire but only after he is gotten on the floor. Do not wrap fire blanket to a standing person, because of a chimney effect.
- In the event of a small scale fire in the lab, use Fire Extinguisher or Fire blanket to extinguish or control it.
- In the event of a big fire/blaze in the lab,
 1. Shout "Fire" to alert others in the immediate area and evacuate the room through the nearest safe exit ASAP.
 2. Remember that if the lab is filled with smoke you will need to crawl on the floor to prevent smoke inhalation.
 3. Call 999 or (from cell phone) 8600999 (all emergencies), 4444 (Security), 3333 (Medical Center) and the PI of the lab.
 4. When Fire alarm is raised, proceed quickly to the nearest exit and gather in the marshalling area (KFUPM tower).
 5. Do not return to the building until the "All Clear" is given by the Security Manager or delegate.

6.1 Chemical spills:

- Establish what material has been spilt and what personal protective measures should be followed. This information can be obtained from a Material Safety Data Sheet (MSDS) from the Chem Alert Database.
- Prior to commencing spill clean-up, ensure that you are wearing the appropriate protective equipment.
- Acids or Alkalis -first neutralize then absorb with paper towel, cloth or mop.
- Mercury -cover with sulfur then remove with dust pan and a broom before placing in a sealed container.

Attestation

I hereby certify that I have gone through all the five pages of this “Chemistry Basic Lab Safety Guidelines” and have understood them very well. I affirm that I shall comply with the above guidelines while working or teaching in the Chemistry Labs.

Student Name: _____

ID: _____

Signature: _____

Date: _____

Student Supervisor

I affirm that any misconducts or signs of non-compliance with safety regulations by the student under my supervision will be reported to the Safety Officer and may result with permanently banning the student from accessing the chemistry labs in the future.

Signature (Student Supervisor) _____

Lab PI

I agree to give the key of Lab # _____ to the above-mentioned student and I affirm that any misconducts or signs of non-compliance with safety guidelines by the student will be reported to the Safety Officer.

Signature (Lab PI) _____

Safety Officer

Number of students who already have the keys of this Lab: _____

1: _____

2: _____

3: _____

4: _____

5: _____

Chairman Approval

_____ Date: _____