SAFETY HANDBOOK

OF THE

DEPARTMENT OF CHEMISTRY AND PHYSICS

Revised January 12, 2023
Approved by University Environmental Health and Safety Office January 17, 2023

TABLE OF CONTENTS

CONTENTS

INTRODUCTION

Safety Committee of the Department of Chemistry and Physics

The head of the Department of Chemistry & Physics shall appoint a safety committee consisting of five members. Appointments to the committee will be made in May of each year. At a minimum, one tenured or tenure-track faculty member from chemistry, one tenured or tenure-track faculty member from physics, and one instructor will serve on the committee. The remaining at-large members can be tenured or tenure-track faculty members or instructors in any discipline. Ideally one member will have a specialty in organic chemistry.

The chair of the committee shall be a tenured or tenure-track faculty member elected by the members of the committee in a timely manner to serve a two year term commencing on July 1 of odd numbered years. There shall be no limit on the number of terms served consecutively by the chair.

It is the responsibility of the safety committee to develop and maintain the Safety Handbook for the department of Chemistry and Physics. The safety committee is responsible for the investigation of accidents that occur in the department. The department head will forward to the chair of the safety committee all accident report forms. The chair of the committee will then forward the accident report forms to the individual members so that a decision can be made relative to a course of action (if any).

The safety committee is responsible for development of safety policies for the department and involved with decisions concerning safety matters.

In performing investigations, the safety committee has the authority to collect data, inspect facilities and equipment. The safety committee shall make recommendations to the department head for remediation of safety issues.

Safety Handbook of the Department of Chemistry and Physics

The purpose of this manual is to document proper safety procedures for the Department of Chemistry and Physics.

Both the faculty and administration are responsible for promoting and administering the safety program in all lecture and laboratory classes taught under their supervision. Every researcher is responsible for the safety of their laboratories and the safety of all persons working under their direction. Each individual is responsible for performing his/her job safely. Each individual should always be diligent in their efforts to have safety hazards corrected as soon as possible. It is the instructor’s responsibility to know the proper action to take if an accident occurs in their lecture or laboratory class, to be familiar with the operation and use of all safety equipment in the department, to know

the proper evacuation route from each of the classrooms used by them, and to be aware of the proper emergency procedures established for the Department, the College, and the University.

Every laboratory instructor/supervisor should set a good example by observing all rules and recommendations and by being an active safety advocate.
The instructor should:

1. Discuss safety procedures and policies with the students during first laboratory period.
2. Be alert for unsafe conditions.
3. Inspect often and intelligently.
4. Take effective corrective action promptly.
5. Maintain discipline and enforce safety rules.
6. Assume responsibility for visitors and require that they follow the same rules as students.
7. Carefully review all laboratory experiments for possible safety problems before the experiments are assigned to students.
8. At the beginning of class point out to the students any possible hazards that may be encountered and, in the event that an accident occurs, indicate the proper course of action that must be taken. The immediate and proper use of the eye wash or safety shower should be emphasized. (The perils of delayed washing of a chemical spilled on a body part should be explained.)
9. The instructor should in general be present at all times in teaching labs except as follows:
    i. The instructor must leave in order to tend to an emergency (and in that case a responsible stand in should be appointed if at all possible)
    ii. The class utilizes several different lab locations (for example Analytical Chemistry Laboratory)

This manual is not intended to supersede the **Southeastern Louisiana University Safety Manual** but is intended to be a supplement to be used in conjunction with that manual. Other available sources of safety related information include: (1) Safety Data Sheets which are located in each lab, (2) “Safety in Academic Chemistry Laboratories” (Volumes 1 and 2) published by The American Chemical Society, (3) “Dangerous Properties of Industrial Materials” by Sax. All of these sources are located in the Chemistry and Physics Laboratory Coordinators office Pursley Hall, Room 118.

EMERGENCY RESPONSE NUMBERS

IF IN QUESTION...CALL UNIVERSITY POLICE AT 985-549 2222

IN CASE OF……	CALL……..	AT……
Fire	University Police	2222
Poisoning	Poison control & University Police	9-395-5554 & 2222
Medical Emergency	University Police	2222
Injury	University Police	2222
Question concerning minor injury	University Health Center	2241
Moderate Chemical Spill	Laboratory Coordinator	5995
Major Chemical Spill	University Police & Environmental Health and Safety & Laboratory Coordinator	2222 &2157 & 5995
Missing Lab Materials	Laboratory Coordinator	5995
Safety Question	Environmental Health and Safety	2157
Emergency Chemical Information	CHEMTREC	9-1-800-424-9300
Emergency Hazardous Substance	LA State Police	9-1-504-925-6595
Equipment Malfunction	Academic Equipment Repair or Laboratory Coordinator	2164 or 5995
Major Maintenance	Physical Plant	3333
Other Issues	Chem. & Phys. Dept. Secretary	2159
SELU Information		2000

A copy of this list should be posted by each laboratory phone.

RESPONSE TO ACCIDENTS

IN CASE OF AN ACCIDENT, CALL UNIVERSITY POLICE at 985-549-2222 if any of the following apply:

- **if there is an injury that requires treatment beyond first aid,**
- **if the chemical involved requires treatment beyond first aid, or**
- **if requested by the victim.**

If you need emergency assistance call University Police at 985-549-2222

Phones are located 1) in each office 2) in each wet chemistry teaching laboratory and 3) in each wet research laboratory. Be sure to tell police your exact location and the nature of the accident.

An Accident Report MUST be filled out for each accident involving any injury. The Accident Report form may be found immediately following this section of this document and in the form drawer of the Departmental office.

If a student refuses assistance (a call to University Police) be sure that the student signs to attest this fact on the Accident Report.

First Aid Procedures

Some minor first aid may be given while awaiting arrival of help. First Aid materials administered should be limited to soap, water, paper towels and standard band-aids. A summary of appropriate temporary aid follows.

Moving Victim- Never move or lift accident victims unless they are in danger of further injury. If they must be moved from a hazardous area, grasp their feet and drag them away while protecting the head from injury. Calm and comfort the victim and do not alarm them.

Acid and Alkali Burns - Flush the affected area with water and remove or cut away clothing. This may be done in the sinks or showers. There are emergency showers and eyewash stations in every laboratory. If substantial amount of acid has gotten on clothes, have individual enter shower and remove all contaminated clothing.

Acid and Alkali Splashes to the Eye - First aid for splashes to the eye should begin as quickly as possible by thoroughly washing the face, eyelids, and eye. Eyewash stations are available in all of the laboratories. The eye should be thoroughly flushed for an additional 15 minutes. The eye lids must be held open during this time. DO NOT RUB THE EYE. Only plain water should be used.

Swallowed Poisons - Dilute strong acids and alkalis by quickly administering large amounts of water. But, NEVER give liquids to an unconscious person. If strong acids,

strong alkalis, or petroleum products are known to have been swallowed, do not induce vomiting.

Cuts- If there is a possibility of contamination, wash affected area with copious amounts of soap and water. If bleeding, follow instructions below.

Bleeding - Have the student apply pressure directly to the wound. This may be done with a clean paper towel or directly with a hand. Do NOT apply a tourniquet. Try to insure that the blood does not contact anyone else.

Fractures - Do NOT move the victim unless absolutely necessary.

Thermal Burns - Immerse burn in gently running cool water. If burn is severe do NOT attempt to remove clothing. If burn is very severe, be careful about applying ice or water over burn, as this may intensify shock reaction.

Electrical Shocks - Remove the source of shock as soon as possible either by (a) shutting off the source of power or (b) using a non-conductive object (wood or dry cloth) to separate the victim from the source.

Note: The instructor should escort the injured student to the eye wash or safety shower to insure that proper flushing is initiated.

ACCIDENT/INCIDENT REPORT FORM
DEPARTMENT OF CHEMISTRY AND PHYSICS

Note: University Police must be notified if there is an injury that requires treatment beyond first aid, if the chemical involved requires treatment beyond first aid, or if requested by the victim.

Date of accident/incident:_____ Time of accident/incident:_____
Name of injured person: _____
Did accident/incident occur during regularly scheduled period? _____ Yes _____ No
Course number and section of class: _____
Experiment being conducted during accident/incident:_____
Exact location where accident/incident occurred: _____
_____
_____
_____
Instructor in charge:_____
Instructor's description of accident/incident (attach additional sheet if necessary)
_____
_____
_____
_____
_____
Other witnesses:_____
Was instructor in area when accident/incident occurred? _____ Yes _____ No
If not, explain why not present_____
_____
_____
Was University Police notified? _____ Yes _____ No Time: _____
Name of police officer responding:_____
Was any minor first aid given to victim prior to police arrival? _____ Yes _____ No
If so, what?_____
_____
_____
Did victim refuse further assistance (call to police)? _____ Yes _____ No
If so, why?_____
_____
If so, have student sign here:
I verify that I have refused further medical assistance_____
(signature)

I certify that to the best of my knowledge that the above information is correct.

_____ _____
(signature of instructor) Date of Report

SAFETY TRAINING

All faculty, staff, research students, and solutions workers will participate in an ongoing program of principle based safety training. The department head will document all training.

SAFETY INSPECTIONS

Quarterly building inspections will be conducted by the building coordinator or his designee. For Pursley Hall, the building coordinator is the Department Head. The stockroom coordinator is designated to conduct safety inspections in accordance with the guidelines set forth by the Environmental Health and Safety Office Department at Southeastern Louisiana University.

Whenever a faculty member leaves the department on a permanent basis, the building coordinator or designee shall conduct an inspection of the laboratory spaces previously occupied by that person to insure that there are no hazardous conditions (wastes, chemicals etc.) that need to be addressed before that person vacates the premises. A completed report will be delivered to the department head for appropriate action.

CORRECTION OF UNSAFE CONDITIONS

The purpose of conducting safety inspections is to identify potential unsafe practices or conditions. The designated person needs to be notified of all unsafe conditions. It is the designated person's responsibility to ensure that proper corrective action is taken in a timely manner to remediate all documented hazardous conditions. This may mean submitting a service request, contacting the laboratory coordinator, asking another faculty member to do so, or taking care of the matter personally. If correcting the safety infraction is outside of the designated person's ability, then inform the Department Head of the situation and suggested corrected action immediately.

DO NOT WAIT FOR A SAFETY REPORT! If you see an unsafe condition, immediately correct it or report it to the Room Steward or the Departmental Safety Chairman.

REVIEW OF PROPOSED NEW EXPERIMENTS FOR TEACHING LABS

Proposed new experiments along with the associated solutions manual shall be submitted to the safety committee for review prior to incorporation in the student laboratory manual. This policy applies to CLAB 103,104, 123, 124, 263, 267, and 268. These labs are taught by multiple instructors and handle large numbers of students each semester. Allow ample lead time in order to provide for the required review.

SAFETY POLICY FOR LABORATORY WORK

Different laboratories have slightly different safety policies dependent upon the commonly encountered hazards associated with each particular laboratory. There are separate laboratory safety policies for Standard Wet Chemistry Labs (CLAB 103, CLAB 104, CLAB 123, CLAB 124, CLAB 256, CLAB 456), Organic Chemistry Labs (CLAB 263, CLAB 267, CLAB 268), Physical Chemistry Lab (CLAB 391, CLAB 392), Earth and Space Science Labs (ESSL 103, ESSL 104), Physics Labs (PLAB 123, PLAB 142, PLAB 193, PLAB 194, PLAB 223, PLAB 224, PLAB 225, PLAB 303, PLAB 314, PLAB 425), Research Laboratory Work (CLAB 211, CLAB 411, CLAB 412), and Student Laboratory Technicians. These laboratory Policy Sheets may be found in this handbook. It is necessary to review in detail each laboratory policy sheet the first day of each new lab class.

