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for Health Sciences
COLLEGE OF PHARMACY



جامعة الملك سعود بن عبد العزيز
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LABORATORY SAFETY MANUAL



TABLE OF CONTENTS

INTRODUCTION	2
<u>I-</u> STANDARD OPERATING PROCEDURES	2
1. General Guidelines in the Laboratory	2
2. Personal Protective Equipment (PPE)	4
3. Ventilation	5
4. Hazardous Electrical Equipment	5
5. Hazardous Waste Storage and Disposal	6
6. Flooding Incidents	9
7. Spills and Accident Reporting	9
8. Safety Equipment	9
9. Lab safety signs or symbols	11
<u>II-</u> SAFE HANDLING REQUIREMENTS IN THE LABORATORY	13
1. Hazards identification	13
2. Hazards identification	13
3. Dry ice handling and storage	13
4. Chemical abbreviations and annotations used on secondary containers in the work area	14
5. Hazardous waste handling	15
6. Label Identification	15
7. Compressed gas and cylinder Safety	16
8. Compressed gas cylinders identification / handling	17
9. Compressed gas cylinders usage	18
<u>III-</u> LABORATORY EMERGENCY RESPONSE PLAN	19
1. Emergency phones numbers	19
2. In case of fire	19
3. Clothing or body on fire	21
4. In case of chemical spill	21
5. In case of Injury and Illness	23

LABORATORY SAFETY MANUAL

INTRODUCTION

College of Pharmacy at KSAU emphasizes on applying all the standards and measures of safety in all laboratories to protect all students, faculties, and any laboratories' users from any possible hazards. Adherence to safety procedures in pharmacy laboratories is a prerequisite to any planned laboratory session. Failure to abide with safety procedures in the lab can result in damaged or destroyed equipment, environmental hazards, personal injury, and even death. Safety rules are set to guard the personal safety of the students, those of the instruction faculty, the protection of laboratory equipment, and that of the University property. This manual is purposed to provide useful information of the universal safety guidelines and procedures to create a minimum-risk environment in our laboratories.

Before engagement in any activities inside the lab, students are required to pass an on-line laboratory safety quiz after watching a video recorded lecture.

I- STANDARD OPERATING PROCEDURES

The General Laboratory Safety Manual offers basic safety guidelines and standard operating procedures for laboratories on campus. Following these guidelines during any assigned experiment ensures the successful accomplishment of the intended objectives of the experiment. Failure to abide by safety procedures in the lab can result in damaged or destroyed equipment, environmental hazards, personal injury, and even death. Safety rules are set to guard the personal safety of the students and those in the instruction faculty, as well as to maintain the protection of laboratory equipment and that of the University property. Students with existing medical condition(s) or disabilities that may interfere with the safe conduct of any experiment should report to the faculty in charge prior to the commencement of the laboratory course work.

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1. General Guidelines in the Laboratory:

The following guidelines have been established to minimize or eliminate hazards in the laboratory. These guidelines have also been provided to maintain a safe laboratory environment. It is the responsibility of each person that enters into the laboratory to understand the safety and health hazards associated with potential hazardous materials and equipment in the laboratory.

- a) Only authorized personnel are allowed in the laboratory.
- b) Students are allowed to work in the laboratory during scheduled sessions only, and under supervision at all times.
- c) Wearing a lab coat inside the lab is obligatory.
- d) Floppy garments, or ones that dangle, are not allowed in the laboratory (i.e. Traditional Saudi Thobe).
- e) Shoes that do not cover the entire foot (including the toes) are prohibited.
- f) Long hair must be tied back and jewelry must be removed prior to any experiment in the laboratory.
- g) Always wear proper eye protection in chemical work, handling and storage areas.
- h) Always wash hands and arms with soap and water before and after leaving the work area.
- i) Pipettors must be used when using pipettes.
- j) Students should not smell or taste any chemical.
- k) Food and drinks are not allowed inside the laboratory.
- l) Laboratory refrigerators, ice chests, cold rooms, ovens, water sources and deionized water should not be used.
- m) Keep equipment bottles from the edge of the lab bench to prevent spillage.
- n) If skin comes in contact with a chemical, wash it thoroughly regardless of amount spilled or its concentration.
- o) Proper housekeeping of the student's work area is mandatory, e.g. cleaning and waste disposal. Students are solely responsible not only for the cleanliness of their respective workbench, but also for used glassware and equipment.
- p) Broken glassware should never be used; if you find any, ask your laboratory supervisor for the proper disposal instructions.
- q) Never engage in horseplay, pranks, or other acts of mischief in chemical work area.
- r) Students must be aware of chemical compatibility when chemicals are co-transported or carried.
- s) Use a hood whenever there is a possibility of poisonous or irritating fumes being emitted.
- t) Laboratory doors and windows must be closed while experiments are in progress.
- u) Never perform any hazardous work when alone in the laboratory. At least two people should be present. Undergraduate students must be supervised by an instructor at all times.
- v) Be familiar with the location of emergency equipment—fire alarm, fire extinguisher, emergency, eyewash, and safety shower.
- w) Every laboratory should have a first-aid kit available to treat minor injuries that do not require immediate medical assistance.
- x) Students are not allowed to leave the site of their experiment while it is in progress.
- y) All hazards, faults, and injuries must be reported to the laboratory supervisor immediately.

