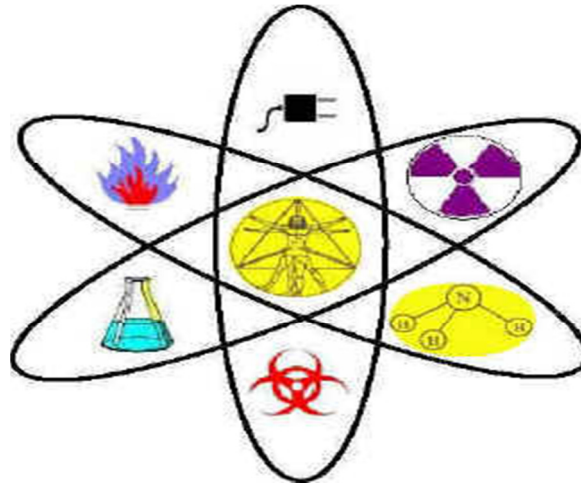


## CAMS SAFETY INSTRUCTIONS GUIDE



1435H.2014G



## **CAMS SAFETY INSTRUCTIONS GUIDE**

**Prepared by**

**Laboratory and Safety Committees**

**College of Applied Medical Science**

**Majmaah University, Al Majmaah-KSA**

## **Forward**

By the authority delegated from the College of applied Medical Sciences, Dean and Vice Dean for Quality and Safety is responsible for the safety of all facilities. Under this authority, policies are developed to provide a safe teaching, research, service, housing and recreational environment.

The Laboratory and Safety committees (L&SCs) was established in 1435H and given the responsibility for the management of all safety practices and the administration of the program. The mission of the Quality and safety committee is to support and advance the teaching, learning and research activities of the University through promotion of a safe and healthy campus environment. This is accomplished providing and coordinating programs and services that minimize safety, health, environmental and regulatory risks to the Majmaah University community in a manner consistent with responsible fiscal and environmental stewardship. Inherent in this mission is the charge to provide a safe and healthy environment in which the University's activities can be pursued.

The University adopts all applicable Universal safety laws, rules and regulations in order to carry out its duties and responsibilities. In additions, L&SCs will reference standards or codes related to safety, which have been adopted and spread by nationally recognized standards-setting organizations. The interpretation of safety codes and standards is the responsibility of the Division of the Laboratory and safety committees.

In order to assure an effective The Laboratory and safety committee program for the Majmaah University, it is imperative that all individuals associated with the University comply fully with the policies and procedures set forth in this manual.

Dr. Nasser bin Ali Al-Jarallah  
Dean, College of Applied Medical Sciences (CAMS)  
Majmaah University, Al Majmaah, KSA.

**Policy Statement**

It is the policy of the Majmaah University to provide a safe working and learning environment. The Laboratory and Safety Committees has developed this manual as a guidance document to familiarize CAMS faculty, staff, students, volunteers, and visitors with the institution-wide policies and procedures for the safe use of hazardous chemical and other material at the University. When these policies and procedures are followed, the risk of occupational exposures to chemicals and physical hazards as well as the risk of accidental environmental release of hazardous materials is minimized. This Safety Manual, produced by Laboratory and safety committees, describes policies and procedures that are required for the safe conduct of research at the College of Applied Medical Sciences, Majmaah University.

## EMERGENCY PROCEDURES

The University campus has specific Emergency Response Guidelines. Faculty, staff and students should contact their departmental chairperson for information. Supervisory personnel may obtain a copy of the Guidelines by contacting safety committee. Faculty, staff, and students from Regional Campuses and other University properties should refer to the specific emergency guidelines, and procedures for their respective areas.

## EMERGENCY CALL LIST

List	الرقم	البيان
Dean Office	4043000	مكتب العميد
Dean of Student Affairs	4042900	عميد شؤون الطلاب
University OPD	7777	الجامعة العيادات الخارجية
Fire Emergency	2222	طوارئ الحريق
Elevator	4042196	مصعد
Electric	4042222	كهربائي
Security		أمن
Police	999	الشرطة
Civil defense	998	الدفاع المدني
Ambulance	997	الاسعاف
King Khaled Hospital	4320000	مستشفى الملك خالد

## INCIDENT AND INJURY REPORTING

- An accident is an unplanned occurrence that may result in damage to people, property, equipment, or the environment. When accidents are reported promptly, injured employees, students, and visitors receive timely medical care and unsafe conditions receive prompt corrective action.
- University employees should report all on-the-job accidents, injuries, or illnesses to provide as much information as you can about the injury or illness.
- If emergency medical treatment is required, call **University Campus OPD staff to 7777**.
- If employees require non-emergency medical treatment, this treatment will be provided by one of the licensed physicians or health care providers listed on the University Health Care Provider
- If an on-the-job injury involves a bloodborne pathogens exposure (such as a needle stick or blood/body fluid splash), or involves an animal or occurs in an animal facility, medical treatment must be obtained at: Employee Health Services or OPD
- All accidents should be investigated and reviewed by department supervisors as soon as possible with the expectation that root causes will be determined and this information will be used to improve safety, as well as to prevent similar accidents from occurring. Safety committee is available to assist in this process. Safety committee encourages supervisors to complete an investigation for all injuries and illnesses, including "near misses". If you would like assistance with an investigation or have questions, please call safety and quality.

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## 1.0 INTRODUCTION

The College of Applied Medical Sciences, Majmaah University Division of Laboratory and Safety committees has developed this manual to assist in the recognition, evaluation, and control of chemical and physical hazards of the laboratory operations. This manual is intended to establish the basic safe operating practices so that investigators, lab technicians, and students may carry out effective teaching and research programs in a safe environment. The L &SCs provides specific information on hazard assessment, training requirements, exposure monitoring procedures, and accident record keeping and reporting. The laboratory specific Standard Operative Procedures also available in each laboratories.

This manual is not proposed to be a complete listing of laboratory hazards or safe practices. Because of the diverse nature of work being conducted in laboratories, additional procedures or requirements may be necessary. For example, laboratories working with biological agents, radioisotopes, animals or labs generating chemical, biological or radioactive wastes all must adhere to strict policies and procedures. For information on these and other safety related policies please consult the following resources.

Individuals having questions are urged to call upon Laboratory and Safety Committees (L&SCs) for assistance. The methods of waste disposal, emergency response will vary depending on each facility. Please check with each site for specific information and procedures.

## **2.0 GENERAL SAFETY**

### **RESPONSIBILITY, AUTHORITY, AND RESOURCES FOR SAFETY**

#### **2.1 FACULTY, STAFF, AND STUDENTS**

This Safety Manual encourages and requires that employees exercise judgment in the workplace. Disregard of prudent practices or the recommendations in this Manual may be grounds for disciplinary action, per the discretion of supervisory personnel. The primary responsibility for safety rests with each individual engaged in research, education and support activities at the College of Applied Medical Science. University faculty, staff and students have responsibility to:

- Attend applicable safety training programs;
- Comply with safety rules prescribed by their Department, Dean, Director, and the Department of Health and Safety committee.
- Report any workplace hazard, unsafe condition, or accident to their supervisor or head.

##### **2.1.1 Supervisors**

- Supervisory personnel are the cornerstone of the safety program at the CAMS. CAMS supervisor has responsibility to:
- Plan and provide adequate safety measures in their area of responsibility in consultation with safety committee and their respective Dean, Director or Department Head;
- Be familiar with the environmental health and safety programs of the University and with the CAMS Safety Manual;
- Implement safety programs and control measures for the specific systems or work environments in their department or area;
- Report any occupationally-related accidents, injuries, or illnesses occurring in their areas of responsibility

- Ensure that all subordinates in their area of responsibility have received adequate safety training.
- Routinely inspect workplaces within their area of responsibility to verify safe conditions.

#### **2.1.2 Deans, Directors, Department Heads**

- Each Dean, Director, or Department Head has responsibility for the implementation of the safety program within their unit. Provides direction in all aspects of the environmental health and safety program.
- Assists University faculty, staff, and students in establishing and maintaining safe work environments;

#### **2.1.3 Building and Department Safety**

- Good communication within each faculty, department or work area is vital for the success of the environmental health and safety program. The Safety committee endorses organized safety committees at the laboratory, building, department or faculty level to provide a forum for CAMS employees to express their needs and concerns for safety, and to resolve such issues and concerns in conformance with the University environmental health and safety program.
- The responsibility for the management of laboratory safety and adherence to safe lab practices rests within the department. All personnel, including Faculties, Students, Administrator, Doctors, Supervisors, Staffs and Visitors have a duty to fulfill their obligations with respect to maintaining a healthy and safe work environment.

