



BIOCHEMISTRY LABORATORY SAFETY RULES FOR UNDERGRADUATE MEDICAL STUDENTS

Biochemistry

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ABSTRACT

The present study subjects is Laboratory Safety Rules for Undergraduate Medical Students. Awareness about the chemicals are used in the laboratory potentially toxic, irritating and flammable. Such hazards chemicals are only when they are mishandled. When the students, staffs came to the laboratory session for complete understanding of the laboratory procedures and carried out the physical and chemical properties of reagents to be used. And the another importance for this studies to improving the students skills, academical achievements, attitudes towards laboratory skills and its reducing laboratory anxiety.

KEYWORDS

Laboratory Safety Rule, Hazards chemical, Personal protective equipments(PPE)

INTRODUCTION

In the united state, the Fedral Occupational Safety and Health Act of 1970 was the beginning of the formal regulatory oversight of faculty and students safety. Since 1970 the Occupational Safety and Health Administration (OSHA) and the Centers for Disease Control and Prevention (CDC) have published numerous safety standard rules that apply to all clinical laboratories. Each year as the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and the College of American Pathologists (CAP) revise their guidelines, more attention is devoted to the laboratory safety[1].

Know newly admitted undergraduate medical students they are not known information about experimental laboratory works. In our department firstly introduced laboratory and its safety rules. When the students perform routine experiments in the laboratory and exposed to the variety of potential hazards: toxic vapors, compressed gases, flammable liquids, radioactive material, corrosive substances, poisons substances and biological hazard materials. Each professional must be taken safety conscious at all times in the Laboratory the effective control of laboratory all hazards that live in the laboratory at any time any were. The laboratory Safety begins with the recognition of all chemical hazards and is achieved through the application of common sense, a laboratory safety-focused attitude, good housekeeping and good personal behavior in the laboratory works and the storage area and above all, the continual practice of good laboratory techniques. In most of the cases, students accident can be traced directly to the two primary causes: 1st is unsafe acts and 2nd is unsafe environmental conditions[2]. The present study subjects suggest that students in laboratory works is important to improving skills, academically achievements, attitudes towards laboratory skills and its reducing laboratory anxiety.

BIOCHEMISTRY LABORATORY SAFETY :-

Students, Teachers, Researchers and Technicians who work in laboratories are exposed to the various hazards chemicals. Most of the workplace have hazards chemicals that are well recognized with well-defined actions to control the situations. In laboratories, involves a greater variety of possible hazards chemicals and some of these hazards chemicals needs to take precautions. In the all laboratory widely used 'laboratory Safety Rules' procedures are listed below.

PERSONAL PROTECTIVE EQUIPMENT (PPE) :-

Personal protective equipment is used in the laboratory to protect ourselves when working with chemical hazards.

Examples : laboratory coats, footwear, gloves, safety goggles and mask.

Laboratory Coats :-

The primary purpose of coats is used in the laboratory to protect against splashes and spills. In the laboratory coats should be nonflammable and easily removable. Laboratory coats should be

buttoned when in use. The rubber coated aprons can be worn to protect against chemical splashes and may be worn over a laboratory coat for additional protection. We should not be wear laboratory coats, gloves, or any other personal protective clothing outside of laboratory areas[3].

Footwear :-

Shoes must be worn in the laboratory at all times, regardless of the performance experimental works and use leather shoes which is completely protects the toes, heel and top of foot provide the best general protection. The shoes must be water proof materials used. The shoes must have a nonslip sole firmly attached to the foot and sandals, sneakers and open-toed shoes. do not provide adequate protection when handling heavy objects that might fall onto the feet[3].

Gloves :-

Gloves are required for routine laboratory practicals to protect the hands when the handling chemical, physical, or biological hazards that can enters in to the body through the skin and it is important to wear the proper protective gloves that is made up of polyvinyl or other nonlatex gloves are an acceptable alternative for people with latex allergies. Certain gloves materials better protection against particular reagent and hazards chemical. Nitrile gloves, offer a wider range of compatibility with organic solvents than do latex gloves [2,3].

Eyewear :-

Laboratory Safety goggles is the best protection against hazards chemical splashes, mists, vapors and dusts. Eye wear is required to be worn at any time projectile objects are being used in the laboratory works. Contact lenses do not offer eye protection; it is strongly recommended that they are not be worn in the laboratory experimental works. If using contact lenses instead of glasses, then we should wear eye-cup safety goggles in the laboratory. We should wear ultraviolet absorbing protective safety glasses while working with ultraviolet light[2,3].

- Mouth pipetting is never be allowed, using only rubber teat (Bulb) or used automated micropipette.
- **Hair :-** Hair must be tied back.
- Do not wear jewellery and loose / baggy clothing.
- Chemical Safety :-
- Never touch, taste or smell of chemical unless instructed to do so.
- Don't mix the chemicals unless instructed to do so.
- Keep the lids on chemical containers when there is not in use.
- Pencils, pen or any other materials should never be placed in your mouth.
- Don't eat food / drink water in the laboratory. Never use glassware as food / water containers.
- **Protect your hands safety :-** Wash the hands after every laboratory works / practicals and handles glasswear sharp tools and heated containers carefully.

- Do not engage in laboratory practical jokes / horseplay.
- Keep the nonessential books and clothing far away from your work area.
- **Accidents:-** Reporting to all accidents including the minor incidents to your instructor immediately.
- Caution must be taken off the burner when the practical work is completed[4].