2. Personal Protective Equipment (PPE)

The use of Personal Protective Equipment is mandatory for enhancing student safety and for reducing the severity of any unpredictable accident that may result in injury.

The minimum guidelines for mandatory PPE in pharmacy laboratories are:

- a) Wearing a long white laboratory coat (see the section below on lab coats).
 - b) Wearing shoes that completely cover the foot, including the toes.
 - c) Putting on safety glasses or goggles.
 - d) Covering long hair and beards with nets.
- i. Laboratory coats:
- a. Must be worn at all times while laboratory work is in progress.
 - b. Should be worn when a student is around chemicals, even when he/she is not engaged in an ongoing experiment.
 - c. Should not be worn in day-to-day activity in the College of Pharmacy.
 - d. Should be clean for every laboratory session.
- ii. Eye Protection:
- a. Contact lenses should not be used in the laboratory.
 - b. Safety glasses or goggles should be worn at all times in the laboratory.
 - c. As a general rule, if any foreign body or reagent gets into a student's eye inadvertently, it must be removed immediately following safe techniques and recommended procedures. The eye wash fountain must be used immediately after such incidents. If the irritation is persistent, the student may need to be seen by a health practitioner immediately after such an occurrence. The eyewash fountain resembles a drinking fountain, but it has two faucets directed toward one another instead of one (see pictures below). If any chemical inadvertently gets into a student's eye, the listed procedure below must be followed:
 - The affected eye(s) must be flushed intermittently for at least 15 minutes, taking rests in between.
 - Affected eye(s) need to be opened by retracting the eyelids if necessary.
 - Such accidents must be reported immediately to the laboratory supervisor by the affected student or by his/her classmate if the former is flushing his/her eye(s), since a follow-up treatment may be necessary.
 - d. A face shield is required when using the autoclave, liquid nitrogen vessel and UV equipment.

iii. Gloves:

The standard disposable gloves will be available in all pharmacy laboratories and must be worn when needed or when instructed. The following must be kept in mind:

- a. Gloves may need to be changed regularly and hands should be washed between every change.
- b. If contaminated, gloves must be changed.
- c. No one should go out of the laboratory wearing gloves.
- d. Students should not perform ordinary tasks wearing gloves (i.e. answering phone calls, handling textbooks, opening backpacks, etc...).
- e. Double gloves may be worn when working with strong and caustic chemicals; students may also wear blue nitrile gloves.
- f. Use ungloved hand to open doors or push elevator buttons, etc.
Removed gloves must be disposed of in the proper bin.

3. Ventilation:

The importance of clean uncontaminated air in the lab work environment is well known. Ventilation controls should be readily available and easily accessible to ensure that the lab air is continuously replaced and that concentrations of toxic substances don't increase during the workday. Additionally, the ventilation system should ensure that the toxic substances aren't recirculated from lab to lab or within the building. There are two main types of ventilation system:

- a) Heating, ventilation and air conditioning (HVAC) system are designed primarily for temperature, humidity and air quality.
- b) Local ventilation systems are designed to remove the contaminants generated by an experiment or device to the exterior of the building.