#### **2.1.4 Laboratory In charge**

- Ensure that all personnel working within their unit are provided sufficient information and training to carry out their work safely;

- Ensure that all lab personnel are equipped with the required Personal Protective Equipment (PPE).
- Ensure that safety devices are adequate, appropriate and in good working order;
- Ensure that all personnel receive appropriate and adequate information and training to be able to respond to emergency situations;

#### **2.1.5 Laboratory personnel and Students**

- Be familiar with the departmental safety instructions, whether written or oral, and to comply with these instructions when conducting laboratory work;
- Wear the appropriate personal protective equipment when conducting work with hazardous materials or procedures;
- Report all accidents, dangerous incidents or suspected occupational illnesses to their immediate supervisor without delay;
- Refrain from manipulating any hazardous materials prior to undergoing appropriate safety training and receiving safety instructions;

#### **2.1.6 Visitors, contractors and non-laboratory personnel**

- Obtain authorization from the lab Incharge prior to entering the lab working area.
- Abide by the instructions of the lab Incharge or designate regarding restricted access and the use of personal protective equipment.

#### **2.1.7 Safety Standards**

- To ensure that the laboratory meets accepted safety standards is the second part of the safety program. This includes attention to proper labelling of chemicals, proper earthing of electrical equipment, and provision of means for proper handling and disposal of bio-hazardous materials, including all patient specimens.

### **2.1.8 Safety education and training program**

- College of Applied Medical Sciences will implement an effective safety and health program for the employees and Students. All staff will be educated to report and manage exposure to infectious and hazardous materials. Training programs will be held to prevent injuries. All staff will report exposure to potentially infectious material to their supervisor so as to initiate action to protect the employee, Students and Researchers patient in the College.

### **2.1.9 Laboratory Security**

- Laboratories must be locked if no one is in the lab. Acute toxins, select agents, controlled substances and radioisotopes must be appropriately secured. Do not hesitate to politely question anyone who does not belong in the area. If asked, it is requested that you decline to answer any questions about the contents or research being performed in the lab or the facility. If there is any concern about lab security or suspicious individuals please contact UPD at 392-2111 or the local responding agency.

### **2.1.10 Visitors**

- Visitors must be escorted by lab staff
- Must be made aware of any potential hazards they may encounter in the lab.
- Wear the correct personal protective equipment for the hazards present in the lab, no matter if they are visitors or maintenance workers, no matter how long they will be in the lab.
- Abide by laboratory regulations for access and control of hazards.
- Pets are not allowed in labs. Only certified service animals may be allowed into UF buildings.

### **2.1.11 Minors**

- Minors are not permitted to work in the laboratory unless they are a registered student or participating in a supervised University sponsored “Scholars” program and meet the following criteria:



## 2.2 BUILDING AND OFFICE SAFETY

All University buildings possess features that afford occupant safety in emergencies. All occupants of University buildings should observe the following guidelines for identifying and reducing hazards:

- Be aware of the emergency procedures or emergency signals for your building. Each University building is equipped with an emergency signaling system.
- Be familiar with the location of emergency exits and fire alarm pull stations.
- Know the short term and long term assembly areas external of your building.
- Never obstruct emergency exits, fire alarm pull stations or emergency equipment with furnishings or stored items. Do not conceal or obscure an exit door by draperies or decorations. Always observe the Decoration Guidelines in the Fire Safety section of this manual.
- Follow EXIT signs to evacuate any building. Do not place decorations, furnishings, or equipment on or near an EXIT sign that may block or diminish their visibility.
- No lock or fastening device of any type (e.g., padlocks, chains, etc.) that prevents egress from any building is to be installed on exit doors.
- Never block open a fire door unless the hold-open device is interconnected to the building fire alarm system.
- All electrically or magnetically locked doors in an egress will release immediately upon the activation of the building fire alarm system .
- Office environments have particular hazards with potential to cause workplace injuries. The leading causes of office accidents are slips and falls, strains, over-exertion, falling objects, electrical shock, and repetitive trauma injuries. Follow these guidelines for safety in the office environment.
- Do not use any machine that smokes, sparks, or appears defective in any way. Immediately remove damaged or defective office machines from service.
- Close hand-operated paper cutters after each use and replace the blade guard.

- If you open a copy machine or printer for troubleshooting, remember that some parts may be hot. Always follow the manufacturer's instructions for troubleshooting.
- Unplug paper shredders before troubleshooting. Exercise caution with loose belts, jewelry, long hair, scarves, and neck ties near shredders.
- Do not open more than one file cabinet drawer at a time. Secure top-heavy file cabinets by having them bolted to the floor or wall. Keep the bottom drawer full to stabilize the entire cabinet. Do not leave file cabinet drawers open while unattended. Do not block ventilation grates with office equipment or furniture.
- Avoid using extension cords.
- Keep all cords and wires out of foot traffic areas and do not roll chairs over electrical cords or wires.
- Never climb using shelves or chairs. Use a step stool or ladder.
- Report slippery, damaged, or uneven floor surfaces, torn carpet, broken tile or poor lighting to your supervisor.
- Elevators and Lifts: The following guidelines are for the safe use of elevators and Lifts at the Majmaah University: Never tamper with elevator and escalator controls or interlocks.
- Never block elevator doors open.
- In the event of a fire or emergency, never use an elevator unless instructed by emergency responders.
- An emergency phone is installed in each elevator to contact the University Police. In case of emergency, press the call button, and clearly state your name and location. University Police will summon emergency help. Remain calm.
- Never exit the car through the emergency hatch or through the doors when between floors. Wait for help to arrive.

- Report unsafe conditions. All employees are encouraged to report dangerous or unsafe conditions to their supervisor. University employees may also contact the Department of Environmental Health and Safety directly to report an unsafe condition.

## **2.3 WORK ENVIRONMENT**

- Supervisors and faculty are responsible for providing a safe work environment for the employees, visitors, and students in their respective areas. It is the responsibility of each supervisor, faculty member or manager to:
  - Monitor the general condition of facilities and equipment within their areas of responsibility to identify potential hazards or unsafe conditions;
  - Communicate hazards which have been identified to faculty, staff, students and the administration as appropriate;
  - Investigate reports of unsafe conditions or seek assistance from safety department regarding such reports;
  - Plan and implement corrective actions for identified hazardous or unsafe conditions; Avoid reprimanding employees or students for exercising their right to report unsafe conditions or request safety information;

### **2.3.1 Individuals with Disabilities**

- College of applied Medical Science, Majmaah University is proactive in providing facilities and programs with unrestricted access for disabled individuals.

### **2.3.2 Smoking**

- Smoking is prohibited inside the University campus owned and leased facilities, including but not limited to: residence halls, off-campus housing, academic halls, health science facilities, athletic

facilities, and food service operations; and in all University vehicles, campus busses, and vans; with explicit limited exceptions described below.

- Smoking is also prohibited within 15 feet of the building primary entrances and HVAC intake vents of all University owned and leased property. Primary entrances shall be defined as the common public access points to each building, and is not intended for doors designated as emergency exit only or as service entrances. However, portions of loading docks that are under building cover shall be considered as inside the building, and smoking shall be prohibited.

#### **2.4 ELECTRICAL SAFETY**

The College of Applied of Applied Medical Science is committed to safety in all aspects of operation. These guidelines were developed using national standards for electrical safety, so that a safe environment is maintained for faculty, staff, students and visitors. The addition or alteration of permanent wiring, lighting or other electrical components requires the involvement of Facilities Management, Housing Facilities, or Property Management. Theatrical groups may add or alter temporary lighting, wiring or other appropriate electrical components provided that electrical safety standards are maintained. All electrical repairs must be done by qualified individuals. The following guidelines are not all-inclusive. They are given as fundamental advice to be applied in all situations.

- Controlling Electrical Hazards
- Never clip off ground pins on three-wire appliances or use two-wire adapters to wed incompatible equipment.
- Never use substandard two-wire household appliances, lamps, hair dryers and power bars.
- Never touch bare wires.
- Never intentionally overload a circuit.
- Never bypass fuses or circuit breakers.

- Keep electrical service and breaker panels accessible at all times. These electrical panels should have 36 inches of clearance in front and a 3 foot wide aisle leading to them. It helps to mark the floor around the area that must remain clear.
- Circuit breakers and fuse boxes must be either recognizable or labeled. Outlets, switches and junction boxes must be covered. All electrical boxes must be secured to the wall.
- Install ground fault circuit interrupters (GFCI) on any outlet in damp or wet locations, or within 6 feet from wet locations or water sources such as sinks. Also install GFCIs on outlets frequently used for power tools.
- Do not perform electrical work in damp locations or put a drink where it could spill in an electrical device or electronic component.
- Lockout/Tagout procedures must be followed when equipment is de-energized. Call to Safety department.
- Only trained and authorized electricians should remove covers from electrical panels.
- Electrical equipment that malfunctions should be immediately removed from service.
- Unplug any lighting instrument before changing the lamp.
- Always disconnect a plug by pulling on the connector body not the cable. Disconnect any device from the circuit before service.
- Use wooden or fiberglass ladders when working on elevated electrical jobs (such as hanging and focusing lights). If metal ladders must be used, they must be insulated with high quality rubber footpads. Moveable metal scaffolds or adjustable ladders should have lockable rubber casters.