SAFETY DOCUMENTATION PRIOR TO LABORATORY WORK

Before each student may begin a new laboratory class they must successfully complete a safety test documenting their knowledge and understanding of the Laboratory Policy for that class. Different classes have slightly different safety tests which focus on the particular safety aspects of that lab. The safety tests for Standard Wet Chemistry Labs, Organic Chemistry Labs, Physical Chemistry Labs, Research Labs and Student Laboratory Technicians may be found in this handbook. After the test has been taken the instructor will review the correct answers with students before the test is collected. Students in Earth and Space Science Labs and Physics Labs are not required to complete a safety test, but must receive documented laboratory specific safety training. The corrected and signed safety test (chemistry) or documentation of safety training (physics and earth and space science) must be given to the Laboratory Coordinator for safekeeping.

BUILDING EVACUATION

At the beginning of each semester the instructor shall inform the students in each of their classes the proper evacuation route from that classroom. In case of an emergency evacuation, the instructor shall make certain that all of their students leave the by the most direct safe route and meet in the grassy area within Azalea Circle and Oak Street. There is an evacuation route posted adjacent to all common room exit doors. If the usual evacuation route is blocked, then the students shall exit the building by the most direct and safe alternate route. The evacuation routes for Pursley Hall and the top floor of Science Building Annex are listed in Appendix XVII.

After an emergency occurs which requires the evacuation of the building, the Faculty and Staff of the Chemistry and Physics Department are to meet the Building

Coordinator **in the grassy area within Azalea Circle and Oak Street**. This requirement is to be met so that emergency personal do not have to enter the building looking for you or your students. It is the instructor's responsibility to insure that all of their students have evacuated the building. If you suspect someone may be trapped inside the building, notify firefighters on the scene. Do not leave Azalea Circle until a responsible party has been made aware of your successful evacuation of the building.

Do not reenter building until directed by police or fire department personnel.

FIRE ALARM PROCEDURE

The safety of the students, staff, and faculty in a fire situation is of the utmost importance. The hallways in Pursley Hall are equipped with internal fire and smoke sensors so that when fire or smoke is detected the alarm will sound. The laboratories ARE NOT equipped with automatic fire or smoke sensors. If a fire occurs in a lab, and help is needed, it must be summoned (by pulling a fire alarm pull station). When a fire alarm is activated, lights will flash and a loud high pitched alarm will sound. The alarm is monitored and University Police will be automatically contacted. If a fire alarm results, it is also beneficial to call the University Police (2222) to update them on specific hazards and current status. When a fire alarm sounds, the building must be evacuated. The building may not be reentered until an "All Clear" is given by fire and police personnel. All faculty, staff, and students should meet in the grassy area between Azalea Circle and Oak Street and be prepared to verify that all of their students are accounted for.

EMERGENCY RESPONSE TO LABORATORY FIRE

As soon as a fire is noticed do the following.

1. Alert other people in the laboratory or immediate area by calling "Fire".

2. If the fire is large, spreading, in close proximity to high volume of flammable or explosive items, or is threatening to block your exit,

    a. Immediately evacuate the room. Do not pause to collect personal items. Pull the (fire) doors closed behind you.

    b. Pull the fire alarm.

    c. Leave the building by appropriate route. Use stairs not elevators.

    d. Proceed to Azalea Circle. (Students must check in with instructors at Azalea Circle).

    e. Notify firefighters on the scene if you suspect someone may be trapped inside the building.

f. Do not reenter building until directed by police or fire department personnel.

3. **If the fire is small, contained, not blocking your exit, and you feel comfortable doing so, you may choose to fight the fire. Otherwise evacuate following the above steps**.

   To fight a fire do the following….

   a. If the fire is small and self-contained, you may be able to extinguish it by covering it with a nonflammable item such as a beaker or watch glass.

   b. Very small contained fires (such as small amount of material in a test tube or beaker) which are not in close proximity to other flammables may be allowed to burn themselves out. This is particularly useful when isolated within a hood.

   c. If the fire is electric in nature, and you can safely do so, unplug the equipment.

   d. Use a nearby fire extinguisher to control and extinguish the fire.

      When using a fire extinguisher, remember the word **PASS**:

      Pull the pin
      Aim the nozzle at the base of the fire
      Squeeze the handle to release the extinguishing agent
      Sweep the base of the fire from side to side

   e. If the fire is not extinguished after one extinguisher, then evacuate the building using above steps.

FIRE OUTSIDE OF THE BUILDING

Call University Police (2222) for an automobile or trash fire.

BOMB THREAT

In the event that a bomb threat is received, notify the University Police (2222)

immediately. The decision to evacuate a building due to a bomb threat shall be made by the person deemed responsible for the building and the Director of University Police.

If a decision is made to evacuate the building, occupants in each office, classroom, and laboratory in the building will be notified by the University Police or other personnel to evacuate the building and report to the grassy area between Azalea Circle and Oak Street for further instructions. Instructors should be directed to bring the class in a group and recheck the roll at the final destination.

All persons not connected with a search of the building will remain outside of the building until it has been declared safe for occupancy by University Police.

GENERAL EMERGENCY RESPONSE PROCEDURES

Since the hoods are interlocked with the air handling units, the hoods in the lab will fail when the air handling unit stops. If the hoods stop many experiments may no longer be done safely and a hazardous (potentially lethal) environment may develop.

In the event of hood stoppage, a chemical spill, gas leak, fire in a laboratory, classroom or other building area, the Instructor, Department Head, or Laboratory Safety Coordinator shall make a determination as to whether or not the emergency can be abated locally, or whether evacuation of the building is required, and if outside assistance is needed.

If the building must be evacuated, follow the below procedures.

1. Alert other people in the immediate area.
2. Immediately evacuate the room. Do not pause to collect personal items. Pull all doors closed behind you.
3. Pull the fire alarm.
4. Leave the building by appropriate route. Use stairs not elevators.
5. Proceed to Azalea Circle. (Students must check in with instructors at Azalea Circle).
6. Call University Police (2222) and advise them of the problem.
    a. Your name
    b. Exact location of the Emergency
    c. Cause of the emergency
    d. List materials that have been spilled or may be released.
    e. Actions taken to ameliorate the emergency.

7. Notify firefighters on the scene if you suspect someone may be trapped inside the building.

8. Do not reenter building until directed by police or fire department personnel.

ELEVATORS

There are two elevators in Pursley Hall. The freight elevator is located at the south end of the main Hall. The passenger elevator is located at the North East corner of Pursley Hall. Never use the passenger elevator for the movement of hazardous objects such as gas cylinders or hazardous chemicals. Never ride with cryogenic liquids in the freight elevator. Never use the elevator if there is a fire in the building.

SAFETY DATA SHEETS

Under the OSHA Hazard Communications Standard (29CFR 1910.1200), all personnel working with hazardous materials must have access to Safety Data Sheets or SDS (formerly called MSDS or Material Safety Data Sheets), and be trained in the safe handling of the material. The SDS provides necessary, helpful, and useful information on the properties of the hazardous material. Each person working with hazardous materials should familiarize themselves with those properties before you work with the material. It is a vital safety requirement to be able to refer to the SDS immediately in the event of an emergency and provide a copy to emergency responders. OSHA has ruled that electronic access to SDS is an acceptable alternative to maintaining paper files. Each lab, department, or work group has the option to maintain a hard copy SDS binder or file. As a minimum, each work group should maintain an inventory of hazardous material names and suppliers and methods to quickly and easily access the SDS if there is no hard copy available. Students and student workers are to be instructed that they have ready access to SDS for all hazardous substances with which they may have contact while working in laboratories. They are also to be instructed in the use of SDS.

The laboratory coordinator will be responsible for providing up to date SDS folders in all teaching labs for which chemicals and solutions are provided. For labs that are not supplied chemicals and solutions by the laboratory coordinator, the instructor will be responsible for the SDS.

CHEMICAL LABELS

Chemical containers must be labeled with either the original label or a new label to include the following information: Chemical Name, Hazard(s), Date and Manufacturer or owner. The labels are to be affixed and filled out by the laboratory coordinator or

designee for labs that have solutions made by the general solutions personnel. For other labs, the labels would need to be completed by the individual who makes the solutions. Note: students do not need to make such labels if the chemicals are used immediately. This would apply when students make solutions for titrations etc. Hazard designations should be indicated USING the **NFPA 704** standard with the colored diamond and appropriate numeric hazard codes. Mixtures can often be rated conservatively by rating each of the individual components and using the highest number for health, flammability and instability (independently). Use judgment in rating since some of the chemicals can act synergistically different than the individual components, and because the components may be present in different percentages.

CHEMICAL STOCKROOM

A method by which the Chemical Storage Area can be maintained in a neat, safe, and reliable repository for chemicals is outlined in this section.

Students are never allowed access to the chemical storage area unless they are under the immediate supervision of the Laboratory/Stockroom Coordinator, Department Head, or Faculty member.

The storage room should contain only chemicals that will be used within their accepted shelf life. Chemicals should be removed and disposed of, following the guidelines for disposal of chemicals, when they fall in one of the following categories.

1. Any chemical whose label has fallen off or the label is not readable.

2. Any chemical whose cap has broken or cracked.

3. Any chemical that has obviously reacted with the air or water.

4. Any chemical that is unusually dangerous, such as explosives (picric acid)

The chemical storage area should be inspected at least once a semester and chemicals that fall in any of the following categories should be removed and disposed of using the proper disposal procedure.

Chemical Acquisition

All incoming containers of chemicals should be given an indelible, corrosion-resistant date of arrival on the container. Each arriving chemical should be entered into the chemical inventory system and affixed with a unique bar code.

Chemical Inventory Procedures

It is important to keep an updated inventory of the chemicals on hand for safety and financial reasons.

The chemical inventory system requires that all chemicals be logged out and logged whenever removed from or returned to the Chemical Storage area.

CHEMICAL STORAGE BY GROUP (Flammable, Acids, etc.)

Southeastern Louisiana University Laboratories voluntarily aims to meet OSHA Laboratory Safety Requirements. These requirements are written in the Code of Federal Regulations 1910.1450 (available in the Federal Documents Sections 3rd floor Sims Library) and "Prudent Practices" by the National Research Council available in it's entirety from the National Academy Press 2101 Constitution Ave, NW Washington DC20418 (or in excerpt in "Laboratory Safety: Principles and Practices", Fleming, et al. (Sims QR 64.7 L33 1995)).

Of particular interest is the Code of Federal Regulations (CFR, 1910.1450, D.2. b, c and d.) A summary of general guidelines for safe storage of chemicals follows. This guideline is not complete. Specific compounds should be stored according to the procedure documented in its SDS. Whenever in doubt consult the SDS of the original chemical manufacturer.

Flammable Solvents

These are materials that have a flash point below 100 F.

1. Store in approved safety cans or cabinets.

2. Segregate from oxidizing acids and oxidizers.

3. Keep away any source of ignition: flames, localized heat or sparks.

4. Safety cans or drums containing flammable liquids should be grounded and bonded when being used.

5. Keep fire-fighting equipment readily available.

6. Have spill cleanup materials handy.

7. Store highly volatile flammable liquids in a specially equipped refrigerator.
   Examples: Hydrocarbons, ketones, alcohols, ethers, esters etc.

Bronsted Acids

These are materials that are proton donors

1. Store large bottles of acids on low shelf or in acid cabinets.

2. Segregate oxidizing agents from organic acids, flammable and combustible materials.

3. Segregate acids from bases and active metals such as sodium, potassium, magnesium, etc.

4. Segregate acids from chemicals which could generate toxic gases upon contact such as sodium cyanide, iron sulfide, etc.

5. Use bottle carriers for transporting acid bottles.

6. Have spill control pillows or acid neutralizers available in case of acid spills.
   Examples: Glacial Acetic Acid, Hydrocyanic Acid, Hydrochloric Acid, Hydrobromic Acid, Nitric Acid, Phosphoric Acid, Sulfuric Acid.

Bases

These materials are active proton acceptors.

1. Segregate bases from acids.

2. Segregate bases from substances that may release corrosive, toxic, or flammable fumes on reaction such as Chloroform.

3. Store solutions of inorganic hydroxides in polyethylene containers.

4. Have spill control pillows or caustic neutralizers available for caustic spills.
   Examples: Ammonium Hydroxide and Sodium Hydroxide.

Water Reactive Chemicals

These materials are highly reactive with water.