Mask :-

The face masks is a partial cover for the face used for protection. It provides protective covering for nose and mouth. Face masks generally used in biomedical research laboratories are called dust masks. These masks are the white disposable kind with two elastic bands, one that goes to above the ears and the other below the ears. The dust masks block most of large airborne particles. They are often used when weighing out powders and during any occupational works. There are many different kinds of dust masks; therefore, know the limitation of the protection and wear the proper mask suitable for the job[5].

Handling Glassware :-

1. Breakage of glassware is the common cause of injuries in laboratories works.
2. Clean all glassware before using laboratory experimental works.
3. Protect hands with latex gloves.
4. Tests may lead to erroneous result if dirty glassware is used.
5. Use glasswares should be washed with water.
6. Special cleaning solutions such as chromic acid solutions are suggested in the case of more dirty glasswares.
7. Glasswares should also be soaked in acidic water for cleaning purpose (1% HCL solution or Nitric Acid) before use.
8. Commonly used glassware beaker, test tube, conical flask, volumetric flask, measuring cylinder, pipette, reagent bottles etc[6].

Electrical :- Electrical hazards are common caused by faulty operation and improper maintenance of electrical equipments. Results in the minor burns to severe injuries that may lead to death. General precautions to prevent electrical hazard in a laboratory areas are;

1. In the Laboratory all electrical equipment shall be properly grounded.
2. Overload circuits should be avoided, Never be used extension cord.
3. Electrical equipment should not be touch with wet hands.
4. Do not disable laboratory any electrical safety features.
5. Repair should be done by authorized persons.
6. Do not leave equipment switched on when not in use[6].

Work space :- Work space must be kept neat at all times and before leaving the laboratory all equipment and apparatus must be returned to there shelf.

Waste disposals :- After completion of laboratory experiment unwanted material must be discarded in designated containers.

EMERGENCY EQUIPMENTS :-

The emergency equipment available in the laboratory in case of emergency, includes:-

First Aid Box In Laboratory :-

- 1) Skin burns should be washed under running water or ice water and petroleum jelly or burn ointment should be applied and then covered with sterile gauze. Any blister formed must not be punctured.
- 2) Chemicals injury to the eyes must be treated by through washing with water.
- 3) In accidental swallowing of chemicals, the mouth must be thoroughly rinsed with water.
- 4) Contamination with infected material in wounds caused by broken glassware, must be thoroughly rinsed with water and washed with soap solution before applying antiseptic solution[7].

Fire Extinguisher :-

The fire extinguishers: Main four types A, B, C, and D :-

Class A fire extinguishers containing water to put out paper and wood based fires.

Class B fire extinguishers containing compressed non-flammable gases such as carbon dioxide to put out fires involving flammable

materials. The gas extinguishes fire by starving it of O₂. Class C fire extinguishers shoot a very fine non-flammable and non-conductive powder in order to extinguish electrical fires.

Class D fire extinguishers use in combating fires involving flammable metals such as magnesium and sodium. Mostly Fire blankets are used to extinguish clothing fire.

The fire extinguishers in the laboratory areas should be inspected on a regular basis. Periodically check the date on the fire extinguisher to make sure that the extinguisher is full and the extinguisher is in good working condition[3].

Eye Wash Station :-

All laboratory using hazardous chemicals, particularly corrosive chemicals. It must be required eyewash station in the laboratory work area. Eye wash stations it must be required mirror and a set of bottles containing saline solution that can be used to flood the injured eye with water. The eye wash station is intended to allow us to flood the eye with a continuous stream of water[3,8].

Exhaust fans :-

The laboratory area should be well ventilated and for this, exhaust fans must be fitted near the ceiling of laboratory for speedy removal of waste chemical gases to keep the laboratory free from dust polluted air[3].

GOOD LABORATORY PRACTICES :- GLP

- 1) Cleanliness is essential for biochemical experiment. Work area must be clean. Make sure that all equipments and labware it must be clean before use. Clean the working area equipment and lab ware after use.
- 2) Laboratory work area must be free from unwanted reagent.
- 3) Proper storage of chemicals must be done.
- 4) All the reagents must be neatly labeled. Do not contaminate reagents by using used / dirty pipettes for taking the reagent.
- 5) Do not contaminate chemicals by using used / dirty spatulas (in case of solids) for taking out the chemical.
- 6) Do not contaminate stoppers of reagent bottles and put the stoppers of bottle immediately after using reagents.
- 7) Returns the reagent bottles to there respective shelf immediately after use so as to avoid accidental breaking of bottles on the working bench.
- 8) Throw solids in the waste bins if it is necessary to pour strong acid or alkali into the sink, run water freely to wash it away.
- 9) All equipments should be handled with extreme care and learn the correct operating procedure for each instrument before using it keep the instrument in working order after its use.
- 10) Fire extinguishers and first aid box must be available in the laboratory.
- 11) All glassware must be sterilized to prevent infections[4].

CONCLUSION :-

The present study subjects suggest that the students perform routine experiments to exposed a variety of potential hazard chemicals, toxic vapors, compressed gases, flammable liquids, corrosive substances, poisons substances and biological waste materials. Personal protective equipment commonly used in the laboratory safety rules for examples; laboratory coats, footwear, gloves, safety goggles and mask. Biochemistry laboratory Safety begins with recognition of chemical hazards and safety focused attitude, good personal behavior, good housekeeping in the laboratory work area and storage areas and all the continual practice of good laboratory techniques.

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