#### **2.4.1 Temporary Wiring and Extension Cords**

- Coil temporary wiring neatly, and keep flexible cable out of traffic areas. Cover wires that cross walkways with treadles.

- Check cable, cords, and connectors periodically and immediately replace any items that show signs of cracking, chipping or other deterioration.
- Remove any grease, dust, or other accumulations from cables and connectors. These substances can act as insulation between the contacts of the connector, and they can pose a fire hazard.
- Temporary cables, cords and wiring must not be spliced. Use proper connectors and terminations.

#### **2.4.2 Extension cords and power strips.**

Use of extension cords should be avoided. Extension cords are intended for temporary use only and should not exceed 90 days. If additional wall receptacles are needed, contact the facility manager for your building (e.g. Facilities Management, Housing, and Property Management).

#### **2.4.3 Standard power strips**

Standard power strips are designed for use with low wattage electronic equipment. High wattage appliances, including but not limited to freezers, refrigerators, copy machines, space heaters, microwave ovens, toaster ovens, and other cooking and laboratory equipment must not be supplied power via extension cords or power strips. High wattage appliances must be plugged directly into a wall holder.

- Extension cords must not be connected in series. Power strips must not be connected in series or be used with extension cords.
- Refrigerators and cooking appliances should be used only in designated kitchenettes and other areas where suitable wall receptacles with proper circuit capacity for power requirements have been provided.
- Location and use of cooking devices outside of designated areas can result in unnecessary fire hazard, electrical shock hazard, tripping of circuit breakers, and activation of smoke detectors and/or the building's fire alarm system.
- Use extension cords that have GFCIs built into them.

- Do not run flexible cords through holes in windows, doors, ceilings, floors, or walls. Cords may not be attached to building surfaces.
- Avoid stretching or pinching cords between objects, and do not cover electrical cords with rugs. This can break interior wires, causing overheating and fires.
- Cable running beyond 25 feet should be avoided as it may increase electrical resistance beyond its normally rated capacity.
- Be sure personnel, students, and trainees know the location of the master switch for stage lighting equipment.
- Permit only authorized and trained personnel to work on lighting. Make sure that each individual knows his or her responsibilities as defined by a job description (in the Handbook of Theatrical Apprentices or some other suitable set of formal guidelines).
- Arrange work schedules so that no other activities take place on stage while lights are being hung or focused.
- Before hanging lights, crewmembers should make sure that there is nothing on their persons that would fall to stage level.
- Portable light bulbs, including backstage lighting, should be guarded.
- All lighting stands must be properly secured.
- Portable stage switchboards must be connected to outlets of sufficient voltage.
- Never overload dimmer boards. Make sure there is a completely dead (non-conducting) front on dimmers and light boards.
- Report to a supervisor immediately after the detection of any irregularities, defective equipment or incidence of electric shock.

## **2.5 Power Tools for Electrical Safety**

- Purchase only power equipment that is either grounded or double insulated. A grounded tool has a three-conductor cord with a three-pronged plug that must be plugged into a grounded outlet. A double insulated tool has a two-conductor cord and a special insulation system that does not require grounding. These tools should have a label or a symbol on them indicating that they are double insulated.
- Never carry a power tool by the cord.
- Unplug power tools before loading them, changing blades or bits, making adjustments or cleaning them.
- Never use electrical power tools on wet surfaces or in wet weather.
- Never alter or remove machine or blade guards.
- Eye protection should be worn when performing tasks with potential to generate flying particles or debris. Most power tool related tasks generate such hazards.

## **3.0 VISITORS TO RESTRICTED AREAS**

As an extension of its educational responsibilities, the Majmaah University allows and encourages community representatives, members of the public and students to visit University facilities. However, visitation by such groups and individuals to laboratories, maintenance shops and other restricted areas must be under the direct supervision of an authorized faculty or staff member, or part of an open house, guided tour, or supervised educational program that has the pre-approval of departmental management.

- Areas housing potential or known hazards including (but not limited to) all research, teaching, and/or clinical laboratories; maintenance shops, mechanical/electrical spaces, and construction areas; and any area where chemicals are handled or stored shall have access restricted to authorized individuals. Authorized individuals are Majmaah University faculty or staff, and other individuals



such as contractors specifically invited to the restricted area for official University business, and/or students with access privileges to specified restricted areas.

- For the purposes of these guidelines, children who are not students or employees of the University. Children are not authorized to visit laboratories, maintenance shops and other restricted areas, except as a participant in department approved tour or educational program with the permission of an informed parent or guardian. At no time should children be exposed to the hazards or dangers of the laboratory, maintenance shop or restricted area until parental consent is obtained.
- Children of University faculty, staff and students are not authorized to be in laboratories, maintenance shops or other restricted areas on an attended or unattended child care basis.
- Individuals under 18 years of age are not permitted into any area designated as a Biosafety Level 3 or posted as "Danger: Asbestos," "High Voltage," "Danger: Laser," and "Extremely Hazardous Area - Do Not Enter - Contaminated Area."
- Individuals under 18 years of age are not permitted into any area with restrictive warning signs, such as "Authorized Personnel Only," "Restricted Area - Admittance to Laboratory Personnel Only," and other restrictive warnings unless pre-approved by the department Head.
- Domestic pets or animal companions are prohibited in restricted areas of University buildings, except for service animals with express written consent of the department Head.
- The functional unit chairperson or director, shop supervisor, or laboratory principal investigator bears primary responsibility for insuring that unauthorized individuals are not granted access to restricted areas in their responsibility areas and that University faculty, staff and students under their directions are aware and adhere to these guidelines.

## **4.0 PERSONAL PROTECTIVE EQUIPMENT**

Personal protective equipment (PPE) is used to protect an individual from hazards associated with their work tasks or environment. Specific types of personal protective equipment include protective clothing, eyewear, respiratory devices, protective shields, gloves, and hearing protection. Personal protective equipment is not a substitute for engineering controls such as chemical fume hoods and biosafety cabinets, or for administrative controls and good work practices. PPE is used in conjunction with these controls to provide safety and maintain health.

The Laboratory and safety committee, college of applied Medical Sciences to provide assess areas or tasks to identify hazards, to select or advise on the appropriate PPE for identified hazards, and to provide training in the proper care, maintenance, use, and disposal of PPE.

### **4.1 Responsibilities Regarding Personal Protective Equipment**

- The University (through faculty and supervisors) is responsible for selecting PPE that fits each affected faculty, staff and student.
- Supplying PPE during the execution of job duties and experimentation that have been pre-determined to have potential hazards
- Assuring the adequacy of any employee-owned PPE
- Providing training to each PPE user on hazards and required PPE.

### **4.2 Responsibilities for Department and Laboratory & Safety committee**

- Assessing work areas to identify hazards which necessitate the use of PPE
- Maintaining records of all hazard assessments
- Assisting in training on the proper use, care, and maintenance of approved PPE
- Providing guidance on the selection of PPE

- Evaluating the overall effectiveness of the PPE

### **4.3 Responsibilities of Supervisors**

- Ensuring that the affected faculty, staff and students working in their respective areas receive the appropriate PPE.
- Ensuring that the affected faculty, staff and students working in their respective areas receive appropriate training for the use, care, and maintenance of PPE.
- Ensuring that the affected faculty, staff and students working in their respective areas use PPE properly during their activities.
- Seeking assistance from Laboratory and safety committees L&SCs to evaluate and identify workplace hazards and to select appropriate PPE.
- Notifying by L&SCs when new hazards are introduced into work areas or when hazardous processes are added or altered.
- Ensuring defective or damaged PPE is immediately replaced or repaired.

### **4.4 Responsibilities for PPE users are**

- Attending training for the proper use of PPE
- Maintaining PPE in a sanitary and reliable condition
- Using PPE properly
- Informing their supervisor or advisor of the need to re-evaluate PPE.

#### **4.4.1 Care and Maintenance of PPE**

- PPE must not be shared between users unless it has been properly sanitized. It is also important to ensure that used or contaminated PPE that cannot be properly decontaminated is disposed according to University waste disposal procedures.

- Disposable or “single use” PPE must never be re-used without approval of L&SCs.

#### **4.4.2 Hand Protection**

- Faculty, staff and students are required to use appropriate hand protection when their hands are exposed to hazards, such as:
  - ✓ skin absorption from harmful substances;
  - ✓ cuts, lacerations or abrasions;
  - ✓ chemical exposure;
  - ✓ thermal burns and/or temperature extremes
  - ✓ potentially infectious material.

The selection of appropriate hand protection should be based on the characteristics of the gloves relative to the task being performed, the conditions present, the duration of use, and the identified potential hazards.