1. Store is specially designated reactive cabinet

2. Store in cool dry place far away from water sources.

3. Label storage area as “Danger, Water Reactive”
   Examples: Hydrides (Lithium Aluminum Hydride, Sodium Hydride), Alkali metals (Sodium, Potassium), Inorganic Chlorides (Aluminum chloride, Boron trichlorides).

Air Sensitive Chemicals

These materials need special storage and handling procedures.

1. Store in specially sealed container possibly blanketed with Nitrogen.

2. Store in cool dry place.

3. Label storage area as “Caution. Air Sensitive Chemicals”

Oxidizers

These materials accelerate the combustion of organic matter.

1. Store in cool dry place.

2. Keep away from flammable and combustible materials (such as paper, hydrocarbons, etc)

3. Keep away from reducing agents such as zinc, alkaline metals etc.

4. Label storage area as “Caution Oxidizers”
   Examples: Hydrogen peroxide, Chlorates, Chlorites, Perchlorates,

Toxic Compounds

These materials may produce bodily injury when encountered.

1. Store according to hazardous nature of chemical.

2. Label container as toxic.

3. Personal Protective Equipment (goggles, gloves, fume hood) need to be utilized when using material.
   Examples: Halogens, Carbon Monoxide, Arsenic, Lead, Mercury, Halogenated hydrocarbons, etc.

Light-Sensitive Materials

These materials will react or decompose when exposed to light.

1. Avoid exposure to light. Store in amber bottles or wrapped in Aluminum foil.
   Examples: Ethyl ether, Mercuric salts, Silver salts, Bromine

Carcinogenic Materials

These materials have a high probability of causing cancer

1. Label all containers as Cancer Suspect Agents.
2. Store according to hazardous nature of chemical, using appropriate security when necessary
   Examples: Benzene, Chromium Oxide, Cadmium compounds, Arsenic compounds.

Peroxide Forming Chemicals

These materials may form explosive peroxides if given the proper conditions.

1. Store in airtight containers in dark, cool, dry place.
2. Label containers with receiving, opening and disposal dates.
3. Keep chemicals on active inventory; ensure chemicals are disposed of before expected date of first peroxide formation.
   Examples: Acetaldehyde, Ethyl ether, Tetrahydrofuran.

Highly Reactive Chemicals (Explosives)

This type of chemical is not to be stored in this building.
Examples: polynitrotoluene, picric acid

REFRIGERATORS

Refrigerators used to store chemicals must be of the type that have self-contained electrical elements or no electrical elements are contained inside the storage area. This is to avoid spark-induced explosions. These must be labeled on the front of the door with the label "**Flammable Material Storage Refrigerator (or Freezer)" and** "**No Food or Drink in this Refrigerator".**

Refrigerators in Pursley Hall used for food storage must have the following label posted of the door "**This Refrigerator is Expressly for the Storage of Food. No Chemicals (other than Food) are to be stored within".**

CHEMICAL WASTE

Chemicals that have no anticipated safe future use should be disposed of in a timely and safe manner.

Segregate halogenated and non-halogenated materials. Do not combine materials in a waste container which may react with each other. Combine materials of similar composition and toxicity which will not react with each other. For instance, a series of non-halogenated organic solvents can often be combined in a common waste container.

Do not combine any materials without detailed knowledge of how they will (will not) react with each other.

Label each waste container with the following information.

1. Complete name of each **and every** chemical contained.

2. Name of Responsible Individual.

3. Room from which it originated.

Waste containers must be made of appropriate material that does not react with the waste chemicals. DO NOT use glass waste bottles for materials which could develop pressure. USE plastic waste containers whenever possible. DO NOT use plastic waste containers with materials which could compromise the integrity of the plastic. Waste containers must have secure fitting lids. Waste containers should not be identifiable (by shape, lid or label) as empty food containers.

Once waste containers are properly labeled, filled and sealed, they should be transferred to the green waste disposal shelf in the chemical stockroom. Waste should be brought to the disposal shelf promptly after filling or after they are no longer being actively used.

The material on the waste disposal shelf in the chemical stockroom will be turned over to the Director of the Environmental Health and Safety Office on a monthly basis.

CHEMICALS AND WASTE IN TEACHING LABORATORIES

Chemicals found in teaching laboratories should be in quantities that are required for the experiments to be conducted that week. Bulk or excess chemicals should not be stored in the teaching laboratory. These chemicals should be stored in the chemical stockroom or in the solution preparation laboratory. Chemicals stored in the solution preparation lab should be no more than necessary to prepare chemicals solutions to be used in the teaching laboratory.

Each chemical should have an accident prevention code label with the appropriate code

numbers. A coded label (which indicates Health, Fire, Reactivity, and Specific Hazard) should be displayed in the laboratory to indicate the meaning of each code number.

Waste containers must be made of appropriate material that does not react with the waste chemicals. DO NOT use glass waste bottles for materials which could develop pressure. DO NOT use plastic waste containers with materials which could compromise the integrity of the plastic. Waste containers must have secure fitting lids. Waste containers should not be identifiable as empty food containers either by shape, lid or labeling.

Each waste container must have a label that indicates the following information:

1. Name of Person Responsible

2. Complete name of all chemicals that can safely be placed in the container

    a. The maximum container size for organic waste is 4 liters (ca. 1 gallon).

    b. The maximum container size for water soluble waste is 5 gallons.

When a teaching experiment is complete the reagent chemicals and the waste for that experiment are to be picked up and stored in the proper areas (either the solution room or the chemical stockroom). Then the new chemicals and a new waste container are to be put out for the next experiment. This procedure will reduce the possibility of mixing chemicals that are not compatible in the same waste container.

Once waste containers are properly labeled, filled and sealed, they should be transferred to the green waste disposal shelf in the chemical stockroom. Waste should be brought to the disposal shelf promptly after filling.

The material on the waste disposal shelf in the chemical stockroom will be turned over to the university hazardous waste manger on a monthly basis.

STUDENT LABORATORY TECHNICIAN TRAINING

Training shall be given to each student laboratory technician. This training shall be conducted by the Laboratory Coordinator of the Chemistry and Physics Department. This training shall be of a nature that the solution personnel can conduct their duties in a safe and professional manner. Chemical and non-chemical hazards will be reviewed. Proper Personal Protective Equipment will be reviewed and all appropriate PPE's will be made available for use. -The student should be encouraged to request assistance when they are in doubt concerning any particular procedure or method.

A paper copy of proper safety policy will be provided to each student technician. A copy

of this policy may be found in Appendix XIII. The corrected and signed student laboratory technician safety test must be retained by the Laboratory Coordinator for safekeeping.

PURSLEY HALL HVAC SYSTEM

The heating ventilation and air conditioning system will only function properly and safely if doors are kept closed. The Life Safety Code (NFPA 101) under which this building was reviewed, requires that each space be separated from the corridor by rated doors. In the event of an emergency, this separation should provide adequate time to evacuate the building before smoke or fire would block the means of egress. The HVAC system was balanced with corridor doors closed. Each laboratory was balanced such that it was negative in pressure with respect to the corridor. In the event of smoke generation within a laboratory, the air handler serving that area will stop. Interlocked hoods will also shut down. If the doors are closed, smoke should be contained within that area for sufficient time required for the evacuation of the building.

GENERAL LABORATORY PROTOCOL

Good Laboratory Practices should be in operation in all teaching and research labs. These good practices include the following.

1. Good housekeeping and tidiness.

2. Keep all aisles and exits clear of obstacles.

3. Reduce all tripping, slipping, and fall hazards.

4. Clean all workspaces within a reasonable amount of time after work is finished.

5. Label all containers with chemical content and responsible person name.

6. Provide information to the laboratory coordinator relative to the composition of “unknowns”. A list of allowed compounds for unknowns will be established by the tenure/tenure-track organic chemists for organic laboratory.

7. Keep eyewashes, showers, and all other safety equipment in well maintained and easily accessible manner.

8. Have spill kits readily available.

9. Have evacuation routes clearly posted.

10. Have emergency contact numbers clearly posted.

11. Have reactive chemicals properly stored and well labeled.

12. Have appropriate personal protection equipment (PPE) available and in good condition. (goggles, gloves, lab coats etc)

13. Have appropriate safety instructions readily available.

14. Routinely carry out safety self inspections.

15. Have SDS and other safety information readily on hand.

16. Keep laboratory doors closed.

CHEMICAL FUME HOODS

Fume hoods capture, contain, and expel emissions generated by chemicals. In general, it is a good idea to conduct all laboratory chemical experiments in a fume hood.

Before using the hood, make sure that the main switch is on and the hood monitor gage is in the green (red or orange indicates that the hood needs to be checked). If you have any question concerning the operation contact Academic Equipment Services phone 2164, Pursley Hall Room 107.

When using a hood, the work should be kept at least six inches beyond the sash of the hood. Keep the sash line between you and the apparatus and it is recommended that the sash be pulled down so that there is a solid barrier between you and the chemical experiment. Never place any body part other than your hands inside a fume hood.

Make sure that equipment, heating mantles, or laboratory kits are not pushed all the way back to the back of the hood. This situation tends to hinder the flow of the more dense vapors from being expelled from the hood. Air is removed from the hoods in Pursley Hall at the rear of the hood from the openings at the bottom, center, and top.

Do not use the laboratory fume hoods as a chemical storage cabinet. If a hood contains a large quantity of bottled chemicals, it is time to do some housekeeping and return the chemicals to the chemical storeroom or the hazardous waste storage (whichever is appropriate).

Make sure that the sash of the hood is not raised above the label on the front of the hood. If the sash is raised higher there may be more turbulence and the face velocity may be insufficient for proper exhaust.

The fume hoods in each location will only develop proper air flow if the doors to the room in which the hoods are installed are kept closed. When doors are propped open, the air balance to the space is altered.

Problems with hood monitors or face velocities should be reported immediately to Academic Equipment Services, Phone 2164. The fume hoods face velocities are checked on a regular basis by Academic Equipment Service. Any hood that is not functioning properly should be tagged as unsuitable for use and no one should use this hood until it has been repaired.

Never dispense chemicals on the air foil sill of the hood. This creates a potential spill hazard and interrupts proper air flow.

Hoods in Pursley Hall are not certified for use with Hazardous Chemicals (NFPA 45)

CHEMICAL DEMONSTRATIONS IN LECTURE ROOMS

All proper safety practices must be evident in any classroom demonstration (gloves, goggles, shields etc). Only demonstrations that **do not** form toxic or noxious vapors or dust may be conducted in the lecture rooms. There is no way of removing toxic or noxious materials from the air in these rooms and these materials will be returned to the recirculating air for the building.

CHEMICAL SPILLS

Chemical spills are to be cleaned up immediately using the proper procedure. Safety goggles, gloves, and a lab coat should be worn during a spill clean up. All available spill kits are located in the north east corner of the chemical stockroom. This includes Acid Spill Clean-up kit, Caustic Spill Clean-up Kit, Mercury Spill kit and additional Solusorb solvent absorbent.

Spilled Liquids; acids, bases, and organic solvents

The specialty spill kits normally are used to adsorb 0.5-1.0 liter. These are located on the shelf adjacent to the stockroom computer. There are large boxes of adsorbent located in the bottom of the reactive chemical cabinet to be used on larger spills.

One should make a dike around the spill to contain it and then use more of the adsorbent inside the adsorbent dike to complete the adsorption process. It is essential that the hoods in the laboratory affected by the spill be turned on to reduce the amount of vapors remaining in the air in this room. **Turning on the hoods also will close the return air damper to that room which will prevent contamination of other parts of**

the building. If the chemical is toxic or vapors are filling the room (even if only a small amount of the chemical has been spilled out in the lab proper) the laboratory shall be evacuated. This does not necessarily mean that the entire building must evacuate. The Laboratory Coordinator (5995) shall be notified. If this takes place in a teaching laboratory, the Director of Safety & Hazardous Materials Management (2157) shall be notified. After the spill has been cleaned up and the air quality of the lab has returned to normal, the students may be allowed back into the laboratory. After the spill has been adsorbed or neutralized, it should be placed in a plastic bag and labeled properly and placed in a hood until it can be picked up by the Laboratory Coordinator for proper disposal.