4. Hazardous Electrical Equipment:

- a) Obtain permission before operating any high voltage equipment.
- b) Maintain an unobstructed access to all electrical panels.
- c) Avoid using extension cords whenever possible. If you must use one, obtain a heavy-duty one that is electrically grounded, with its own fuse, and install it safely. Extension cords should not go under doors, across aisles, be hung from the ceiling, or plugged into other extension cords.
- d) Never, ever modify, attach or otherwise change any high voltage equipment.
- e) Always make sure all capacitors are discharged (using a grounded cable with an insulating handle) before touching high voltage leads or the "inside" of any equipment even after it has been turned off. Capacitors can hold charge for many hours after the equipment has been turned off.
- f) When you are adjusting any high voltage equipment or a laser which is powered with a high voltage supply, USE ONLY ONE HAND. Your other hand is best placed in a pocket

or behind your back. This procedure eliminates the possibility of an accident where high voltage current flows up one arm, through your chest, and down the other arm.

- g) Students must report any malfunctioning electrical equipment, or any signs of electrical hazard, to the laboratory supervisor. All electrical laboratory equipment should be plugged in. Laboratory electrical outlets cannot be used for students' personal devices.

5. Hazardous Waste Storage and Disposal.

Chemical Storage Guidelines:

In addition to eliminating hazards that may arise with the use of chemicals, an appropriate chemical storage system must be developed. Improper storage will increase the chances of an accident occurring. Examples of improper storage include storage of chemicals in alphabetical order or other categories that may bring incompatibles in contact, storage of flammables in an ordinary refrigerator, and storage of chemicals with food. The following guidelines can be used to implement a safe storage system for chemicals.

- a) Rotational Stock System:
 - i. Limit the amount of chemicals present in the laboratories.
 - ii. Ensure that all containers have the following:
 - a. Proper IUPAC Name
 - b. Manufacturer's Name
 - c. Chemical label with associated precautions
 - d. Date the chemical was received
 - e. Date the chemical was first used
 - iii. Use the following for maximum storage times:
 - a. When storing untreated chemicals that degrade to unstable forms (e.g. peroxide formers), limit the maximum storage time to one year from purchase or six months from first use.
 - b. For other hazardous chemicals, use the manufacturer's recommended storage time or other indications of degradation (e.g., discoloring of liquids).
 - c. Innocuous material (e.g., sodium chloride, sodium bicarbonate, Buffer Solutions, etc.) can be stored indefinitely or until no further use is desired.
- b) Storage:
 - i. General:
 - a. Do not store anything in the hallway, stairwells, on the floor or in any area accessible to the general public.

b. Properly label all storage areas (e.g., “Chemical Storage Area”) to warn personnel of the hazards that are present.

c. Do not store incompatible chemicals in areas where there exists the possibility of reaction. See attached list for examples of incompatible chemicals. Secondary containers may be used to segregate incompatibles stored in the same area.

d. Ensure that all containers are not corroded, broken, rusted, or leaking. If the container loses its integrity, transfer the chemical to another container or, when transfer is not possible or safe, use secondary containers.

e. In general, limit container size to one gallon in the laboratory. Larger containers should be kept in chemical storage rooms.

f. Routinely check chemicals that are being stored for possible hazards.

g. Store reactive chemicals in areas to reduce the possibility of reaction. For instance, keep water reactive chemicals in a controlled, low humidity environment.

ii. Shelves:

a. If possible, avoid storing chemicals above shoulder height. Large containers (one gallon or larger), liquids, and corrosive materials should be stored on lower shelves below eye level.

b. Ensure that shelves are capable of storage. Do not store chemicals on unsteady shelves.

c. Do not overcrowd shelves.

d. Shelves should be impervious to spilled liquids. This can be accomplished by coating the shelves with an epoxy.

e. See attached illustration for possible guidelines for storage on shelves. If this is not possible, a system of storage should be developed to ensure that incompatible chemicals are not stored together. Alphabetical storage occasionally brings incompatibles into contact and should be avoided. If this method for storage is chosen, secondary containers must be used to separate incompatibles.

iii. Refrigerators and Freezers:

a. Do not store chemicals and food together.

b. When storing flammables, use an approved explosion proof or flammable storage refrigerator.

c. Only use refrigerators or freezers for storage of chemicals that need to be kept refrigerated or frozen.

iv. Flammable and Combustible Liquids

a. Flammable and combustible liquids are separated into the following classes according to the National Fire Protection Association (NFPA):