- General Purpose Work Gloves: Leather or fabric gloves used to reduce the effects of using tools over extended periods of time (generally not suitable for protection from liquids or chemicals)
- High temperature gloves: Leather gloves with heat reflective aluminized coating, wool lining, heat resistant acetate lining in cuff.
- Low temperature or refrigerator gloves: Leather gloves with , insulated wool lining and knit wrist
- Cut/Puncture/Abrasion Resistant Gloves: high strength synthetic fibers

##### **4.4.2.1 Chemical Resistant Gloves**

- Neoprene gloves protect against acids, caustics, oils, greases, most solvents.
- Vinyl coated gloves provide abrasion resistance and protection against solvents, ammonia, alcohols, and most organic acids. Ideal for petrochemical operations.

- Butyl gloves provide permeation resistance to most gas or water vapors and are ideal for protection against aldehydes, ketones, esters. They provide greater protection than neoprene, nitrile, and natural rubber for certain classes of chemicals.
- Latex rubber gloves provide liquid resistance for food handling and laboratory work, and protection from exposure to potentially infectious material
- Nitrile gloves provide protection against a wide range of chemicals including aromatic, petroleum and chlorinated solvents, and offers liquid barrier protection for potentially infectious materials. These are ideal for faculty, staff and students with a documented sensitivity to latex.

#### **4.5 Care and Use of Hand Protection**

- To preserve the useful life of gloves, wash chemicals or materials from reusable gloves after each use.
- Store gloves away from the contaminating area or hazard to reduce deterioration
- Properly discard disposable or compromised gloves
- Check gloves prior to donning and periodically for signs of wear or deterioration, and replace as necessary;

#### **4.6 Body Protection**

- Certain activities require protective apparel to minimize the potential for exposure to skin. This section is intended to provide faculty, staff and students with general guidelines for identifying activities that require protective apparel and selecting appropriate body protection for the associated hazards.

#### **4.6.1 Chemical Resistant Clothing**

- Protective apparel designed to provide a barrier against a variety of chemical hazards. Chemical resistive clothing may be required for tasks where chemical splashing is anticipated or large volume transfers are conducted. Prior to selection of chemical resistant clothing, L&SCs should be consulted.

#### **4.6.2 Laboratory Apparel and Scrub Suits**

- A wide variety of styles and materials are available to protect employees during laboratory operations. The selected type of lab coat or other apparel is designed to protect the wearer against accidental splashes or day-to-day handling of chemicals.

#### **4.6.3 Clean room Apparel**

- Cleanroom apparel is designed and classified to meet Federal requirements for the control of airborne particles.

#### **4.6.4. Care and Use of Body Protection**

- Body protection is specifically designed and designated as “reusable” or “disposable.”
- When using disposable apparel, a new garment should be used for each operation, and the used garment should be properly discarded after each use.
- When utilizing reusable protective apparel, it is important to follow the manufacturer’s cleaning instructions. Improper cleaning may compromise the integrity of the garment and reduce it’s capability for body protection or protection of clean room environments.

#### **4.6.5 Ear and Hearing Protection**

- Ear plugs and muffs are available for any employee potentially exposed to noise levels at or above 85 dBA

#### **4.6.6 Eye and Face Protection**

- Approved eye protection must be worn by all University faculty, staff, students, and visitors that engage in hazardous activities or are exposed to identified eye hazards within University buildings or on University property. Protective eye wear does not provide unlimited protection and is not intended as a substitute for engineering controls, such as equipment shields, and operational controls.
- University faculty, staff and students that wear prescription eyeglasses while engaged in operations that involve eye hazards must wear protective eye wear that incorporates the prescription lens in the design or fits properly over the prescription eyeglasses.
- Wearers of contact lenses must wear appropriate eye and face protection devices in hazardous environments.
- Safety goggles and/or a face shield must be used when there is a significant hazard from chemical splashes or from projectile hazards such as fragments, chips, or flying particles.
- Equipment fitted with appropriate filter lenses must be used to protect against light radiation. Filter lenses must have a shade number that is appropriate for the work being performed. See the Laser Safety section of this manual for more information.

#### **4.6.7 Care and Use of Eye and Face Protection**

- Clean eyewear after each shift or work activity. Use anti-fogging agents to reduce or eliminate fogging.

- Replace scratched or damaged eyewear
- Thoroughly disinfect eyewear that was used by other employees with warm water and soap or a recommended disinfectant.
- Store eyewear in a bag, drawer or protective case to prevent scratching, damage or contamination.

#### 4.6.8 Recommended Types of Eye Protection for Identified Hazards

Workplace activities	Identified Hazards to Eye and Face	Recommended Eye Protection (Listed from least to most protective)
<b>Woodworking, grinding, drilling, any operation that produces flying particles.</b>	Impact from flying particles	Safety glasses with side shields Direct vent goggles Clear face shield over Safety glasses or impact protection goggles
<b>Laboratory or chemical handling operations</b>	Impact from broken glassware, splashes from liquid chemicals	Safety glasses with solid side Shields Indirect vent goggles
<b>Medical, clinical, or biological laboratory operations</b>	Exposure to biohazardous or infectious materials	Safety glasses with solid side shields Face shield over Safety glasses
<b>Laser operations</b>	Exposure to direct or reflected laser radiation	Laser protective eye wear appropriate for individual laser
<b>Welding operations (electric arc or gas welding)</b>	Exposure to infrared radiation and hot sparks	Welding goggles, welding helmet or welding shield specific to type of welding operations



#### 4.7 FACULTY AND STAFF RESPONSE TO STUDENT INJURY

These guidelines are intended to provide faculty and staff with a standardized process to evaluate, document, and report incidents that involve student injury. It is the University's goal to prevent student injuries and to provide a campus that is free from recognized hazards, but in the event of student injuries that may occur during academic endeavors or University-related events, a swift and effective response by faculty and staff is expected.

- If a student (or any individual on the university campus) is observed by faculty or staff to be in a condition requiring **emergency medical attention, immediately call to 7777**. Conditions requiring emergency medical attention include but are not limited to loss of consciousness, unexplained shortness of breath, burns, chemical splashes and injuries regarding the eye, profuse bleeding or other severe injury. The faculty or staff member should remain at the site of the individual requiring emergency medical attention in order to provide additional information to emergency responders.
- For students injured in academic settings, including classrooms, teaching laboratories and research laboratories, the faculty member or designee should immediately respond to the injured student, regardless of whether emergency medical attention is needed, by approaching the injured student to offer assistance and collect information. Collected information should include the injured student's name and the injured student's description of the incident. Actions taken should include the following:
  - If emergency medical attention is needed (or if emergency medical assistance is requested by the injured student), immediately call to 7777.
  - If non-emergency medical attention is needed, escort the injured student to Student Health Services, University campus in working hour at medicine OPD. Any student injury shall be reported to the office of the chair for the department or responsibility center of the class or laboratory before the end of the next business day. If emergency medical attention was

required the Heads or chairperson's office should promptly notify the responsible dean's office and the Office of the Dean of Students affair at **4042900**

- If hazardous materials are involved in the incident, follow the laboratory safety manual found in the L&SCs. Provide basic first aid as warranted by the injury, then call to **7777** for emergency medical assistance.
- After the student is treated, a faculty or staff member should document the event based on witness accounts or personal observation. Documentation should be factual and should not include opinions as to fault or cause. Documentation should be given to the chair of the department or the director of the laboratory who shall immediately forward it to the Dean of Students, the dean of the school involved, and the Director of Health and Safety. If requested, this documentation should be provided to the Office of General Counsel, Office of Risk Management, and/or other University responsibility center with a legitimate need to know.
- When an incident involves injury to an undergraduate student, the Dean of Students shall be responsible for coordinating responses and communicating with students and parents. When an incident involves a graduate student, communications with the student shall be coordinated by the dean of the school or his/her designee. Students participating in Athletic Department events are not included in these guidelines. Resources for medical support of student athletes are provided at all Athletic Department events.
- For students injured in intramural settings and recreational areas within University buildings, a description of the incident and the student's name is documented by the Department of Intramurals and Recreation, and forwarded to the Office of the Dean of Students.
- If a student is injured while participating on a University-sponsored field trip or study abroad program during programmed time, it is the responsibility of the faculty director or program assistant to ensure that the student receives care. If emergency care is required, the faculty director or

program assistant should dial the appropriate local emergency number and/or escort the student to the hospital or care center. If non-emergency care is required, the faculty director or program assistant should stay with the student to ensure his/her safety and, while abroad, function as an interpreter where necessary. The faculty director or program assistant should maintain regular contact with their Study Abroad Office as applicable. If a student is injured during free time, the faculty director or program assistant should proceed to the hospital or medical center where the student is receiving care and ensure communications occur as described above.