Spilled Solids

These spills can normally be swept into a dust pan and then placed into a suitable container for disposal. Be careful of chemicals that produce fine particles that can be inhaled. A dust mask would be appropriate to use in this case. Reactive solids may need to be neutralized before disposal.

Spilled Mercury

Mercury thermometers should not be used in lower level teaching lab. If found, remove any mercury thermometers from any lower level laboratory rooms. For small spills such as a broken thermometer wear polyvinyl chloride gloves, lab coat, and safety goggles during spill cleanup. A mercury suction pump and other supplies are available in the Laboratory Coordinators office (120A) to collect the mercury. There is also a mercury containment kit in the chemical stockroom along with the other spill kits. Return the supplies and mercury suction pump to Room 120A.
Any contaminated materials are to be placed in a plastic bag, tied, and labeled for proper waste disposal.

SHARP OBJECT DISPOSAL

All broken glass, needles, cannulas, razor and scalpel blades shall be placed into a cardboard box that is labeled “CAUTION SHARP OBJECTS” or “CAUTION BROKEN GLASS”. When the container is full it shall be securely closed (with tape) and taken to the outside dumpster.

COMPRESSED GAS CYLINDERS

Cylinders must have the valve covered with its metal cover, if so designed, before moving or transporting. Cylinders should be transported using a hand truck that has a chain or belt to secure the cylinder. When the cylinder is in place it should be clamped securely to the wall or counter top before the metal valve cover is removed. Every effort

should be made not to drop cylinders or allow them to strike other cylinders or walls violently. If you are not sure of the proper procedure of connecting a cylinder to a regulator, please contact Academic Equipment Services (2164).
When a cylinder becomes empty, write “EMPTY” with chalk on the cylinder or attach an “EMPTY” tag and return it to the storage area and order another tank to replace it.

Always consider a cylinder as being full, and handle them with care. Do not test a cylinder to see if it has gas in it by opening the valve without a regulator on it.

The fusible safety plugs on acetylene cylinders melt at about the boiling point of water. If an outlet becomes clogged with ice or frozen, it should be thawed with warm (not boiling) water applied **only** to the valve. Never use a flame on any cylinder or valve.

Using Cylinders

1. Cylinders that contain liquefied gases and acetylene should be used in an upright position and be secured against accidentally being knocked over. For that matter, all compressed gas cylinders must be secured to the wall or counter top by chains or cylinder belt clamps.

2. Make sure that the correct pressure reducing regulator designed for the particular gas is used for each cylinder and be sure to leak test cylinder and regulator before use.

3. Before a regulator is removed from a cylinder valve, close the cylinder valve and release the gas from the regulator.

4. Unless the cylinder valve has first been closed tightly, do not attempt to stop a leak between the cylinder and the regulator by tightening the union nut.

5. Never use oil or grease as a lubricant on valves or attachments of oxygen cylinders. Never use oxygen as a substitute for compressed air.

6. Be aware that some cylinders have left handed threads (denoted by a notched nut). These cylinders typically require special procedures (as with oxygen). Be careful not to damage the threads by attempting to turn in wrong direction.

7. If a leak is suspected in a fuel gas cylinder, do not use a flame for detection; rather a soapy water solution or other suitable “snoop” solution should be used. If the leak cannot be remedied by closing a valve or tightening a packing nut, emergency action should be effected. A cylinder in which leaks occur should be taken out of use immediately and handled as follows:

    a. Close the valve and take the cylinder outdoors well away from any source of ignition. Properly tag the cylinder and notify the supplier and University

Police. A regulator attached to the valve may be used temporarily to stop a leak through the valve seat.

b. If the leak occurs at a fuse plug or other safety device, take the cylinder outdoors well away from any source of ignition. Notify University Police so they can maintain a safety area around the cylinder so that no one brings a cigarette or any other spark source into the area and notify the supplier of the cylinder. It is suggested that the fire department be notified by University Police.

Storage of Cylinders

1. Cylinders should be stored in a safe, dry, and well-ventilated place prepared and reserved for this purpose. Cylinders are not designed for temperatures in excess of 130^{o}F (54^{o}C). Thus, do not store near heaters, radiators, furnaces, or any other heat source (continuous sunlight).

2. Cylinders of oxygen should not be stored within 20 feet of cylinders containing flammable gases or highly combustible materials.

For more information on cylinders: refer to **Southeastern Louisiana Safety Manual** Section II pages 16-20.

ROTATING AND PINCHING HAZARDS

Hand injuries are commonly caused by simple pinching and binding. The best prevention is to keep fingers, loose clothing, and hair far removed from all rotating equipment. All rotating equipment should have adequate guards or warnings in place. Bind hair and keep loose clothing to a minimum when operating such equipment. If necessary to have hands in close proximity to rotating equipment, ensure that proper guards are in place. Kevlar or metal mail gloves may be warranted.

THERMAL HAZARDS

There are many heating devices located throughout Pursley Hall; for example, hot plates, Bunsen burners, heating mantles, and drying ovens. Most items appear cool even when very hot. Do not assume something will be cool when it could be hot.

If you are unsure of the temperature first check the setting on the piece of equipment. If it is off, it may have just been switched off and it may still be hot. To verify the temperature either touch surface with a T/C and get a direct reading or place your hand NEAR object and attempt to detect warmth. Zetex gloves may be warranted if routinely working around hot equipment.

If you are leaving a heated piece of equipment unattended, be sure a sign warning of the thermal hazard is prominently displayed.

ELECTRICAL HAZARDS

Before working on any 120V, 208V, 240V, 277V or 480V, equipment, be sure the equipment is not energized and cannot be easily reenergized. Unplug the equipment and ensure the plug is within your control at all times while working on the equipment. LOCK OUT /TAG OUT procedures should be used where the energizing mechanism is not within your control at all times while manipulating.

Equipment over 120V should only be worked on by an authorized person.

ENCLOSED SPACES

Working in unventilated enclosed spaces such as walk-in coolers poses a suffocation hazard. The following safety policy shall apply:

1. No work shall be performed in an enclosed space which is not equipped with an interior door handle or other door latch opening mechanism.

2. No work is to be performed in a space in which an exterior door lock cannot be overridden from the inside.

3. No work exceeding three minutes per 150 cubic feet shall be performed without additional ventilation.

4. If work time is expected to exceed the value above, a means of supplying adequate ventilation must be provided. There shall be a second party, not in the enclosed space, that shall supervise that ventilation at all times. Specialty training must be obtained before undertaking this type of process.

5. Notify a responsible party that you will be entering the enclosed space, even for routine occupation.

SAFETY PROCEDURES FOR GENERAL LABORATORIES

General Safety Policy for Students in Introductory, General, and Analytical Chemistry Laboratories
CLAB 103, CLAB 104, CLAB 123, CLAB 124, CLAB 256, CLAB 456

EMERGENCIES–In case of an emergency when the instructor is unavailable or incapacitated, call University Police at 2222 using the laboratory telephone. When using a cell phone, it is necessary to dial (985)-549-2222.

CONDITIONS OF YOUR WORK AREA
You should maintain a work area that is free of unnecessary equipment, books, coats, purses, excess chemicals, and trash. Keep aisles and exits unobstructed. Books, coats, purses and other personal belongings should be stored in the cabinets beneath the counters. Reagents should be returned to the proper location. At conclusion of lab, clean all used glassware and bench top and replace all equipment in proper location. Before you leave the lab, be prepared to have your station inspected by your instructor.

CHEMICAL SPILLS
All chemical spills should be cleaned up immediately by the proper procedure (if you do not know the correct procedure, notify your instructor for instructions).

EYE PROTECTION
Safety goggles must be worn at all times when you are in the laboratory. Contact lenses are not recommended, however ACS indicates that these lenses are acceptable with proper safety goggles. It is required that you wear safety goggles over your regular prescription glasses.

DISPOSAL OF WASTE MATERIALS
Waste chemicals are to be discarded in the properly labeled waste container. BE SURE TO READ THE LABEL ON THE WASTE CONTAINER. Broken glass and syringes should be placed in the broken glass container. Waste paper, towels, and other trash should be discarded in the waste baskets.

PIPETTING LIQUIDS
Always use a rubber suction bulb or a syringe attached to the pipette to fill the pipette. NEVER USE YOUR MOUTH TO DO THE WORK OF THE SUCTION BULB OR SYRINGE.

HEATING MATERIALS
Make sure that a boiling stone or stir bar is contained in all liquids before heating. When heating materials in a test tube, always point the opening of the container away from yourself and others. Point the opening toward the back of the hood or up toward the splash guard that runs the length of the work bench. Never heat a closed (sealed) container. Never place your face over a material which is being heated. This includes liquids or solids, beakers, test tubes, and Erlenmeyer flasks. The hot material could contact your face and cause chemical and/or thermal burns. Never heat a flammable substance over an open flame. Never leave an experiment that is being heated unattended.

OPEN FLAMES
Have open flames (Bunsen burners, lighters, matches) **ONLY** when the instructor or the lab manual specifically tells you to do so.

EATING OR DRINKING
Since there is a possibility of food substance becoming contaminated with toxic chemicals, no eating or drinking will be allowed in any of the laboratories. No chewing gum or hard candy. Never taste any chemicals from the laboratory.

SMOKING
Smoking is not allowed in any building on campus.

CONDUCTING EXPERIMENTS
Under no circumstances will you be allowed to conduct experiments that have not been assigned for you to do or to work in the lab alone without proper supervision. If you need to leave the lab during class, you should notify the instructor. Do not leave an experiment unattended.

FIRE IN THE LABORATORY
Call out "FIRE" and get away from the fire. **Notify the instructor.** Your safety is the number one priority. Some small fires may be extinguished as discussed the first day of lab. Medium to Large fires will require evacuation of the building. Pull the fire alarm, and then evacuate the building.

EVACUATION
In case of evacuation, leave behind all personal objects, leave the room by nearest exit and proceed directly to Azalea Circle. Evacuation Routes are posted adjacent to all classroom exit doors. Check in with instructor at Azalea Circle to ensure your safety and verify that no rescue is necessary. Do not leave until told to do so.

FIRE ON A PERSON
If your clothing or hair catches fire, DO NOT RUN. Running only fans the flames and makes them burn faster and hotter. Go immediately to and use the safety shower and call out for help. Stay under the shower until the fire is out and the skin temperature has cooled down. If you are in a lab where a person is on fire, it is your responsibility to help that person get under the safety shower and assist them in any way that you can. NEVER USE A FIRE EXTINGUISHER ON A PERSON.

CHEMICAL SPILLS ON

Remember that speed in washing to remove the chemical is most important in reducing the extent of injury. Wash off the contaminated area immediately. Notify the Laboratory Coordinator.

YOUR EYES
Immediately go to the eye wash station and while holding your eye open, irrigate the eye completely for at least 15-30 minutes. Report to the Student Health Center.

YOUR HANDS OR ARMS
Immediately go to the sink and wash your hands until they are no longer contaminated. If a chemical burn has occurred, notify the Lab Coordinator and report to the Health Center. Always wash your hands before you leave the laboratory.

YOUR BODY
Immediately go to the safety showers, pull the shower lever, and with the water running remove any contaminated clothing. Stay under the shower until all of the contamination has been washed away. Notify the Lab Coordinator and report to the Health Center.

OTHER INJURIES
In the event that you or your lab partner cuts themselves or burns themselves, you should notify your instructor immediately.

CHEMICALS
Never use a chemical from an unlabeled container. Never substitute a chemical in an experiment without the instructor's permission. Always treat unfamiliar chemicals as dangerous.

FUME HOOD
When dispensing or working with volatile chemicals, it is recommended to do so in the fume hood. Be sure that the hood is operating by observing that the flow meter is indicating in the green. Never place any body part other than your hands inside the fume hood. When working in fume hood, keep the sash line between you and the material being manipulated. Never dispense chemicals on the air foil sill of the hood. This creates a potential spill hazard and interrupts proper air flow.

