GENERAL LABORATORY GUIDELINES AND PRACTICES

CHAPTER 1

GENERAL LABORATORY SAFETY

1.1 General Tips

Do's

- Ensure good general ventilation.
- Wear laboratory coats (fastened), safety goggles and gloves.
- Legs should be covered with closed-toe shoes.
- Confine long hair and loose clothing.
- Use fume hood for cautious reactions.
- Replace all caps and lids on reagent/chemical containers.
- Return reagent/chemical containers to proper locations.
- Wash off any chemicals spilled on skin or clothes immediately.
- Clean all spills in and around balances.
- Wash hands before [especially before eating], and after handling contaminated material.
- Use bulb pipette/micro pipette for measuring harmful liquid chemicals.

Don'ts

- Don't wear contact lenses during laboratory work.
- Don't perform unauthorized reaction, and work alone if procedures are hazardous.
- Don't eat anything during the lab work inside the laboratory.
- Don't store food or beverages in the lab or in chemical refrigerator.

- Don't put face inside the fume hood and ensure the minimum storage of chemicals in the fume hood.
- Don't bring contaminated materials out of the cabinet until they have been decontaminated.
- Don't pipette harmful/evaporable substances.

1.2 Specific Rules

1. ***Safety Awareness:***
    - Develop and implement preventative maintenance program and safety awareness for chemical operations.
    - *Personal protective equipments*: Personal protective equipments (PPEs) such as respirators, goggles, gloves and lab coats should be available in work place and use them whenever necessary.
    - *Safety equipments:* Gain knowledge on the location and operation of safety equipments, such as safety showers, eyewashes, fire extinguishers, first-aid kits and explosion-proof refrigerators.
2. ***Reactive Safety:***
    - Use personal protective equipments (PPEs) and keep appropriate fire suppression equipment in laboratory.
    - Never use any laboratory equipment without proper training.
    - Always wear lab coats (apron), safety goggles and gloves in the laboratory.
3. ***Chemical safety:***
    - Chemical exposure results in burns, inflammation, allergic responses, eye irritation and dizziness. Hence minimize all chemical exposures, observe exposure limits and institute chemical hygiene plan.
    - Use prescribed chemicals only and do not substitute.
    - *Chemical disposal:* Equip the laboratory with waste solvent container for collecting waste organic solvents and solutions. Neutralize any acids and alkalis before pouring them down the drain.
    - *Decontamination:* Decontamination is the removal or neutralization of toxic agents, it includes both sterilization and disinfection.
    - Use proper shields when handling with peroxides. Ethers and alkenes should be tested for peroxides before using them.

4. ***Compressed Gas Safety:***
   - Read label and tags to identify gaseous chemicals and do not use unknown gases.
5. ***Flammable Safety:***
   - Keep containers closed, away from heat, sparks and sources of ignition.
   - Limit the quantity of flammable liquids storage in the laboratory.
   - Use sparkless "flammable storage" refrigerator for flammables.
   - Be aware of the fire extinguishers location and its operation.

   Easy acronym for the use of fire extinguisher

   PASS: **P**ull **A**im **S**queeze **S**weep
   - ***P**ull:* Pull the pin at the top of the extinguisher.
   - ***A**im:* Aim the nozzle toward the base of the fire, stand approximately 8 feet away from the fire.
   - ***S**queeze:* Squeeze the handle in short intervals to discharge the extinguisher.
   - ***S**weep:* Sweep the nozzle back and forth at the base of the fire.
6. ***Lab Safety:***
   - Never under-estimate the risk and don't proceed with unfamiliar procedure.
   - Acquire complete training and understanding for safe working.
   - Use fume hood for conducting reactions with hazardous and toxic substances and also in case where flammable gases and vapours are produced.
   - Ensure that the exhaust blower is operating and air is entering the fume hood.
   - Ensure that gas supply, water supply, power supply, vacuum lines, compression lines and heating apparatus are turnoff properly.
7. ***Corrosive Safety:***
   - Prevent exposure to corrosive fumes and vapours.
   - Use proper personal protective equipments (PPEs) for eyes, face, hands and body.
8. ***Toxic Safety:***
   - Provide routine medical monitoring.
9. ***Glassware Safety:***
   - Borosilicate glassware is recommended for all laboratory glassware and never use cracked or chipped glassware.
   - Pyrex and shatterproof glassware can be used for special applications.

10. ***Ultraviolet radiation safety:***

- Ultraviolet (UV) lamps and arcs should not be viewed directly. Exposure of eye and skin to UV radiation cause eye damage and skin burns.

11. ***Environmental Protection:***

- Aware of possible environmental threats and institute environmental protection measures.

11. ***Labeling Containers:***

- Label all the reagent/chemical containers to avoid confusion and chemical accidents.

1.3 First Aid

First aid is the immediate help given to an ill or injured person using readily available materials. It include cleaning minor cuts, scrapes and scratches, treating minor burns, applying bandages, dressings, cold compress, cold pack ice bag and splint. It also includes calling emergency medical services.

The very first step in the first aid is not to create any panic condition.

All injuries that are a result of a spill must be attended immediately.

- ***Bleeding:*** Flush the wound thoroughly with water, apply antiseptic and bandage to prevent contamination. If the bleeding is uncontrollable then rise the bleeding part and apply pressure to the wound with sterile gauze.
- ***Inhalation:*** Move to fresh air.
- ***Swallowing:*** Get emergency medical assistance.
- ***Thermal burns:*** Apply cold water and or ice immediately to the burned area until the pain subsides. Wrap to protect the area from infection.
- ***Chemical burns:*** Flush the affected area with plenty of water for several minutes (at least 15 minutes). Acid or minor bromine burns may be treated with 5% sodium carbonate solution. Alkali burns may be washed with 5% acetic acid or saturated boric acid. Wrap the burned area loosely.
- ***Eyes:*** Flush with water in the eye wash immediately for about 15 minutes.
- ***Skin:*** Flush the skin with water first then with soap. Neutralize an acid with *baking soda* and neutralize a base with boric acid. Use safety shower for large amount of chemical slipped on the body.
- ***Fainting and shock:*** Place the victim in a prone position with head lower than the feet.