Liquid Class	Flash & Boiling points	Example
Class 1A (Highly Flammable)	Flash Point <73°F (22.8°C) Boiling Point <100°F (37.8°C)	Ex: Ethyl ether, Dimethyl sulphide, Petroleum ether
Class 1B Flammable	Flash Point <73°F (22.8°C) Boiling Point >100°F (37.8°C)	Ex: Acetone, Toluene, Ethanol, Ethyl acetate, Hexane, Gasoline
Class 1C Flammable	Flash Point >73°F (22.8°C) Boiling Point <100°F (37.8°C)	Ex: Amyl acetate, Bromopentane, Butyric acid, Hexene, Xylene
Class II Combustible	Flash Point >100°F (37.8°C) & <140°F (60°C)	Ex: Acetic acid, Cumene, Formaldehyde
Class IIIA Combustible	Flash Point >140°F (60°C) & <200°F (93.4°C)	Ex: Benzaldehyde, Ethanolamine, Nitrobenzene

b. Do not store flammable or combustible liquids near sources of ignition.

c. The following are other NFPA specifications for storage. For chemical stockrooms, individual evaluations will be necessary and, as a result, may not be bound to these requirements.

d. The following are other NFPA specifications for storage. For chemical stockrooms, individual evaluations will be necessary and, as a result, may not be bound to these requirements.

i. Not more than 10 gallons of Class I or Class II liquids combined shall be stored outside of a storage cabinet or storage room, except in safety cans.

ii. Not more than 25 gallons of Class I or Class II liquids combined shall be stored in safety cans outside of a storage room or storage cabinet.

iii. Not more than 60 gallons of Class IIIA liquids shall be stored outside of a storage room or storage cabinet.

iv. Any quantity of liquids over this limit must be stored in an inside storage room or storage cabinet.

- v. Approved storage cabinets shall not exceed 120 gallons of combustible and flammable liquids and not more than 60 gallons of the total may be flammable liquid. Not more than 3 storage cabinets will be within one fire area of a building.

6. Flooding Incidents:

In case of water flooding the laboratory due to improper hoses or to plumbing problems:

- a) Close any visible open taps.
- b) Inform the lab supervisor immediately, and/or call the proper personnel to handle the water spilled in the laboratory.
- c) Adjust or fasten the connection of hoses on water equipment, such as the water condenser cooling pipes, if the flooding was due to improper connections.

7. Spills and accident reporting

DO NOT ADD WATER TO CONCENTRATED ACIDS.

Spilt concentrated acid should be neutralized with solid sodium bicarbonate before cleaning up. Ask for the help of the laboratory supervisor for the proper cleaning of the spillage. *Do not use organic flammable solvent such acetone to clean strong acid spillage.*

Solvents Spillages: If any solvent is spilled:

- a) Ask the laboratory supervisor to assist you in the proper cleaning of the spill.
- b) In case of the inhalation of chemical fumes: Take the individual to fresh air, seek medical assistance immediately, and provide artificial respiration or CPR as needed.
- c) Chemicals should not be disposed of down drains connected to fresh water or by evaporation.
- d) Chemical waste is required to be disposed of in properly labeled containers.
- e) Assist emergency responders as needed.
- f) All accidents should be reported, even those that require only minor medical treatment or observation.

8. Safety Equipment:

- a) Safety Shower:

In general, any student or person who accidentally get splashed or becomes wetted with a chemical over a large part of his/her body (i.e. in the case of massive spills), he/she must first remove the laboratory coat then activate the safety shower installed for this purpose to “wash off” the chemical. The student or a classmate who first observed the accident must report the accident to the laboratory supervisor, since a follow-up treatment may be necessary.