PREGNANCY/ALLERGY/CHEMICAL SENSITIVITY
Due to the possibility of contact with chemicals, please self-notify your instructor if you are currently pregnant, have a known allergy or have a known chemical sensitivity or if you develop of any of these conditions during the semester. Additional safety equipment (such as gloves and lab coats) may be put in place. You may be forbidden from participating in select labs.

HEALTH CONDITIONS
If you have a condition that may impact the safety of yourself or others in the lab (such as fainting spells, seizures, tremors, etc) notify your instructor. Special safety practices may be put in place.

HAZARD COMMUNICATION
While academic laboratories do not fall under the purview of OSHA, students graduating in the sciences are likely to be hired into positions were a basic knowledge of chemical safety and its hazard communication are expected and required by law. OSHA Hazard Communications Standard 29 CFR 1910.1200 requires written communication of the hazards associated with chemicals, proper labeling of hazardous chemicals and access to safety data sheets, and safety training.

Written Communication – In this course, the most important hazards associated with each laboratory experiment are listed at the beginning each procedure. Additional written safety information for each substance can be found in safety data sheets that are kept in a binder in each laboratory. Students should know the location of this binder. In most cases, instructors

will also inform students of specific dangers for each experiment during pre-laboratory lectures.

Labeling and Safety Data Sheets – Chemical stock bottles will be labeled with the name of the substance (concentrations are generally included for mixtures), a signal word, and its hazard class. Signal words are **DANGER** for significant hazards and **WARNING** for lesser hazards. The hazard class describes the nature of the physical or health hazard associated with a substance such as flammable, carcinogen, or acute toxin and may be shown in words or pictograms. **Safety Data Sheets** (SDS) were formerly called material safety data sheets and are often still referred to as MSDS. The SDS for a substance is a 16-section written document provided by its manufacturer. You should be familiar with the format of the SDS so that you can find necessary information in the event of an emergency. Each section is briefly described below and an example SDS is given in the appendix of this laboratory manual.

Section 1 Identification: contents and manufacturer information
Section 2 Hazard Identification: hazard class, signal word, pictograms, and precautions
Section 3 Composition: chemical name (with synonyms) and concentration of each substance
Section 4 First Aid Information: description of symptoms and first aid instructions by exposure
Section 5 Fire-fighting Information: extinguishing equipment and personal protective equipment
Section 6 Accidental Release Measures: information on clean-up of spills
Section 7 Handling and Storage: types of containers and incompatible chemical classes
Section 8 Exposure Controls/Personal Protection: exposure limits and PPE
Section 9 Physical and Chemical Properties: appearance, melting points, boiling points, etc.
Section 10 Stability and Reactivity: stable or unstable conditions, conditions to avoid, etc.
Section 11 Toxicological Information: exposure routes, toxicity data (LD_{50}), and symptoms
Section 12 Ecological Information: species specific toxicity, bioaccumulation information, etc.
Section 13 Disposal Considerations: recommended disposal containers and procedures
Section 14 Transport Information
Section 15 Regulatory Information
Section 16 Other Information

Global Harmonized System Pictograms – OSHA hazard communications policies are consistent with the United Nations' Globally Harmonized System of Classification and Labelling of Chemicals (**GHS**). The system employs a series of pictograms. You should be familiar with the GHS pictograms shown below and their associated hazards.

<table>
<tr>
<td>

Flammable
Flammable and pyrophoric substances and those that produce flammable gases by reaction with water

Explosive
Explosive and self-reactive substances

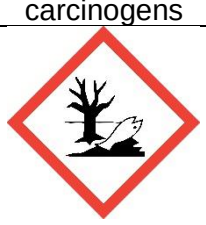
Oxidizer
Substances that act as strong oxidizing agents allowing combustion in the absence of oxygen

Corrosive
Substances that are corrosive to metal or cause skin/eye damage

Compressed Gases
Gases and liquified gases stored under pressure
</td>
<td>Physical Hazards</td>
</tr>
<tr>
<td>

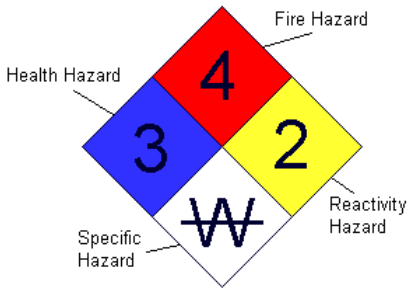
Toxic
Acutely toxic substances when ingested, inhaled, or absorbed through skin that cause severe damage or death

Health Hazard
Substances that adversely affect health such as acute and chronic damage to specific organs, mutagens, and carcinogens

Irritant
Substances that cause respiratory, skin, and eye irritation or less severe acute toxicity
</td>
<td>Health Hazards</td>
</tr>
<tr>
<td>

Environmentally Damaging
Acute and chronic environmetal damage
</td>
<td>Environmental Hazards</td>
</tr>
</table>

Non-GHS Hazard Communication – Many chemical labels and SDS will contain other hazard communication methods in addition to GHS. Two common methods are NFPA (National Fire Protection Association) and HMIS (Hazardous Material Identification System). Older labels may not include the newer GHS pictograms and information necessitating that students be familiar with these methods.

NFPA Diamonds – The NFPA system uses a series of three colored diamond shapes (shown below) containing a number from 0 to 4. The diamond at the left will be blue and the number identifies the level of health risk; the diamond at the top will be red and describes the substance's flammability; and the diamond at the right will be yellow and indicates a substance's instability or reactivity. Higher numbers represent a greater degree of danger. The diamond at the bottom will be white and is used for special information. The specific descriptions of the hazards represented by the numbers in each diamond is available in the appendix of this laboratory manual.



HMIS Color Bar – The HMIS system is similar to the NFPA diamond except the information is arranged as a stack of colored bars (shown below) containing a number from 0 to 4. The top of the label may identify the substance. The first bar will be blue and represents the health hazard; the second bar will be red and describes the substance's flammability; the third bar will be yellow or orange and indicates the physical and reactivity hazards of a substance; and the last bar will be white and provides information on the necessary personal protective equipment used when handling a substance. As with the NFPA system, larger numbers mean greater danger. Specific descriptions for the hazards represented by each bar and number are available in the appendix of this laboratory manual

Training – The training component of the OHSA Hazard Communication Standard is met through the safety training each student receives at the beginning of each laboratory course at Southeastern.

LAB ATTIRE

Safe laboratory practices mandate proper attire for handling unknown or hazardous chemicals. Departmental policy forbids students from entering the lab if they are non-compliant with safety policy (including attire items 1-7 below). The department is not required to provide make up labs due to safety non-compliance.

1. ALWAYS wear eye protection.
2. DO NOT wear sandals or open-toe shoes.
3. If you have long hair, pull it back in a bun or a pony-tail
4. If you have long, baggy sleeves roll them up or bind them close.
5. DO NOT wear nylon hose.
6. DO NOT wear shorts, short skirts, short shirts, low pants or other clothing that leaves excess skin exposed.
7. All skin that would normally be covered by a below the knee length lab coat, needs to be covered when wearing street clothing in the lab.

In the event of inappropriate clothing, the student may remedy the situation by changing clothes or wearing of a lab coat. Alternative clothes may be may be purchased from the union bookstore. A limited amount of lab coats may be available for borrowing. Disposable lab coats are available for purchase from the Retail Bookstore located in the Student Union.

Students are forbidden from working in the lab in a non-safety-compliant manner.

This Safety Policy is by no means a complete and absolute statement of laboratory safety instructions. Your instructor will periodically point out other safety precautions.

SAFETY PROCEDURES FOR ORGANIC CHEMISTRY LABORATORIES

General Safety Policy for Students in Organic and Introductory Inorganic Chemistry Laboratories
CLAB 263, CLAB 267, CLAB 268, CLAB 274

EMERGENCIES–In case of an emergency when the instructor is unavailable or incapacitated, call University Police at 2222 using the laboratory telephone.

CONDITIONS OF YOUR WORK AREA
You should maintain a work area that is free of unnecessary clutter. Store all books, coats, purses, etc. in "Student Locker" beneath bench. Remove only necessary equipment from "Equipment Locker" beneath bench. Communal equipment is found under center bench. At conclusion of lab, replace all equipment in proper location, and wash all glassware (with soap and brush) and place in metal tray for drying. Do not place Teflon or plastic in metal trays.

CHEMICAL SPILLS.
All chemical spills should be cleaned up immediately by the proper procedure (if you do not know the correct procedure, notify your instructor for instructions).

EYE PROTECTION
Safety goggles must be worn at all times when you are in the laboratory. Contact lenses are not recommended to be worn in the lab; however, ACS indicates that these lenses are acceptable with proper safety goggles. It is recommended that you wear a regular pair of prescription glasses under your safety goggles.

DISPOSAL OF WASTE MATERIALS
Waste chemicals are to be discarded in the properly labeled waste container. BE SURE TO READ THE LABEL ON THE WASTE CONTAINER. Broken glass and syringes should be placed in the broken glass container. Waste paper towels, filter paper, boiling stones and other trash should be discarded in the waste baskets.

PIPETTING LIQUIDS
Always use a rubber suction bulb or a syringe attached to the pipette to fill the pipette. NEVER USE YOUR MOUTH TO DO THE WORK OF THE SUCTION BULB OR SYRINGE.

HEATING MATERIALS
Make sure that a boiling stone or stir bar is contained in all liquids before heating. When heating materials in a test tube, always point the opening of the container away from yourself and the other workers in the area. Point the opening toward the back of the hood or up toward the splash guard that runs the length of the work bench. Never heat a closed (sealed) container. Never place your face over a material which is being heated. This includes liquids or solids, beakers, test tubes, and Erlenmeyer flasks. The hot material could contact your face and cause chemical and/or thermal burns.

UNSCHEDULED LABORATORY PERIODS
Under no circumstances are you allowed to work in a laboratory alone or without proper supervision.

EATING OR DRINKING
Since there is a possibility of food substance becoming contaminated with toxic chemicals, no eating or drinking will be allowed in the laboratory. No chewing gum and no hard candy. Never taste any chemicals from the laboratory.

OPEN FLAMES
Have open flames (Bunsen burners, lighters, matches) **ONLY** when the instructor specifically tells you to do so.

SMOKING
Smoking is not allowed in any building on campus.

UNAUTHORIZED EXPERIMENTS
Under no circumstances will you be allowed to conduct experiments that have not been assigned for you to do.

FIRE IN THE LABORATORY
Call out "FIRE" and get away from the fire. Notify the instructor. Small, self-contained fires with limited fuel source may be extinguished by covering with a watch glass or simply allowing it to burn itself out. Small to Medium fires may be extinguished by the instructor using a fire extinguishers located in the lab. Medium to Large fires demand evacuation of the building. Pull the fire alarm, and then evacuate the building.

EVACUATION
In case of Pursley Hall evacuation, leaving behind all personal objects, leave room by nearest exit and using evacuation route proceed directly to Azalea Circle. Check in with instructor at Azalea Circle to ensure your safety and that no rescue is necessary. Do not leave until told to do so.

FIRE ON A PERSON
If your clothing or hair catches fire, DO NOT RUN. Running only fans the flames. Go immediately to and use the safety shower and call out for help. Stay under the shower until the fire is out and the skin temperature has cooled down. If you are in a lab where a person is on fire, it is your responsibility to help that person get under the safety shower and assist them in any way that you can. NEVER USE A FIRE EXTINGUISHER ON A PERSON.

ALLERGY/CHEMICAL SENSITIVITY
Due to the possibility of contact with chemicals, please self-notify your instructor if you have a known allergy or have a known chemical sensitivity or if you develop of any of these conditions during the semester. Additional safety equipment (such as gloves and lab coats) may be put in place. You may be forbidden from participating in select labs.

PREGNANCY
Due to the hazardous nature of organic chemicals and the possibility of injury, Departmental Policy forbids pregnant students from actively engaging in organic chemistry laboratory. If you currently are pregnant or become pregnant during the semester, discuss immediately with your instructor.

HEALTH CONDITIONS
If you have a condition that may impact the safety of yourself or others in the lab (such as fainting spells, seizures, tremors, etc) notify your instructor. Special safety practices may be put in place.