## **5.0 GENERAL SAFETY MEASURES IN LABORATORY**

Each laboratory at the college of Applied Medical Science is unique, by virtue of the research being performed, the equipment in use, and the physical layout of the lab or utilization of space. Regardless of the characteristics, teaching and research laboratories at the Majmaah University must follow to the basic safety policies outlined in this manual.

An annual Laboratory Safety Review is performed by LC to verify compliance with the policies set out in this manual as well as compliance with safety programs related to the type of research conducted and agents used in the lab. If a safety issue is observed the reviewer will offer recommendations to aid the staff in correcting the problems. However, the following laboratory rules are given below!

1. Conduct yourself in a responsible manner at all times in the laboratory



2. Before start in Laboratory work follow all written and verbal instructions carefully. If you do not understand a direction or part of a procedure, **ASK YOUR CONCERN TEACHER BEFORE PROCEEDING WITH THE ACTIVITY.**
3. Students are never allowing to work in Laboratory alone or without presence of the teacher.
4. Students are not allowed to touch any equipment, chemicals or other materials in the laboratory area until you are instructed by Teacher or Technician.
5. Perform only those experiments authorized by your teacher. Carefully follow all instructions, both written and oral.
6. Unauthorized experiments are not allowed in the Laboratory.
7. Do not eat food, drink beverages or chew gum in the laboratory and do not use laboratory glassware as containers for food or beverages.



8. Be prepared for your work in the laboratory. Read all procedures thoroughly before entering the laboratory. Never fool around in the laboratory. Horseplay, practical jokes and pranks are dangerous and strictly prohibited.



9. Always work in a well-ventilated area and Observe good housekeeping practices. Work area always Keep clean and tidy.
10. Be alert during the work proceed with caution at all times in the laboratory. If you find any unsafe condition you must be convey immediately to the teacher.
11. Dispose of all chemical waste according to the universal guideline. Never mix chemicals in sink drains. Sinks are to be used only for water. Check with your teacher for disposal of chemicals and solutions.
12. Before use equipment must be read carefully Labels and instructions. Set up and use the equipment as directed by your teacher.
13. Keep hands away from face, eyes, mouth and body while using chemicals or lab equipment's. Wash your hands with soap and water after performing all experiments.
14. Experiment must be personally monitored at all times. Do not wander around the room, distract other students, startle other students or interfere with the laboratory experiments of others.
15. Every Student should know the locations and operating procedures of all safety equipment including, First AID KIT (s) and Fire extinguisher. Know where the fire alarm and the exits are located.



16. Know what to do if there is a fire drill during a laboratory period, containers must be closed, and any electrical equipment turned off.

17. Any time chemicals, heat or glassware are used, students will wear safety goggles. NO EXCEPTIONS TO THIS RULE!



18. Contact lenses may be not be worn in the laboratory.

19. Dress properly during a laboratory activity. Long hair, dangling jewelry and loose or baggy clothing are a hazard in the laboratory. Long hair must be tied back, dangling jewelry and baggy clothing must be secured. Shoes must completely cover the foot. No sandals allowed on lab days.

20. A lab coat or smock should be worn during laboratory experiments



21. Report any accident (spill, breakage etc.) or injury (cut, burn etc.) to the teacher immediately, no matter how trivial it seems. **DO NOT PANIC.**



22. If you or lab Partner is hurt, immediately (and loudly) yell out the teacher's Name to get the teacher's attention. **DO NOT PANIC.**

23. If a chemical should splash in your eye(s) or on your skin, immediately flush with running water for at least 20 minutes. Immediately (and loudly) yell out the teacher's name to get the teacher's attention.



24. All chemicals in the laboratory are to be considered dangerous. Avoid handling chemicals with fingers. Always use a tweezers: when making an observation, keep at least 1 foot away from the specimen. **DO NOT TASTE OR SMELL ANY CHEMICALS.**



25. Before using the chemicals and reagents must be checked the label twice. Take only as much chemical as you need.

26. Never return unused chemicals to their original container.

27. Never remove chemicals or other materials from the laboratory area.

28. Never handle broken glass with your bare hand. Use a brush and dustpan to clean up broken glass.

Place broken glass in the designated glass disposal container.

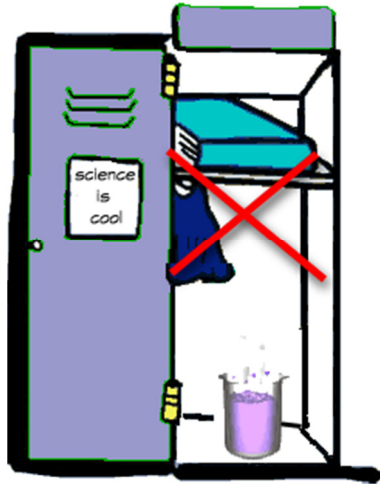
29. Examine glassware before each use. Never use chipped, cracked or dirty glassware.





30. If you do not understand how to use a piece of equipment, ASK THE TEACHER FOR HELP!

31. Do not immerse hot glassware in cold water. The glassware may shatter.



32. Do not operate a hot plate by yourself. Take care that hair, clothing and hands are a safe distance from the hot plate at all times. Use of hot plate is only allowed in the presence of the teacher.

33. Heated glassware remains very hot for a long time. They should be set aside in a designated place to cool and picked up with caution. Use tongs or heat protective gloves if necessary.

34. Never look in to a container that is being heated.

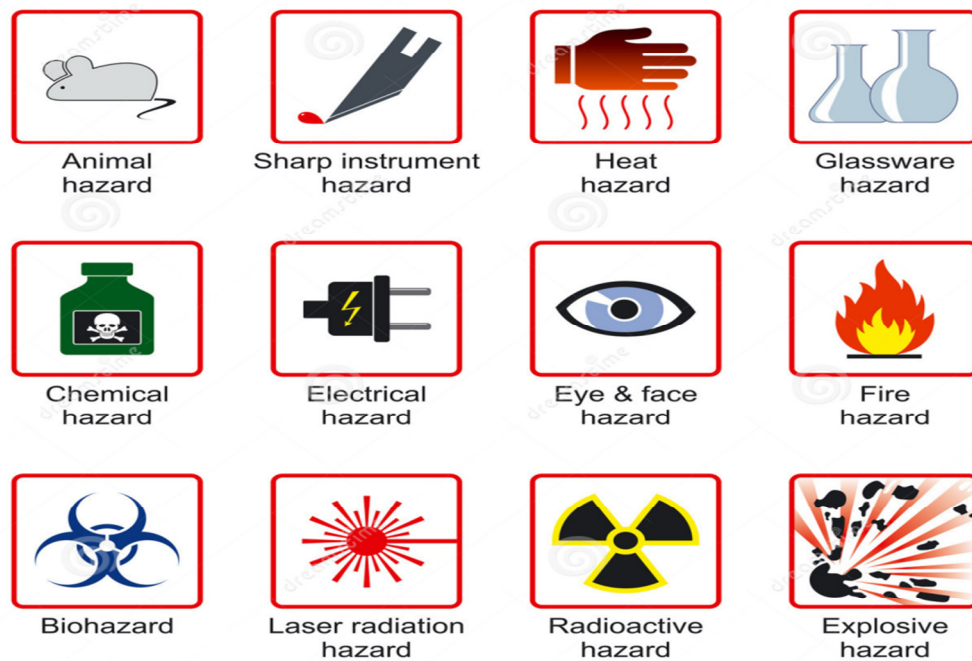
35. Do not place hot apparatus directly on the laboratory desk. Always use an insulated pad. Allow plenty of time for hot apparatus to cool before touching it.

## 6.0 Hazard Identification and communication

Laboratories are deal with many type of hazardous material like inflammable liquids/solids, oxidizing materials, toxic materials, corrosive materials, compressed gas etc. Identification of the type of hazard / spill is important to take adequate action. Communication to all the personnel in the area should be done if a flammable, carcinogenic, reactive or toxic hazard is spilled. Also spills/hazards have to be communicated to the supervisor.

### 6.1 Identification Marks

Hazard identification marks or symbol posted at all of the entrances to the lab will identify the categories of potentially hazardous materials that may be found in the lab at any given time and contact persons in case of emergency. Hazard warning stickers identify the potential chemical, biological or physical hazards that may be in the laboratory. These stickers can be added or removed as needed for the changes in the laboratory inventory. The Emergency Call List identifies the individuals to contact in case of an emergency.



## 6.2 Labeling

The manufacturer's label will provide the initial information on the handling of any substance. Directions found on the label must be followed. All bottles and chemical containers must be labeled, including, flasks, beakers, etc. If abbreviations are used, a reference list of the abbreviations must be posted in the lab.



Labelling of Equipments

## 6.3 Chemical Inventories

A complete inventory of all chemicals at the worksite is required to be maintained at all times. An inventory must be carried out and updated at least annually to cross check against the previous inventory, remove out unused or expired chemicals, and check the condition of caps, bottles and labels. This inventory must be available for lab staff, Laboratory Committee review.