- b) Eyewash Stations:

Eyewash Stations are designed to provide a gentle and continuous, low-pressure flow of tempered aerated potable water at 0.4 gallons per minute for a period of at least 15 minutes. The stations must be easily accessible from any location in the laboratory. When possible, all laboratory users should practice activating the eyewash stations. While the EHRM prefers permanent station with plumbing, a hand-held portable eyewash station is better than no station at all.

c) Fume Hoods

Fume hoods are to be used when the student is handling toxic or caustic chemicals, or when directed by a lab supervisor. The following needs to be observed by all students using the fume hood:

- i. The hood suction and lights must be turned on when in use.
- ii. If the hood's low air flow alarm is sounding, the lab staff must stop work in the hood.
- iii. Students should never put their heads inside a fume hood.
- iv. Chemicals, glassware, or equipment should not be put on the fume hood counter in a disorderly fashion, as this may increase the chance of an accident.
- v. The hood's window sash must be taken down to the level of the student's hands after the chemicals are placed inside the hood. The lowered window sash will act as a shield that will protect the student's head and chest.
- vi. While experiments are running, the fume hood glass windows (sash) must be about 80% closed. Students should not shut the window down completely.
- vii. After working, pour waste chemicals in chemical waste container according to compatibility of chemicals.
- viii. The hood must be turned off when not in use.

d) Biological Safety Cabinets:

A biological safety cabinet is the device used to provide containment of infectious splashes or aerosols generated by many microbiological procedures. Three types of biological safety cabinets (Class I, II, and III) are used in microbiological laboratories. Class I and II biological safety cabinets are primary barriers which offer varying levels of protection to laboratory personnel and to the environment (when used with good microbiological techniques).

e) Fire Extinguishers:

Fire extinguishers are very important components of safe laboratory operation. Each laboratory should be equipped with the appropriate type for the expected fire emergency and be capable of immediate utilization. Currently the UH Department of Public Safety Fire Marshal Office is

utilizing multi-purpose (Class ABC) extinguishers for the majority of laboratories on campus. There are several Class D (metal fires) extinguishers in laboratories which work with metals.














f) Safety Containers for Flammable Liquids:

An approved container with a spring-closing lid and spout cover should be used to store flammable liquids. The safety container is designed so that it will safely relieve internal pressure when subjected to fire exposure. The safety container utilized in the laboratories must not exceed 19 L (5 gal) capacity.

9. Lab safety signs or symbols:

Understanding the meaning of the common laboratory symbol is very necessary to avoid danger inside the lab.

The following are common symbols

				
Safety shower	Eye protection	Skull & crossbones	Corrosive	Flammable gas
				
Eyewash	Lab coat	Black biohazard trefoil	Flammable	Non-flammable gas
				
Recycling	Gloves	Triangular radioactive	Explosives	Prohibition
				
First aid	Protective footwear	Radiation	Harmful or irritant	Non potable water
				
Defibrillator	Respiratory protection	Reactive material	Oxidizing	Don't touch
				
Magnetic field	Low temperature warning	Carcinogen hazard	Toxic	No open flames
				
Optical radiation	Hot surface warning	Toxic chemical	High voltage	Compressed gas

:

II- SAFE HANDLING REQUIREMENTS IN THE LABORATORY

PURPOSE

This manual provides general guidance to handle and work safely with chemicals “particularly hazardous”. It describes the minimum requirements for the safe handling use of hazardous substances and gases.

1. Hazards identification:

- a) Hazardous substances must be stored in a designated area and used in a manner that will minimize the risk of accidental release.
- b) MSDS Should be available near the entrance of the laboratory. Additional requirements for the safe storage of a specific chemical may be found in the manufacturer’s instructions.
- c) Working quantities of particularly hazardous substances should be kept as small as practical and their use should be physically contained as much as possible.
- d) Initial signature is required for all containers, designated work areas.
- e) Chemicals should be segregated from incompatible materials. The use of particularly hazardous substances must be confined to an established designated area.
- f) When transporting chemicals beyond the immediate laboratory environment, containers should be protected from breakage by using a bottle carrier or other effective containment.
- g) If the spill involves acutely toxic materials, the spill should be treated as a large spill if there is any doubt about the group’s ability to safely mitigate the spill.
- h) After working with these chemicals, gloves must immediately be removed and disposed of as hazardous waste and hands and arms washed with soap and water.

2. Hazards identification:

- a) Store alkali metals under mineral oil or kerosene.
- b) Avoid using oils containing sulfur since a hazardous reaction may occur.
- c) Only special class D dry powder fire extinguishers may be used on alkali metal fires. Consult with EH&S Fire Safety if your lab will require one of these.