CHEMICAL SPILLS ON

Remember that speed in washing to remove the chemical is most important in reducing the extent of injury. Wash off the contaminated area immediately. Notify the Laboratory Coordinator.

YOUR EYES
Immediately go to the eye wash station and while holding your eye open, irrigate the eye completely for at least 15-30 minutes. Report to the Student Health Center.

YOUR HANDS OR ARMS
Immediately go to the sink and wash your hands until they are no longer contaminated. If a chemical burn has occurred, notify the Lab Coordinator and report to the Health Center. Always wash your hands before you leave the laboratory.

YOUR BODY
Immediately go to the safety showers, pull the shower lever, and with the water running remove any contaminated clothing. Stay under the shower until all of the contamination has been washed away. Notify the Lab Coordinator and report to the Health Center.

CHEMICALS
Never use a chemical from an unlabeled container. Never substitute a chemical in an experiment without the instructor's permission. Always treat unfamiliar chemicals as if they are dangerous.

ELECTRICAL EQUIPMENT AND GLASSWARE
Examine all electrical equipment (hot plates, stirrers, etc.) to make sure the power cord is not frayed, all guards and covers are in place, and it is in good operating condition. Notify the instructor if there are any concerns about a piece of equipment. Examine all glassware closely for small fractures or cracks as these may cause breakage of the glassware during the experiment. Notify the instructor if you notice any glassware abnormalities.

FUME HOOD
Never place any body part other than your hands inside the fume hood. When working in fume hood, keep the sash line between you and the material being manipulated. Never dispense chemicals on the air foil sill of the hood. This creates a potential spill hazard and interrupts proper air flow.

HAZARD COMMUNICATION
While academic laboratories do not fall under the purview of OSHA, students graduating in the sciences are likely to be hired into positions were a basic knowledge of chemical safety and its hazard communication are expected and required by law. OSHA Hazard Communications Standard 29 CFR 1910.1200 requires written communication of the hazards associated with chemicals, proper labeling of hazardous chemicals and access to safety data sheets, and safety training.

Written Communication – In this course, the most important hazards associated with each laboratory experiment are listed at the beginning each procedure. Additional written safety information for each substance can be found in safety data sheets that are kept in a binder in each laboratory. Students should know the location of this binder. In most cases, instructors will also inform students of specific dangers for each experiment during pre-laboratory lectures.

Labeling and Safety Data Sheets – Chemical stock bottles will be labeled with the name of the substance (concentrations are generally included for mixtures), a signal word, and its hazard class. Signal words are **DANGER** for significant hazards and **WARNING** for lesser hazards. The hazard class describes the nature of the physical or health hazard associated with a substance such as flammable, carcinogen, or acute toxin and may be shown in words or pictograms. **Safety Data Sheets** (SDS) were formerly called material safety data sheets and are often still referred to as MSDS. The SDS for a substance is a 16-section written document provided by its manufacturer. You should be familiar with the format of the SDS so that you can find necessary information in the event of an emergency. Each section is briefly described below and an example SDS is given in the appendix of this laboratory manual.

Section 1 Identification: contents and manufacturer information
Section 2 Hazard Identification: hazard class, signal word, pictograms, and precautions
Section 3 Composition: chemical name (with synonyms) and concentration of each substance
Section 4 First Aid Information: description of symptoms and first aid instructions by exposure
Section 5 Fire-fighting Information: extinguishing equipment and personal protective equipment
Section 6 Accidental Release Measures: information on clean-up of spills
Section 7 Handling and Storage: types of containers and incompatible chemical classes
Section 8 Exposure Controls/Personal Protection: exposure limits and PPE
Section 9 Physical and Chemical Properties: appearance, melting points, boiling points, etc.
Section 10 Stability and Reactivity: stable or unstable conditions, conditions to avoid, etc.
Section 11 Toxicological Information: exposure routes, toxicity data (LD_{50}), and symptoms
Section 12 Ecological Information: species specific toxicity, bioaccumulation information, etc.
Section 13 Disposal Considerations: recommended disposal containers and procedures
Section 14 Transport Information
Section 15 Regulatory Information
Section 16 Other Information

Global Harmonized System Pictograms – OSHA hazard communications policies are consistent with the United Nations' Globally Harmonized System of Classification and Labelling of Chemicals (**GHS**). The system employs a series of pictograms. You should be familiar with the GHS pictograms shown below and their associated hazards.

<table>
<tr>
<td>

Flammable
Flammable and pyrophoric substances and those that produce flammable gases by reaction with water


Explosive
Explosive and self-reactive substances

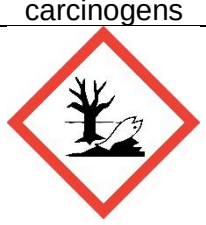

Oxidizer
Substances that act as strong oxidizing agents allowing combustion in the absence of oxygen


Corrosive
Substances that are corrosive to metal or cause skin/eye damage


Compressed Gases
Gases and liquified gases stored under pressure
</td>
<td>Physical Hazards</td>
</tr>
<tr>
<td>

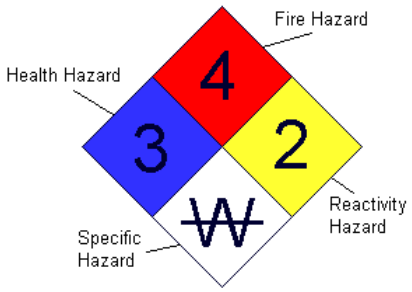
Toxic
Acutely toxic substances when ingested, inhaled, or absorbed through skin that cause severe damage or death


Health Hazard
Substances that adversely affect health such as acute and chronic damage to specific organs, mutagens, and carcinogens


Irritant
Substances that cause respiratory, skin, and eye irritation or less severe acute toxicity
</td>
<td>Health Hazards</td>
</tr>
<tr>
<td>

Environmentally Damaging
Acute and chronic environmetal damage
</td>
<td>Environmental Hazards</td>
</tr>
</table>

Non-GHS Hazard Communication – Many chemical labels and SDS will contain other hazard communication methods in addition to GHS. Two common methods are NFPA (National Fire Protection Association) and HMIS (Hazardous Material Identification System). Older labels may not include the newer GHS pictograms and information necessitating that students be familiar with these methods.

NFPA Diamonds – The NFPA system uses a series of three colored diamond shapes (shown below) containing a number from 0 to 4. The diamond at the left will be blue and the number identifies the level of health risk; the diamond at the top will be red and describes the substance's flammability; and the diamond at the right will be yellow and indicates a substance's instability or reactivity. Higher numbers represent a greater degree of danger. The diamond at the bottom will be white and is used for special information. The specific descriptions of the hazards represented by the numbers in each diamond is available in the appendix of this laboratory manual.



HMIS Color Bar – The HMIS system is similar to the NFPA diamond except the information is arranged as a stack of colored bars (shown below) containing a number from 0 to 4. The top of the label may identify the substance. The first bar will be blue and represents the health hazard; the second bar will be red and describes the substance's flammability; the third bar will be yellow or orange and indicates the physical and reactivity hazards of a substance; and the last bar will be white and provides information on the necessary personal protective equipment used when handling a substance. As with the NFPA system, larger numbers mean greater danger. Specific descriptions for the hazards represented by each bar and number are available in the appendix of this laboratory manual

Training – The training component of the OHSA Hazard Communication Standard is met through the safety training each student receives at the beginning of each laboratory course at Southeastern.

LAB ATTIRE

Safe laboratory practices mandate proper attire for handling unknown or hazardous chemicals. Departmental policy forbids students from entering the lab if they are non-compliant with safety policy (including attire items 1-7 below). The department is not required to provide make up labs due to safety non-compliance.

1. ALWAYS wear eye protection.
2. DO NOT wear sandals or open-toe shoes.
3. If you have long hair, pull it back in a bun or a pony-tail
4. If you have long, baggy sleeves roll them up or bind them close.
5. DO NOT wear nylon hose.
6. DO NOT wear shorts, short skirts, short shirts, low pants or other clothing that leaves excess skin exposed.
7. All skin that would normally be covered by a below the knee length lab coat, needs to be covered when wearing street clothing in the lab.

In the event of inappropriate clothing, the student may remedy the situation by changing clothes or wearing of a lab coat. Alternative clothes may be may be purchased from the union bookstore. A limited amount of lab coats may be available for borrowing. Disposable lab coats are available for purchase from the union bookstore.
Students are forbidden from working in the lab in a non-safety-compliant manner.

This Safety Policy is by no means a complete and absolute statement of laboratory safety instructions. Your instructor will periodically point out other safety precautions.

SAFETY PROCEDURES FOR BIOCHEMISTRY LABORATORIES

General Safety Policy for Students in Biochemistry Laboratories
CLAB 283, 485, 486

EMERGENCIES–In case of an emergency when the instructor is unavailable or incapacitated, call University Police at 2222 using the laboratory telephone.

CONDITIONS OF YOUR WORK AREA
You should maintain a work area that is free of unnecessary equipment, books, coats, purses, excess chemicals, and trash. Keep aisles and exits unobstructed. At conclusion of lab, clean all used glassware and bench top, and replace all equipment in proper location.

CHEMICAL SPILLS
All chemical spills should be cleaned up immediately by the proper procedure (if you do not know the correct procedure, notify your instructor for instructions).

EYE PROTECTION
Safety goggles must be worn at all times when you are in the laboratory. Contact lenses are not recommended to be worn; however, ACS indicates that these lenses are acceptable with proper safety goggles. It is recommended that you wear a regular pair of prescription glasses under your safety goggles.

DISPOSAL OF WASTE MATERIALS
Waste chemicals are to be discarded in the properly labeled waste container. BE SURE TO READ THE LABEL ON THE WASTE CONTAINER. Broken glass, test tubes, syringes and pipets should be placed in the broken glass container. Paper towels and other trash should be discarded in the wastebaskets.

PIPETTING LIQUIDS
Always use a micropipettor fitted with the appropriate tip or a pipet pump attached to a glass pipette to fill the pipette. NEVER USE YOUR MOUTH TO DO THE WORK OF THE PUMP.

HEATING LIQUIDS
First and foremost, there is NO fire used in the biochemistry teaching labs. Obtain a hot plate and make sure that it is securely placed toward the back of the bench. When heating liquids in a test tube it is best to boil water and place the tubes in the boiling water. If the water is boiling too violently, the water will “bump” when the tubes are added. Lowering the heat or adding a boiling chip will avoid this. Never heat a closed (sealed) container. Never place your face over a material which is being heated. This includes solids, liquids, test tubes and flasks. The hot material could contact your face causing chemical and/or thermal burns.

UNSCHEDULED LABORATORY PERIODS/UNAUTHORIZED EXPERIMENTS
Under no circumstances are you allowed to work in a laboratory alone or without proper supervision. Also, you are not allowed to conduct experiments of your design. Perform experiments as outlined in your manual.

EATING OR DRINKING
Since there is a possibility of food and drink becoming contaminated with toxic chemicals or bacteria, no eating or drinking is allowed in the laboratory (this includes chewing gum and hard candy). Never taste any chemicals from the laboratory.

SMOKING
Smoking is not allowed in any building on campus.

EVACUATION
In case of Pursley Hall evacuation, leave behind all personal objects, leave room by the nearest exit and proceed directly to Azalea Circle. Evacuation routes are posted adjacent to all classroom exits. Check in with the instructor at Azalea Circle to ensure your safety and to verify that no rescue is necessary. Do not leave until told to do so.

FIRE ON A PERSON
If your clothing or hair catches fire, DO NOT RUN. Running only fans the flames and makes them burn faster and hotter. Go immediately to, and use, the safety shower and call out for help. Stay under the shower until the fire is out and the skin temperature has cooled down. If you are in a lab where a person is on fire, it is your responsibility to help that person get under the safety shower and assist them in any way that you can. NEVER USE A FIRE EXTINGUISHER ON A PERSON.

CHEMICAL SPILLS ON

Remember that speed in washing to remove the chemical is most important in reducing the extent of injury. Wash off the contaminated area immediately. Notify the Laboratory Coordinator.

YOUR EYES
Immediately go to the eye wash station and while holding your eye open, irrigate the eye completely for at least 15-30 minutes. Report to the Student Health Center.