## 6.4 Physical Hazards and Housekeeping

Physical hazards and poor housekeeping practices may put staff and visitors at risk of injury. Lab staff must correct or report any hazards found in the lab. Physical hazards or housekeeping issues observed outside of the lab should be reported to the appropriate maintenance division.

## 6.5 Accidents in the laboratory may be caused by:

- A. Chemicals
  - a. Acid

- b. Alkali
- c. Poisonous/Toxic Substance
- d. Chemical Spills

B. Biological

C. Heat & Fire

D. Electric Shock

E. Compressed Gases



### 6.6 Chemical hazards



### **6.6.1 Precautions to prevent accidents:**

The proper storage and use of chemicals is necessary to avoid dangers such as burns, explosions, fires and toxic fumes. Thus knowledge of the properties of the chemicals in use and proper handling procedures greatly reduces dangerous situations.

6.6.1.1 Bottles of chemicals and solutions should be handled carefully, and a cart should be used to transport a heavy container or multiple numbers of containers from one area to another.

6.6.1.2 Glass containers of chemicals should be transported in rubber or plastic containers that protect them from breakage and contain the spill if breakage does occur.

6.6.1.3 Keep bottles of acids and alkalis on the lower shelves of the cupboards. When you take a bottle out make sure your hand is dry and hold the bottle firmly upright. Do not keep acids and alkalis in bottles with ground glass stoppers (they may get stuck).

6.6.1.4 All bottles containing reagents must be labelled properly. A good practice is to label the container before adding the reagent, thus avoiding the possibility of an unlabeled reagent. The label should bear the name and concentration of reagent, the initial of the individual who made up the reagent and the date on which the reagent was prepared. When appropriate, the expiry date also should be included.

6.6.1.5 An additional label should be added to designate specific storage instructions, such as the need for refrigeration or special storage related to potential hazard.

6.6.1.6 A bottle should never be held by its neck, but instead firmly around its body with one or both hands, depending on size of the bottle.

6.6.1.7 Acids must be diluted through slow addition to water; water should never be added to concentrated acid. Do this in a sink whenever possible. Never pour the water into the sulfuric acid because of the danger of splashing due to the explosive evaporation of water while mixing.

6.6.1.8 Use small measuring cylinders for measuring acids and alkalis. If more accurate measurement is required, use a pipette with a rubber safety bulb attached. Pipette slowly, watching the level of the liquid.

## **6.7 First Aid in case of Accident with Chemicals**

### **6.7.1 Acids**

1. Nitric Acid
2. Sulphuric Acid
3. Hydrochloric Acid
4. Trichloroacetic Acids etc.

In all cases: Wash immediately and thoroughly with running water.

*In case of acid splashes in the eye:* Wash the eye immediately with large quantity of water sprayed from a wash bottle or rubber bulb. Squirt the water into the corner of the eye near the nose.

*In case of swallowing of acids drink plain cold water (3-4 glasses) and shift to patient to the casualty.*

### **6.7.2 Alkali**

1. Sodium
2. Potassium

### 3. Ammonium Hydroxide etc.

In all cases: Wash immediately with large quantities of water

In case of alkali splashes in the eye wash immediately with large quantities of water sprayed from a wash bottle or rubber bulb. Squirt the water into the corner of the eye near the nose.

**In case of swallowing alkalis** give him 3 or 4 glasses of ordinary water and shift to the casualty.

#### 6.7.3 Poisoning

This can be caused by:

- Inhaling toxic vapours or gases (e.g. chloroform).
- Accidental swallowing while pipetting a poisonous solution.

**In all cases:**

Shift the patient to Casualty/ Clinics immediately for necessary medical attention.

#### 6.7.4 Spills

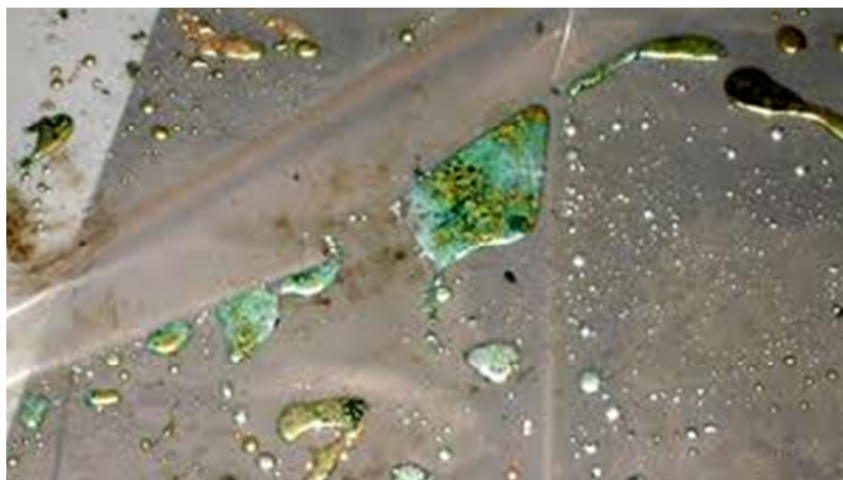
##### 6.7.4.1 Chemical Spills



1. If a chemical spill occurs, first assess the toxicity, flammability and other properties of the material. For flammables, remove or turn off all ignition sources such as motors, fridges etc.
2. If the spill is large or threat to personnel – immediately alert everyone - isolate the area - inform supervisor – confine the spill if possible.
3. If the spill is smaller, clean up is to be done depending upon the nature of spill.
4. Rubber gloves, eye protection and protective clothing have to be worn. Spill of chemicals that do not pose a fire, toxic or corrosive hazard may be cleaned up by a lab worker. Absorbent materials that will neutralize the spill (spill clean up material) like sand, sodium bicarbonate for acids, and powdered citric Acid for bases are used.
5. A dust pan and brush are used. Decontaminate area with soap and water after clean up.
6. In case of hazardous spills like nitro-compounds, ethers – inform to supervisor.
7. Floor drains should be protected from contamination, by putting absorbents or barriers around them.
8. Package and label waste – send hazardous material according to waste management manual.
9. If formalin spills over any body part, wash thoroughly with water. Apply urea stib amine solution.



### 6.7.5 Mercury Spills



If a small amount of mercury is spilled (e.g. broken thermometer), use an aspirator bulb or eye drops to pick up droplets, place the mercury in a container, cover with water, seal it, and label the bottle appropriately. To clean up the residual micro-droplets that may have worked into cracks and other hard-to-clean areas, sprinkle sulphur powder or other commercially available product for mercury decontamination. Leave the material for several hours and sweep up solid into a plastic bottle, seal it in a plastic bag and label it appropriately.

**USE EYE/FACE PROTECTION WHILE HANDLING MERCURY.**



## 6.8 BIOLOGICAL HAZARDS



**6.8.1** Prevention of laboratory employee and student exposure to infectious agents, such as the hepatitis virus (HCV/HBsAg) and HIV is essential.

### **Exposure to infectious agents results from:**

1. Accidental puncture with needles and sharps.
2. Spraying of infectious material by a syringe or spilling splattering of these materials on bench tops or floors.
3. Centrifuge accidents.
4. Cuts or scratches from contaminated glassware. Any unfixed tissue, including blood slides, also must be treated as potentially infectious material.

### **6.8.2 Prevention of Accidents with Biological Hazardous Material**

All Lab employees will strictly adhere to **Standard Precautions** as under:

1. Never perform mouth pipetting and never blow out pipettes that contain potentially infectious material.
2. Do not mix potentially infectious material by bubbling air through the liquid.

3. Use barrier protection, such as gloves, when drawing blood from a patient and handling all patient specimens, including when removing stoppers from tubes.
4. Disposable gloves provide adequate barrier protection. Phlebotomists should clean their gloved hands with skin antiseptic hand rub between patients.
5. Wash hands whenever gloves are changed.
6. Use facial barrier protection if a significant potential exists for the spattering of blood or body fluids.
7. Needle should not be recapped, bent or broken by hand. Always use a needle destroyer.
8. Dispose the needles in puncture proof containers after destroying them.
9. Dispose all sharps appropriately. Don't overfill a sharp container. All sharps containers to be discarded when 3/4<sup>th</sup> full. Sharps should not be passed from one worker to another. The person using the equipment should discard it. Rubber Gloves and boots must be worn during clean up and decontamination procedures.
10. Before centrifuging tubes, inspect them for cracks. Inspect the inside of the trunnion cup for signs of erosion or adhering matter. Ensure that rubber cushions are free from all bits of glass and balancing of the tubes is proper.
11. Cleaning of working bench is done daily with 1 % sodium hypochloride. Container for discarded tips, tube corks etc. should be filled daily with 1% sodium hypochloride.