3. Dry ice handling and storage:

- a) Wear safety glasses and thermally protective gloves when handling dry ice.
- b) Store dry ice in a thermally insulated container. The thicker the insulation, the slower it will sublimate (turn into carbon dioxide gas)
- c) Carbon dioxide is heavier than air, especially when obtaining dry ice from chest freezers or coolers. Do not lean into dry ice coolers, as there will be no oxygen.
- d) Ensure the door is braced so it will not shut down on the person retrieving the ice.
- e) Wear a face shield whenever grinding or crushing the solid.
- f) Do not transport dry ice in an enclosed vehicle without allowing for ventilation.

4. Chemical abbreviations and annotations used on secondary containers in the work area

a) Acids- Corrosive to skin, eyes, and respiratory tract

HCl Hydrochloric Acid

HF Hydrofluoric Acid (extremely hazardous)

TCA Trichloroacetic Acid

H₂SO₄ Sulfuric Acid

b) Bases- Corrosive to skin, eyes, and respiratory tract

KOH Potassium Hydroxide

NH₃OH Ammonium Hydroxide

NaOH Sodium Hydroxide

c) Flammable liquids , fire hazard, toxic by ingestion, irritant

EtOH Ethyl Alcohol

MeOH Methanol

IPA Isopropyl Alcohol

d) Toxic- Harmful by ingestion or skin absorption

DEPC Diethyl Pyrocarbonate

DMSO Dimethyl Sulfoxide (carries hazardous materials through the skin)

e) **Low hazards**

SDS Sodium Dodecyl Sulfate (detergent)

TAE Tris Acetic acid + Ethylenediaminetetra acetic acid

TBE Tris Boric acid + Ethylenediaminetetra acetic acid

PBS Phosphate Buffered Saline

SSC Sodium chloride Sodium Citric acid

TE Tris Ethylenediaminetetra acetic acid

SSPE Sodium chloride Sodium Phosphate + Ethylenediaminetetra acetic

STET Sodium chloride Ethylenediaminetetra acetic acid Tris Triton X-100

TNT Tris sodium chloride + Tween-20

TPE Tris Phosphoric Ethylenediaminetetra acetic acid

5. Hazardous waste handling

The following may never be poured into a laboratory sink or drain:

- Acetone or alcohols
- Volatile Organic Compounds (e.g. organic solvents)
- Organic chemicals
- Mercury and other heavy metals
- Strong acids (solutions with $\text{pH} < 5.5$)
- Strong Bases (solutions with $\text{pH} > 12.0$)
- Infectious/biological waste
- Radioactive waste (unless under maximum radiation levels in an approved sink)
- Malodorous substances

6. Label Identification

- Ensure that you clearly label all wash bottles, base baths, solvent bottles, and chemicals.
- Label research samples with chemical names and/or chemical structures and/or the relevant laboratory notebook number and page number.
- National Fire Protection Association (NFPA): Hazard Identification Ratings

The NFPA hazard labeling system consists of a multicolored diamond broken into four sections: health (blue), fire (red), reactivity (yellow), and special hazards (white). Numbers in the three colored sections are in the range from 0 (least hazard) to 4 (most severe hazard).



Select NFPA Hazard Identification Ratings

Chemical	Fire	Health	Reactivity
m-CPBA	0	3	3
t-BuLi	4	3	3
DIBAL-H	4	3	3
NaH 95%	3	3	2
diphosgene	0	3	2
BH ₃ •THF	3	2	3
HClO ₄	0	3	3
NaN ₃	0	4	2
Fe(CO) ₅	3	3	1
HO ₃ SCF ₃	0	3	0
Cl ₂	0	3	3
(CF ₃ SO ₂) ₂ O	0	3	2

7. Compressed gas and cylinder Safety

General guidelines should be employed when dealing with compressed gas:

- a) Cylinders must be secured by use of chains, straps, racks, base plates or carts (regardless of cylinder size) any time they are in use, being moved or stored.
- b) Cylinders should not be transported without trolley or specific cart for cylinder transportation from one place to another place in the department.
- c) Store full cylinders in a cool, well ventilated and protected area, away from emergency exits
- d) Do not let the temperature of the cylinders exceed 38° C (100° F)
- e) Oxygen cylinders (empty or full) in storage should be separated from fuel-gas cylinders and combustible materials by a minimum distance of 20 feet or by a barrier at least 5 feet high having a fire-resistance rating of at least one-half hour.
- f) Flammable gas cylinders should not be stored with oxygen or nitrous oxide cylinders.
- g) Full and empty cylinders of all gases should be stored separately and identified by signs and date to prevent confusion.
- h) Cylinders may be stored outdoors but should be protected from the ground to prevent bottom corrosion. Where extreme temperatures prevail, cylinders should be stored so they are protected from the direct rays of the sun.
- i) Cylinders should not be exposed to continuous dampness, stored near salt or other corrosive chemicals or fumes. Corrosion may damage cylinders and cause their valve protection caps to stick.