YOUR HANDS OR ARMS
Immediately go to the sink and wash your hands until they are no longer contaminated. If a chemical burn has occurred, notify the Lab Coordinator and report to the Health Center. Always wash your hands before you leave the laboratory.

YOUR BODY
Immediately go to the safety showers, pull the shower lever, and with the water running remove any contaminated clothing. Stay under the shower until all of the contamination has been washed away. Notify the Lab Coordinator and report to the Health Center.

CHEMICALS
Never use a chemical from an unlabeled container. Never substitute a chemical in an experiment without the instructor's permission. Always treat unfamiliar or unlabeled chemicals as if they are dangerous.

BIOLOGICAL HAZARDS
When we use infectious bacteria later in the semester, you will be wearing disposable gloves to lessen the possibility of skin contact. Spills will be treated with disinfectant and cleaned. Upon

completion of the experiment you will wipe down bench tops with disinfectant and place contaminated disposables in a **BIOHAZARD** bag for autoclaving.

MUTAGENS/CARCINOGENS
At least two chemicals that fall into this category are used in the biochemistry teaching laboratory (ethidium bromide and ninhydrin). These chemicals should ONLY be handled while wearing gloves, safety goggles AND a lab coat. Special disposal is required for these chemicals—ask instructor for proper procedures.

PREGNANCY/ALLERGY/CHEMICAL SENSITIVITY
Due to the possibility of contact with chemicals, please self-notify your instructor if you are currently pregnant, have a known allergy or have a known chemical sensitivity or if you develop any of these conditions during the semester. Additional safety equipment (such as gloves and lab coats) may be put in place. You may be forbidden from participating in select labs.

HEALTH CONDITIONS
If you have a condition that may impact the safety of yourself or others in the lab (such as fainting spells, seizures, tremors, etc.) notify you instructor. Special safety practices may be put in select labs.

FUME HOOD
Never place any body part other than your hands inside the fume hood. When working in fume hoods, keep the sash line between you and the material being manipulated. Never dispense chemicals on the air foil sill of the hood. This creates a potential spill hazard and interrupts proper air flow.

HAZARD COMMUNICATION
While academic laboratories do not fall under the purview of OSHA, students graduating in the sciences are likely to be hired into positions were a basic knowledge of chemical safety and its hazard communication are expected and required by law. OSHA Hazard Communications Standard 29 CFR 1910.1200 requires written communication of the hazards associated with chemicals, proper labeling of hazardous chemicals and access to safety data sheets, and safety training.

Written Communication – In this course, the most important hazards associated with each laboratory experiment are listed at the beginning each procedure. Additional written safety information for each substance can be found in safety data sheets that are kept in a binder in each laboratory. Students should know the location of this binder. In most cases, instructors will also inform students of specific dangers for each experiment during pre-laboratory lectures.

Labeling and Safety Data Sheets – Chemical stock bottles will be labeled with the name of the substance (concentrations are generally included for mixtures), a signal word, and its hazard class. Signal words are **DANGER** for significant hazards and **WARNING** for lesser hazards. The hazard class describes the nature of the physical or health hazard associated with a substance such as flammable, carcinogen, or acute toxin and may be shown in words or pictograms. **Safety Data Sheets** (SDS) were formerly called material safety data sheets and are often still referred to as MSDS. The SDS for a substance is a 16-section written document provided by its manufacturer. You should be familiar with the format of the SDS so that you can find necessary information in the event of an emergency. Each section is briefly described below and an example SDS is given in the appendix of this laboratory manual.

Section 1 Identification: contents and manufacturer information
Section 2 Hazard Identification: hazard class, signal word, pictograms, and precautions
Section 3 Composition: chemical name (with synonyms) and concentration of each substance
Section 4 First Aid Information: description of symptoms and first aid instructions by exposure
Section 5 Fire-fighting Information: extinguishing equipment and personal protective equipment
Section 6 Accidental Release Measures: information on clean-up of spills
Section 7 Handling and Storage: types of containers and incompatible chemical classes
Section 8 Exposure Controls/Personal Protection: exposure limits and PPE
Section 9 Physical and Chemical Properties: appearance, melting points, boiling points, etc.
Section 10 Stability and Reactivity: stable or unstable conditions, conditions to avoid, etc.
Section 11 Toxicological Information: exposure routes, toxicity data (LD_{50}), and symptoms
Section 12 Ecological Information: species specific toxicity, bioaccumulation information, etc.
Section 13 Disposal Considerations: recommended disposal containers and procedures
Section 14 Transport Information
Section 15 Regulatory Information
Section 16 Other Information

Global Harmonized System Pictograms – OSHA hazard communications policies are consistent with the United Nations' Globally Harmonized System of Classification and Labelling of Chemicals (**GHS**). The system employs a series of pictograms. You should be familiar with the GHS pictograms shown below and their associated hazards.

<table>
<tr>
<td>

Flammable
Flammable and pyrophoric substances and those that produce flammable gases by reaction with water

Explosive
Explosive and self-reactive substances

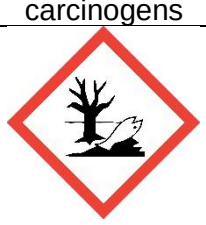
Oxidizer
Substances that act as strong oxidizing agents allowing combustion in the absence of oxygen

Corrosive
Substances that are corrosive to metal or cause skin/eye damage

Compressed Gases
Gases and liquified gases stored under pressure
</td>
<td>Physical Hazards</td>
</tr>
<tr>
<td>

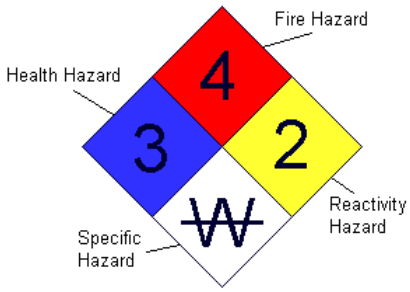
Toxic
Acutely toxic substances when ingested, inhaled, or absorbed through skin that cause severe damage or death

Health Hazard
Substances that adversely affect health such as acute and chronic damage to specific organs, mutagens, and carcinogens

Irritant
Substances that cause respiratory, skin, and eye irritation or less severe acute toxicity
</td>
<td>Health Hazards</td>
</tr>
<tr>
<td>

Environmentally Damaging
Acute and chronic environmetal damage
</td>
<td>Environmental Hazards</td>
</tr>
</table>

Non-GHS Hazard Communication – Many chemical labels and SDS will contain other hazard communication methods in addition to GHS. Two common methods are NFPA (National Fire Protection Association) and HMIS (Hazardous Material Identification System). Older labels may not include the newer GHS pictograms and information necessitating that students be familiar with these methods.

NFPA Diamonds – The NFPA system uses a series of three colored diamond shapes (shown below) containing a number from 0 to 4. The diamond at the left will be blue and the number identifies the level of health risk; the diamond at the top will be red and describes the substance's flammability; and the diamond at the right will be yellow and indicates a substance's instability or reactivity. Higher numbers represent a greater degree of danger. The diamond at the bottom will be white and is used for special information. The specific descriptions of the hazards represented by the numbers in each diamond is available in the appendix of this laboratory manual.



HMIS Color Bar – The HMIS system is similar to the NFPA diamond except the information is arranged as a stack of colored bars (shown below) containing a number from 0 to 4. The top of the label may identify the substance. The first bar will be blue and represents the health hazard; the second bar will be red and describes the substance's flammability; the third bar will be yellow or orange and indicates the physical and reactivity hazards of a substance; and the last bar will be white and provides information on the necessary personal protective equipment used when handling a substance. As with the NFPA system, larger numbers mean greater danger. Specific descriptions for the hazards represented by each bar and number are available in the appendix of this laboratory manual

Training – The training component of the OHSA Hazard Communication Standard is met through the safety training each student receives at the beginning of each laboratory course at Southeastern.

LAB ATTIRE
Safety practices mandate proper attire for handling unknown or hazardous chemicals. The department is not required to provide make-up labs due to safety noncompliance.

1. Always wear eye protection.
2. DO NOT wear sandals or open-toe shoes.
3. If you have long hair, pull it back in a bun or a ponytail
4. If you have on long, baggy sleeves, roll them up.
5. DO NOT wear nylon hose
6. Shorts are acceptable provided they are knee length. You should also consider wearing a lab coat or plastic apron.

ULTRAVIOLET LIGHT
High intensity ultraviolet light is used to identify fluorescent compounds or fluorescent stains. Our primary concern with its use is eye protection. You **MUST** wear UV safety goggles to prevent UV light from reaching your eyes. Limited exposure is required (< 10 seconds at a time) to minimize the risk of skin damage.

CENTRIFUGES
This piece of equipment presents some unique problems. If not handled properly, it is possible for a sample and the rotor to come out of the centrifuge while spinning at upwards of 20,000 rounds per minute. At this speed, the rotor could destroy a concrete wall! Always make sure that a sample is counter balanced in the rotor before starting and that the rotor has stopped spinning prior to opening the chamber.

This Safety Policy is by no means a complete and absolute statement of safety to be followed in the laboratory. Its intent is to make you aware of polices and first-aid procedures for certain emergency situations. Your instructor will from time to time point out other safety precautions.

SAFETY PROCEDURES FOR PHYSICS LABORATORIES

General Safety Policy for Students in Physics Laboratories
PLAB 123, PLAB 142, PLAB 193, PLAB 194, PLAB 223, PLAB 224, PLAB 225, PLAB 303, PLAB 314, PLAB 334, PLAB 353, PLAB 425

EMERGENCIES–In case of an emergency when the instructor is unavailable or incapacitated, call University Police at 2222 using the laboratory telephone.

1. Never open gas valves unless specifically directed to by your instructor.
2. Never insert anything into the electrical outlets on or under the lab tables except the electrical plugs designed for this purpose.
3. Never stand on the tables or chairs to conduct experiments.
4. When working with suspended masses, be careful to keep hands, feet, all other parts of your body, as well as fragile objects out of the area where they might fall.
5. When working with motion tracks, be aware that the track might slide and fall off of the table or the cart or sled may fall off the end of the track. Keep the area clear where anything would fall if this were to happen.
6. When working with ballistic launchers, always wear eye protection.
7. When working with glass tubes, make sure that their edges are smooth. Do not overstress them. When using them to rotate objects, hold them at the topmost part. If a glass tube breaks, do not reuse the broken parts.
8. When working with springs, be aware that an overstretched spring can fail suddenly, resulting in the whole spring or pieces flying in unexpected directions.
9. When working with hot water and steam, be careful not to touch any heated material, the hot water, or the steam. Be careful not to spill hot water.
10. When working with gas spectrum tubes, be careful not to touch the metal electrodes of the power supply when the power is on.
11. When working with lasers, do not let the laser beam or its reflection hit your eye. Stay aware of the direct and reflected paths of the laser. Do not leave the laser on when unattended.
12. When working with electric circuits, be careful not to create a short circuit.
    - **(a)** Leave they circuit disconnected from the power supply until you have double- and triple-checked for short circuits.
    - **(b)** Your resistance meter can be used to check for short circuits before connecting your circuit to the power supply. If the resistance between the positive and negative wire is less than a few ohms, then you probably have a short circuit.
    - **(c)** An ammeter has very low resistance and may create a short circuit.
    - **(d)** When the circuit is connected to the power supply and the power supply is turned on, if there are sparks, smoke, or any other unusual signs, immediately turn the power supply off and call the instructor.

13. When working with electric circuits follow the following instructions regarding the power supply
   (a) Before plugging in a power supply be sure that the ON/OFF switch is in the OFF position.
   (b) Keep the maximum current of the power supply below the rated capacity of the ammeter that you are using.
   (c) When a circuit is dismantled, first disconnect the circuit from the power supply.

14. When working with electrical circuits, be aware that parts may get hot and require time to cool down after the power has been turned off. Feel for heat before touching parts of a powered or recently disconnected circuit.

15. When working with capacitors be aware that capacitors can hold a charge after being disconnected from the circuit. Do not accidentally touch the terminals of a capacitor with any conductor, including parts of anyone's body. When deliberately discharging a capacitor, do so only in the manner prescribed by the instructor.