### **6.8.3 First Aid Measures in case of Accident with Biological Hazardous Material**

#### **IN CASE OF NEEDLE STICK INJURIES OR SKIN EXPOSURE**

1. Do not panic or put finger in the mouth – encourage bleeding by squeezing – wash thoroughly with soap under running water, followed by 70% alcohol (-> Report to the supervisor (Incident Reporting Form))
2. Blood samples will be taken for assessing basal status and the risk of transmission.

3. If the index case (patient) is HBsAg Positive, exposed employee's investigations are done and HBV immunoglobulin, HBV vaccine (booster), reassurance and counseling are done accordingly.
4. If the index case is HIV Negative, HIV antibody testing of the exposed person is offered at 0,6,12 and 24 Weeks.
5. If the index case is HIV Positive exposure code and status code is evaluated and chemoprophylaxis is started within 1-2 hours following exposure. The cut off period for chemoprophylaxis is 72 hrs following exposure. All the routine investigations are to be done while starting chemoprophylaxis. Two or three drug prophylaxis is given depending on the category of exposure (Refer Infection Control SOPs)
6. In case of splash to mouth or eyes, rinse thoroughly with plenty of running water- check for and remove contact lenses – Don't use a disinfectant here.

**IN CASE OF A BIOLOGICAL MATERIAL SPILL FOLLOW SPILL PROTOCOLS AS UNDER**

1. Wear rubber gloves and cover the spill with gauze or newspaper.
2. Soak with 1% freshly prepared sodium hypochlorite solution for blood spills and 5% for culture spills and keep it for 20 minutes.
3. Discard the news paper/gauze in yellow bin.
4. 2nd decontamination may be done if required – wash the area with detergent and water.

**6.8.4 HEAT & FIRE**

**I. Prevention of Accidents with Heat/Fire:**

**Test tubes:** Never heat the bottom of a test tube. The liquid inside might sputter. Heat the middle of the tube, shaking gently. The mouth of the tube should be facing away from the worker and any other person, towards an empty space or a sink.

**Inflammable Liquids:** Only small quantities of inflammable liquids such as ether, ethanol, acetone, benzene, toluene and carondisulphide should be kept in the laboratory.

**WARNING:** Ether will ignite at a distance of several metres from a flame. Never place a bottle of ether on a workbench where there is an open flame (Bunsen burner, spirit lamp, etc.) Carbon disulphide is even more dangerous.

#### **6.9 LP Gas:**

- a. When lighting a gas burner, always light the match and hold it to the burner before turning on the gas tap. Turn off the main valves of all gas cylinders every evening. Replace the rubber connecting pipes once a year.
- b. Do not use nylon clothes while working as these are easily inflammable. Always use a laboratory apron.
- c. Always ensure that electrical wiring and electrical appliances are in good condition.

#### **6.9.1 First Aid Measures in case of burns**

They fall into two categories:

- a. **Severe burns:** affecting large areas of skin, e.g. burns caused when victim is on fire.
- b. **Minor burns:** affecting a small area of skin, e.g. burns caused by hot glassware or a Bunsen Flame.

#### **Severe Burns:**

- a. If the victim is on fire, e.g. if splashed with burning ether or other inflammable solvent. Wash the burned portion thoroughly with clean water.
- b. Inform the physician on duty immediately.
- c. Do not remove his clothing. Shift him/her to Casualty.

**Minor Burns:**

- a. Plunge the affected part into cold water or ice-water to soothe the pain.
- b. Apply silver sulphadiazine ointment to the burn.
- c. If the burn becomes infected or does not heal, refer the patient to a physician.

*Note: Never tear off the blisters that form over the burns.*

**6.10 Fire hazards**

The ideal solution to the problem of fire and indeed to all laboratory accidents is prevention. However, all fires cannot be prevented, so provisions must be made for those that do occur.

Type of hazard	Fire class	Recommended extinguisher agents
<b>Ordinary Combustibles</b> Wood, Cloth, Paper	A	Water, Type ABC (Dry Powder)
<b>Flammable Liquids and Gases</b> Any energized electrical equipment, if electricity is turned off at the source, equipments reverts to a class A & B	C	ABC, carbon dioxide
<b>Combinations of hazards</b> Ordinary combustibles and flammable liquids and gases.	A & B	ABC, Foam
Ordinary combustibles and electrical equipment.	A & C	ABC, Carbon dioxide
Flammable liquids and gases and electrical equipment.	B & C	ABC, Carbon dioxide
Ordinary combustibles and flammable liquids and gases and electrical equipment.	A,B & C	ABC, Carbon dioxide, Foam

- Various types of fire extinguishers are available for use in various types of fires. Because every area practically can not contain several types of fire extinguishers, ABC (Dry Powder) fire extinguishers are among the best all purpose extinguishers. Every individual in the laboratory is instructed in the use of these extinguishers and other available firefighting equipment. All fire extinguishers should be tested by qualified personnel at intervals specified by the manufacturer. Each fire extinguisher is labeled based on the type of fire it should be used to extinguish.
- In case of fire, immediately inform the fire safety officer and dial extension 333 (Code Red), evacuate the area and follow instructions of fire safety officers.

Fire extinguisher is located near the laboratory door. Every individual has been instructed/trained in the use of fire extinguishing equipments.

#### **6.10.1 Hazard from compressed gases**

Cylinders of compressed gas should be handled with care.

1. Always transport cylinders with a hand truck to which the cylinder is secured.
2. Leave the valve cap on a cylinder until the cylinder is ready to use, before which time the cylinder should be secured by a support around the upper one third of its body. Disconnect the regulator, shut off the valve, and replace the cap before the cylinder is completely empty to avoid the possibility of the development of a negative pressure.
3. Place a sign or label that reads empty on the container.
4. Cylinders should be chained to a fixed piece of furniture or secured by a strap attached to a wall even when they are empty.

## **6.10.2 Electrical hazards**

### **6.10.2.1 Prevention of Electrical Accidents:**

- a. Worn wires on all electrical equipment should be replaced immediately, all equipment should be grounded through use of three prong plugs.
- b. Electrical equipment and connections should not be handled with wet hands, nor should they be used after liquid has been spilled on it.
- c. The equipment should be turned off immediately and dried thoroughly.
- d. In case a wet or malfunctioning electrical instrument is used by several individuals, the plug should be pulled and a note cautioning all employees against its use should be placed prominently on the instrument.

### **6.10.2.2 First Aid:**

- a. Before doing anything else, put off the main switch.
- b. Remove the victim from the site.
- c. Shift the patient to Casualty/Start CPR/Call for Code Blue – Dial .....
- d. In case of damage to the equipment, call for biomedical engineer/ the company engineer.

## **7.0 Utility Systems**

Laboratory staff may not perform any modifications of any utility systems in buildings or labs. No part of the ventilation, electrical, plumbing (water and gas) may be tapped into, repaired, removed added or tampered with in any way by anyone except approved by laboratory committee. If there are any concerns about the electrical system, equipment or need to upgrade it within a lab area, contact the Members of laboratory committee to assess the requirements and concerns.



### **7.1 Ventilation Systems**

Ventilation systems for laboratories are normally designed to provide 6 - 12 air changes per hour at a slightly negative pressure relative to hallways and office space. It is important to keep lab doors and windows closed as much as possible for proper pressure balance and ventilation of the lab.

### **7.2 Fume Hoods**

Chemical fume hoods are intended to remove vapors, gases and dusts of toxic, flammable, corrosive or otherwise dangerous materials. It is important for lab staff to understand how the chemical fume hood in the lab functions. All laboratory personnel must be trained in proper use of fume hoods. For complete guidelines on fume hood use see. If there are any questions or concerns about fume hood function, please contact Laboratory committee.

#### **7.2 Profiling**

Laboratory committee will profile each hood annually as mandated by various regulations and fire codes. The Laboratory committee profile sticker will provide information on the type of hood, intended use and sash height settings.

### **7.3 Plumbing Systems**

Tap water will not be left flowing for prolonged experiments for longer than 30 minutes or left unattended. A refrigerated re-circulating system must be used to cool experiments or equipment to minimize potential damage from leaks and flooding. The use of these closed loop systems is required to minimize the wasting of this valuable resource. Isolated or unused sinks and floor drains may be a source of foul odors if the traps dry out. Please ensure that all sinks have had water periodically run into them to fill the trap. If a sink is in an isolated area and will not be used for some time, please contact Maintenance to have it sealed or have the trap filled with mineral oil. Mineral oil will not evaporate and is environmentally safe.