8. Compressed gas cylinders identification / handling

- a) Compressed gas cylinder should be identified and clearly be written
- b) Label should be provided that cannot be removed from the compressed gas cylinder.
- c) Label should be pasted along with color of the cylinder.
- d) Tags should be attached to the gas cylinders on which the names of the users and dates of use can be entered.
- e) Cylinders transported by truck must be fastened securely in an upright position.

- f) Cylinders should not be transported without safety caps. A cylinder's cap should be screwed all the way down on the cylinder's neck ring and should fit securely. Do not lift cylinders by the cap. The cap is for valve protection only.

9. Compressed gas cylinders usage

- a) Before attaching cylinders to a connection, be sure that the threads on the cylinder and the connection mate are of a type intended for the gas service.
- b) Do not permit oil or grease to come in contact with cylinders or their valves.
- c) Wipe the outlet with a clean, dry, lint-free cloth before attaching connections or regulators. The threads and mating surfaces of the regulator and hose connections should be cleaned before the regulator is attached.
- d) Corrosive and reactive gas cylinders must be returned to the manufacturer one year after their date of delivery.
- e) All other cylinders must be returned to the manufacturer three years after their date of delivery.
- f) Flammable gas should be minimized in a laboratory. Do not store extra cylinders of flammable gas in the lab. Flammable gases need to store away from oxidizer gases, such as oxygen or nitrous oxide.
- g) Carbon dioxide and carbon monoxide may require a monitoring system or device.

III- LABORATORY EMERGENCY RESPONSE PLAN

Emergencies can occur at any time, without warning. Careful planning, with an emphasis on safety, can help people to handle crises and emergencies with appropriate responses, and could save lives. Every member of the college shares responsibility for emergency preparedness. All college' members -including faculty, staff and students- should be familiar with emergency plans.

1. Emergency phones numbers

Note: Please call these numbers from campus internal phones (extensions).

Campus Security	111
Fire Department	88
Ambulance	85-19989 / 85-19924
Maintenance Department	92211
Keys Control Department	91212

- a) If you **FORGET** emergency numbers, **CALL “111”** and they will response appropriately to the emergency situation
- b) When calling, report a fire or medical emergency case, give name, exact location and building. Then follow emergency protocol of the building.
- c) Unsafe Work Conditions: Report unsafe work conditions to lab supervisor.
- d) Emergency phone numbers will be posted near the phone inside each laboratory.

2. In case of fire:

In the event of a fire, pull the fire alarm first. If you have been trained on fire control and the fire is very small (e.g., no bigger than a wastepaper basket), attempt to extinguish the fire with an appropriate fire extinguisher. If you manage to completely extinguish the fire, inform labs custodian(s) or fire department.

Mr. Sultan Al-Huraysi Ext. **95101** Mob. +966560700609

Mr. Azzam Al Hobaish Ext. **95134** Mob. +966541567702

Mr. Ibrahim Idress Ext. **95086** Mob. +966534367287

If you decide to fight the fire, do so from a position where you can escape. A fire contained in a small vessel can usually be suffocated by covering the vessel with a lid. While attempting to control the fire, continually assess the situation. If you doubt your ability to quickly extinguish the fire with an extinguisher, get out of the building.

If possible, prior to evacuation;

- a) Shut down any equipment that may add fuel to the fire.
- b) Do not turn off any hoods in the immediate area as they will work to keep the area free from smoke and flames, but close the door behind you to help prevent the fire's spread.
- c) When you evacuate, move well away from the building to allow firefighters room to work.
- d) Move upwind of the building. Do not reenter the building until permission is given by the Fire Department.
- e) Know the exact location of fire extinguishers in the lab. They're located beside the lab main entrance inside the lab (Fig. 1) and beside the lab small entrance outside the lab (Fig. 2).
- f) Know how to use fire extinguisher (Fig. 3)



Fig. 1: Fire Extinguisher

Fig. 2: Fire Extinguisher outside the Lab

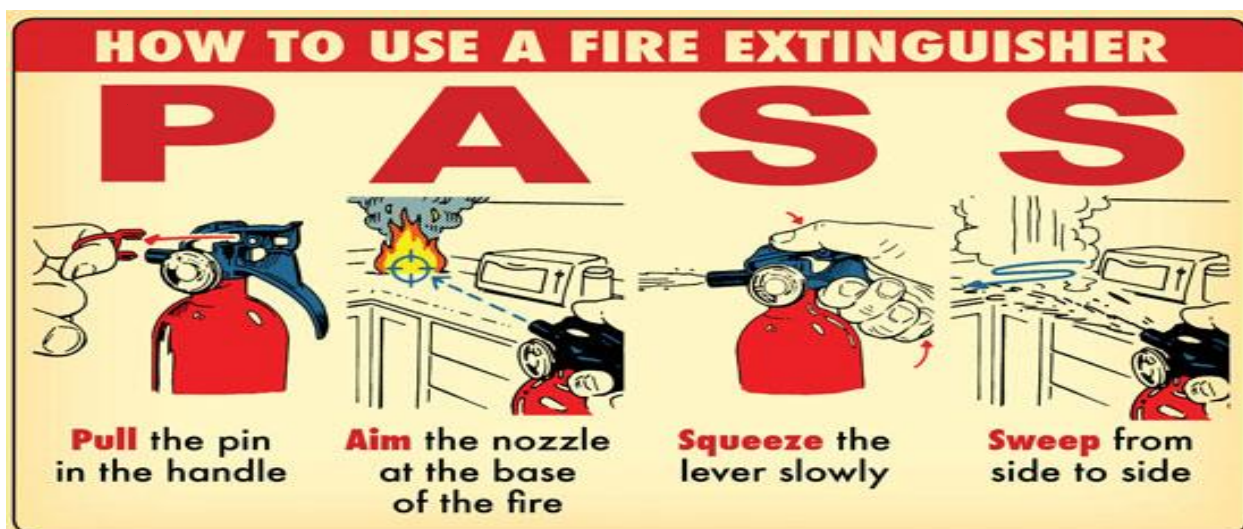


Fig. 3: How to Use Fire Extinguisher

3. Clothing or body on fire

Douse with water from emergency shower (Fig. 4) immediately which located closed to small lab entrance. DO NOT USE a fire extinguisher on people.



Fig. 4: Emergency Shower

4. In case of chemical spill

a) Minor Chemical Spills

- i. Alert people in the immediate area of spill
- ii. Avoid breathing vapors from spill.
- iii. Turn off heat sources if spilled material is flammable.
- iv. Put on appropriate protective equipment, such as safety goggles, suitable gloves, and long sleeved lab coat.
- v. Confine spill to small area.
- vi. Use appropriate kit to neutralize and absorb organic acids and bases.
- vii. Use appropriate kit or spill pads.
- viii. Collect residue, place in appropriate container and dispose as chemical waste
- ix. Clean spill area with water.

b) Chemical Spill on Body and/or Eyes

i. On body

Wash thoroughly with water or use emergency shower (Fig. 4) immediately for 15 minutes, remove all contaminated clothing and shoes (Avoid modesty). Prevent further contamination of other body parts, especially face and eyes.

ii. In eye

Best practices recommend contact lenses not to be worn in the lab. If chemical is splashed in eyes, remove contact lenses immediately. Flush eyes with water for at least 20 minutes using eye washer (Fig. 5). There are 6 eye washers distributed in the lab located beside the wash basins. Hold eyes, open during flushing - ask for assistance.



- Obtain medical attention (if necessary) by calling lab custodian for minor chemical spill or ambulance for major one

Fig. 5: Eye Washer

5. In case of Injury and Illness

For medical treatment due to an injury received in a laboratory environment, the affected person must seek medical care.

- a) For minor injuries, contact Mr. Sultan (Ext. 95101) asking for first aid kits. First aid kits are only recommended for incidents that do not require emergency care.
- b) For major injuries and illness, call the ambulance (Ext. **85-19989 / 85-19924**) or campus security (Ext. **111**).