## **8.0 LIST RECOMMENDED SAFETY AND EMERGENCY EQUIPMENT FOR THE LABORATORY**

### ***a. Personal Protective Equipment***

***I. Chemical splash goggles***

***II. Face shields***

***III. Lab coat***

***IV. Lab apron***

***V. Gloves***

### ***b. Safety and emergency equipment***

***c. Eye wash stations***

***d. Deluge safety showers***

***e. Safety shield with heavy base***

***f. Fire extinguishers***

***g. Sand buckets***

***h. Emergency lights***

***i. Emergency signs and placards***

***j. Fire detection or alarm system with pull stations***

***k. Fore aid kits***

***l. Spill control kit***

***m. Chemical storage cabinets***

***n. Gallon size carrying buckets for chemical bottles***


***o. Laboratory chemical hood (60-100ft/minute capture velocity, vented outside)***

***p. Ground fault interrupter electrical outlets***

***q. Container for broken glass and sharps***

r. Material safety data sheets (MSDSs)

s. Emergency action plan for the institution

 Explosive	 Explosive	 Oxidizing	 Oxidizing	 Flammable	 Flammable
 Harmful Irritant	 Harmful Irritant	 Corrosive	 Corrosive	 Toxic	 Toxic
 Toxic to the environment	 Toxic to the environment		 Gas under pressure		 Carcinogenic Mutagen Reprotoxic

#### 9.0 National fire protection association hazards labels-704



The National Fire Protection Agency (NFPA), in section 704 of the National Fire Code, specifies a system for identifying the hazards associated with materials. Although the system was developed primarily with the needs of fire protection agencies in mind, it is of value to anyone, including someone working in the Laboratory, which needs to handle potentially hazardous material. This standard presents a simple, readily recognized, and easily understood system of markings that provides an immediate general sense of the hazards of a material and the severity of these hazards as they relate to emergency response. There are categorized four types;

### 9.1 Types of NFPA Hazards Labels-704

#### 9.1.1 Red (Flammability):



#### Susceptibility of Material to Burning

The red section of the diamond provides data on the flammability of the chemical. There are certain conditions under which chemicals may burst into flame, and this section of the diamond explains those circumstances in which a chemical may burn. Within this section is a number between zero and four;

0		<b>Not combustible</b>
1		Combustible if heated, the temperature must be above two hundred degrees Fahrenheit for the substance to burst into flame.
2	Caution	Combustible liquid flash point below one hundred and two hundred degrees Fahrenheit (100 to 200°F).
3	Warning	Combustible liquid flash point between seventy three and one hundred degrees Fahrenheit (70-100°F).
4	Danger	Flammable gas or extremely flammable liquid temperatures less than seventy three degrees (73°F) can be sufficient to make it burst into flame.

### 9.1.2 Blue (Health Hazard)



Blue informs people as to the potential health hazard of the chemical and its toxicity in the short term. Toxicity is measured with the numbers zero through four.

0		No unusual hazards, indicating that the chemical poses no short term health threat. It should be noted, however, that such a chemical could still pose a long term health threat if a person is exposed to it consistently.
1	Caution	May be irritating, the chemical is slightly hazardous.
2	Warning	May be harmful if inhaled or absorbed, means it is hazardous.
3	Warning	Corrosive or toxic, avoid contact or inhalation. The chemical is an extreme danger.
4	Danger	Short term exposure can be deadly. May be fatal on short exposure. Specialized protective equipment required

### 9.1.3 Yellow Reactivity



#### Susceptibility of Material to Burning.

On the NFPA diamond, the yellow section measures reactivity or the likelihood of the material exploding or detonating. Again, the rating is somewhere between zero and four.

<b>0</b>	<b>Stable</b>	<b>Not reactive when mix with Water, indicating that the chemical is stable.</b>
<b>1</b>	<b>Caution</b>	May react if heated or mixed with water but not violently, Means chemical becomes unstable when it is heated.
<b>2</b>	<b>Warning</b>	Unstable or may react violently if mixed with water.
<b>3</b>	<b>Danger</b>	It can detonate under heat or vibration. May be explosive if shocked, heated under confinement, or mixed with water.
<b>4</b>	<b>Danger</b>	It is very likely to detonate, explosive material at room temperature.

#### 9.1.4 White (Special Notice key)



The white section of the NFPA diamond is used to identify chemicals that are especially water reactive or that will respond with greater combustion when fuel is added to a fire in which they are involved.

<b>W</b>	An unusually water reactive chemical will be identified with a "w" that has a line drawn through.
<b>OX</b>	An OX will identify those chemicals that can increase a fire's intensity ie. Oxidizing agent.

#### 10.0 TYPES OF FIRE EXTINGUISHER LABELS

These are four types of fire extinguisher Class A od ABC, Class B, Class C and Class D. They are colour coded so that it can identify quickly and use the right extinguisher for the right type of fire.

**Class A or ABC Extinguisher Fire:** Wood, paper, textiles and other ordinary combustibles.



**Class B Extinguisher Fire:** Flammable liquids, oils, soils, solvents, paint, grease etc.



**Class C Extinguisher Fire:** Electrical- live or energized electric wire or equipment.



**Class D Extinguisher Fire:** Consumables metals (Magnesium, titanium, potassium etc.)



## 10.1 TYPES OF FIRE EXTINGUISHER

### 10.1.1 Water extinguisher - Red



For use on Class A fires only, e.g. solids such as wood, plastics. Extinguishes by cooling. Not safe on petrol/oil fires and not to be used near electrical equipment (unless it is a specialised mist extinguisher).



### 10.1.2 Dry powder extinguisher - Blue or Red with a Blue strip



May be classified either ABC (containing ammonium phosphate) or BC (containing sodium or potassium phosphate), indicating the type of fire that can be tackled. Can be used on solids such as wood, plastics and liquids such as petrol/paints. Safe to use near electrical appliances. Extinguishes by smothering the flames. Does not cool very well.

### 10.1.3 Foam extinguisher - Cream or Red with a cream strip



Can be used on solids such as wood, plastics and liquids such as petrol/paints. Safe to use near electrical appliances. Extinguishes by smothering liquids with film or cooling and smothering solids.

#### 10.1.4 CO<sub>2</sub> extinguisher - Black or Red with a Black strip



Suitable mostly for liquids only such as petrol/paints (Class B or C fires). Safe to use near electrical appliances. Extinguishes by displacing oxygen. Does not cool and not suitable for solids.

#### 10.1.5 Metal/Sand dry powder extinguishers










Only for flammable metal (Class D) fires. Work by smothering the fire. You must have a specialised Class D extinguisher if you are working with such materials.

### 10.1.6 Fire blanket












Very effective at smothering the fire and denying it oxygen but has to cover entire burning areas.

Good for intense but localized areas such as chip fat fires (Class K or kitchen fires).

Extinguisher Type	A Wood Paper & Plastics	B Flammable Liquids	C Flammable Gases	E Energised Electrical Equipment	F Cooking Oils & Fats	LIMITED
 Powder ABE	Y	Y	Y	Y	N	Indicates that the extinguishant is not the agent of choice for the class of fire, but that it will have limited extinguishing capability. Class D fires (involving combustible metals) use only special purpose extinguishers and seek expert advice.
 Carbon Dioxide (CO <sub>2</sub> )	LIMITED	LIMITED	N	Y	LIMITED	Special powders are available specifically for various types of metal fires. Seek expert advice.
 Water	Y	N	N	N	N	Generally not suitable for outdoor fires. Suitable only for small fires.
 Foam	Y	Y	N	N	LIMITED	Dangerous if used on flammable liquid, live electrical equipment and cooking oil/fat fires.
 Wet Chemical	Y	N	N	N	Y	Dangerous if used on electrical fires.
 Fire Blanket	N	N	N	N	LIMITED	Use blanket to wrap around a human torch. Ensure you replace the blanket with a new one after use.
 Fire Hose Reel	Y	N	N	N	N	Ensure you maintain a path of egress between you and the nearest exit.

11.0 Safety Symbols:

			
<p>Skull and Crossbones</p>	<p>Radioactive</p>	<p>Radiation</p>	<p>Oxidizing</p>
			
<p>Flammable</p>	<p>Do not eat and drink</p>	<p>Protective clothing</p>	<p>Gloves Required</p>
			
<p>Explosives</p>	<p>Corrosive! Avoid Contact with Eyes and Skin.</p>	<p>Biohazard</p>	<p>FOOT PROTECTION MUST BE WORN IN THIS AREA</p>

 <b>NO ENTRY</b> <small>AUTHORISED PERSONS ONLY</small>	 <b>Dangerous chemicals</b>	 <b>Safety Shower</b>	 <b>Eye Protection</b>
 <b>FIRE HOSE</b>	 <b>Corrosive</b>	 <b>Ionizing Radiation</b>	 <b>Eyewash</b>
 <b>Recycling</b>	 <b>Fire Hose Safety</b>	 <b>Flammable Gas</b>	 <b>Non Flammable Gas</b>



			
Prohibition	Non Potable water	Do not Touch	No Open Flames
			
Carcinogen Hazard	Reactive Material	Low Temperature Warning	Hot Surface Warning
			
Magnetic Field	High Voltage Warning	Toxic Chemical	Defibrillator

## References

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