16. If you have a condition that may impact the safety of yourself or others in the lab (such as fainting spells, seizures, tremors, etc) notify your instructor. Special safety practices may be put in place.

SAFETY PROCEDURES FOR EARTH SCIENCE LABORATORIES

General Safety Policy for Students in Earth Science Laboratories
ESSL 103, ESSL 104

EMERGENCIES–In case of an emergency when the instructor is unavailable or incapacitated, call University Police at 985-549-2222.

EYE PROTECTION
Safety goggles must be worn when performing the acid tests on rock and mineral samples. U. V. Safety goggles must be worn when you are using the U. V. lamps.

ACID TESTS
When performing any tests on rocks or minerals with the weak HCl, be sure to only use 1-2 drops, wipe off the sample with paper towel when finished, and wash your hands. The acid is weak, however it will cause holes in clothing so be careful of spills.

MOUTH PROTECTION
Never lick or taste any minerals or rocks.

HANDS
When performing any streak or hardness test on a rock or mineral, always keep the glass plates and porcelain streak plates on the tabletop. NEVER hold them in your hand. Always wash your hands after you have handled the minerals and rocks and before you leave the laboratory.

ELECTRICITY
Do not insert anything into the electrical outlets on or under the lab tables except the electrical plugs designed for this purpose.

DISPOSAL OF WASTE MATERIALS
Waste paper, towels, and other trash should be discarded in the waste baskets.

HAZARD COMMUNICATION
While academic laboratories do not fall under the purview of OSHA, students graduating in the sciences are likely to be hired into positions were a basic knowledge of chemical safety and its hazard communication are expected and required by law. OSHA Hazard Communications Standard 29 CFR 1910.1200 requires written communication of the hazards associated with chemicals, proper labeling of hazardous chemicals and access to safety data sheets, and safety training.

Written Communication – In this course, the most important hazards associated with each laboratory experiment are listed at the beginning each procedure. Additional written safety information for each substance can be found in safety data sheets that are kept in a binder in each laboratory. Students should know the location of this binder. In most cases, instructors will also inform students of specific dangers for each experiment during pre-laboratory lectures.

Labeling and Safety Data Sheets – Chemical stock bottles will be labeled with the name of the substance (concentrations are generally included for mixtures), a signal word, and its hazard class. Signal words are **DANGER** for significant hazards and **WARNING** for lesser hazards.

The hazard class describes the nature of the physical or health hazard associated with a substance such as flammable, carcinogen, or acute toxin and may be shown in words or pictograms. **Safety Data Sheets** (SDS) were formerly called material safety data sheets and are often still referred to as MSDS. The SDS for a substance is a 16-section written document provided by its manufacturer. You should be familiar with the format of the SDS so that you can find necessary information in the event of an emergency. Each section is briefly described below and an example SDS is given in the appendix of this laboratory manual.

Section 1 Identification: contents and manufacturer information
Section 2 Hazard Identification: hazard class, signal word, pictograms, and precautions
Section 3 Composition: chemical name (with synonyms) and concentration of each substance
Section 4 First Aid Information: description of symptoms and first aid instructions by exposure
Section 5 Fire-fighting Information: extinguishing equipment and personal protective equipment
Section 6 Accidental Release Measures: information on clean-up of spills
Section 7 Handling and Storage: types of containers and incompatible chemical classes
Section 8 Exposure Controls/Personal Protection: exposure limits and PPE
Section 9 Physical and Chemical Properties: appearance, melting points, boiling points, etc.
Section 10 Stability and Reactivity: stable or unstable conditions, conditions to avoid, etc.
Section 11 Toxicological Information: exposure routes, toxicity data (LD_{50}), and symptoms
Section 12 Ecological Information: species specific toxicity, bioaccumulation information, etc.
Section 13 Disposal Considerations: recommended disposal containers and procedures
Section 14 Transport Information
Section 15 Regulatory Information
Section 16 Other Information

Global Harmonized System Pictograms – OSHA hazard communications policies are consistent with the United Nations' Globally Harmonized System of Classification and Labelling of Chemicals (**GHS**). The system employs a series of pictograms. You should be familiar with the GHS pictograms shown below and their associated hazards.

<table>
<tr>
<td>

Flammable
Flammable and pyrophoric substances and those that produce flammable gases by reaction with water

Explosive
Explosive and self-reactive substances

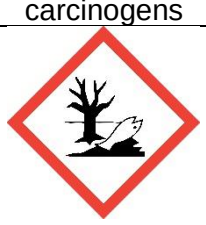
Oxidizer
Substances that act as strong oxidizing agents allowing combustion in the absence of oxygen

Corrosive
Substances that are corrosive to metal or cause skin/eye damage

Compressed Gases
Gases and liquified gases stored under pressure
</td>
<td>Physical Hazards</td>
</tr>
<tr>
<td>

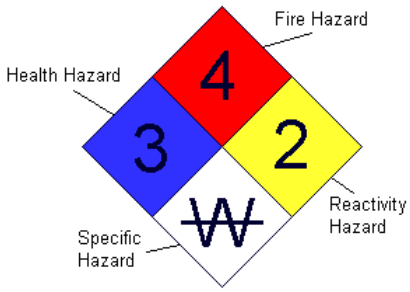
Toxic
Acutely toxic substances when ingested, inhaled, or absorbed through skin that cause severe damage or death

Health Hazard
Substances that adversely affect health such as acute and chronic damage to specific organs, mutagens, and carcinogens

Irritant
Substances that cause respiratory, skin, and eye irritation or less severe acute toxicity
</td>
<td>Health Hazards</td>
</tr>
<tr>
<td>

Environmentally Damaging
Acute and chronic environmetal damage
</td>
<td>Environmental Hazards</td>
</tr>
</table>

Non-GHS Hazard Communication – Many chemical labels and SDS will contain other hazard communication methods in addition to GHS. Two common methods are NFPA (National Fire Protection Association) and HMIS (Hazardous Material Identification System). Older labels may not include the newer GHS pictograms and information necessitating that students be familiar with these methods.

NFPA Diamonds – The NFPA system uses a series of three colored diamond shapes (shown below) containing a number from 0 to 4. The diamond at the left will be blue and the number identifies the level of health risk; the diamond at the top will be red and describes the substance's flammability; and the diamond at the right will be yellow and indicates a substance's instability or reactivity. Higher numbers represent a greater degree of danger. The diamond at the bottom will be white and is used for special information. The specific descriptions of the hazards represented by the numbers in each diamond is available in the appendix of this laboratory manual.



HMIS Color Bar – The HMIS system is similar to the NFPA diamond except the information is arranged as a stack of colored bars (shown below) containing a number from 0 to 4. The top of the label may identify the substance. The first bar will be blue and represents the health hazard; the second bar will be red and describes the substance's flammability; the third bar will be yellow or orange and indicates the physical and reactivity hazards of a substance; and the last bar will be white and provides information on the necessary personal protective equipment used when handling a substance. As with the NFPA system, larger numbers mean greater danger. Specific descriptions for the hazards represented by each bar and number are available in the appendix of this laboratory manual

Training – The training component of the OHSA Hazard Communication Standard is met through the safety training each student receives at the beginning of each laboratory course at Southeastern.

EQUIPMENT
Replace all lab equipment and supplies in the properly labeled storage containers and areas.

SMOKING
Smoking is not allowed in any building on campus.

FIRE IN THE LABORATORY
Call out “FIRE” and get away from the fire. Notify the instructor. Pull the fire alarm, and then evacuate the building.

EVACUATION
In case of Pursley Hall evacuation, leave behind all personal objects, leave the room by the East door and evacuate the building by the East door. Check in with the instructor at Azalea Circle to ensure your safety and that no rescue is necessary. Do not return to the building until told to do so.

SAFETY PROCEDURES FOR UNDERGRADUATE RESEARCH LABORATORIES

General Safety Policy for Students Participating in Undergraduate Research
CLAB 211, CLAB 411, CLAB 412 (Does not apply to computer labs)

EMERGENCIES–In case of an emergency when the instructor is unavailable or incapacitated, call University Police at 2222 using the laboratory telephone.

In general, most of the safety policy applied to the teaching laboratories applies to the research laboratories. Safety practices that promote and maintain a safe working environment must be applied during the course of laboratory work regardless of the purpose of the work. For example, the guidelines regarding lab attire and hygiene applied to the teaching labs apply to the research labs as well. Refer to the safety policy for student laboratory technicians for additional detail.

The guidelines below apply strictly to research labs, students enrolled in Chemistry 211, 411, 412 or as paid researchers on stipend or salary from an internally or externally funded grant, and to faculty advisors.

1. Students must be trained in safety procedures by the faculty advisor prior to starting a project. The hazards associated with the particular chemicals in which the student is working must be discussed and appropriate safety precautions are followed. Training should be documented.
2. Emergency response procedures must be reviewed with each student researcher. A telephone must be readily available in each wet research laboratories. Emergency phone numbers must be posted in prominent location.
3. Faculty advisors shall review the scope of the project with student workers and point out any special hazards in writing (a copy is to be given to the Laboratory Coordinator).
4. Faculty advisors, with the help of the Department, shall provide adequate safety equipment for the project.
5. SAFETY DATA SHEETS - Under the OSHA Hazard Communications Standard (29CFR 1910.1200), all personnel working with hazardous materials must have access to Safety Data Sheets or SDS (formerly classed MSDS or Material Safety Data Sheets), and be trained in the safe handling of the material. The SDS provide necessary, helpful, and useful information on the properties of the hazardous material. You should familiarize yourself with those properties before you work with the material. It is vital to your safety to be able to refer to the SDS immediately in the event of an emergency and provide a copy to emergency responders. Your instructors or research directors or supervisor will endeavor to alert you to the hazards of materials used in the laboratories; however, you may read the SDS should you desire to review the information provided there in. Updated Safety Data Sheets (SDS) shall be kept readily available.
6. Students working after-hours must be supervised by their advisor or another qualified faculty member appointed by the advisor.
7. Faculty advisors must supervise the student researchers. The advisor shall be readily available (in the building) while the student works. If the advisor must leave the building while students are working, they must either dismiss the student until they return or appoint another qualified person to supervise in their absence (e.g., another faculty member in Chemistry, Physics, or Biology).

8. In case where there are two or more student researchers, the advisor should try to schedule work hours so that students may work together as much as possible.
9. Running experiments overnight or for extended periods of time is unavoidable in a research lab. During such operation the experiment shall be clearly labeled with chemical composition, safety precautions, and an emergency shutdown procedure.
10. Lab clutter shall be kept to a minimum. Cleaning and storing of lab ware, proper disposal of waste, and proper stocking of chemicals shall be done regularly as deemed appropriate by the advisor.
11. Student researchers shall be trained properly before they are allowed independent use of the departmental instrumentation.

SAFETY PROCEDURES FOR STUDENT LABORATORY TECHNICIANS

General Safety Policy for Students Laboratory Technicians

EMERGENCIES–In case of an emergency when the supervisor is unavailable or incapacitated, call University Police at 2222 using the laboratory telephone.

The safety policy related to being a student in chemistry laboratories also applies to the setting up the chemistry labs. This policy is strengthened however to reflect the independent nature of the work and the larger quantities and higher concentrations of reagents being used.

As a student laboratory technician, your number one priority should be the safety of yourself, others working in the same lab, and the students who will use your prepared materials. If you at any time have questions or concerns regarding safety or best practices, be sure to get those questions resolved before beginning or resuming that work.

SUPERVISION
The Chemistry Laboratory Coordinator shall be readily available (in the building) while the student laboratory technicians work. If the Laboratory Coordinator must leave the building while students are working, they must appoint another staff or faculty member to supervise in their absence.

PERSONAL PROTECTIVE EQUIPMENT (PPE)
Protective eye wear, lab coat, and gloves will be provided to you by the department. It is important that you wear these PPE's.

SAFETY DATA SHEETS
Under the OSHA Hazard Communications Standard (29CFR 1910.1200), all personnel working with hazardous materials must have access to Safety Data Sheets or SDS (formerly classed MSDS or Material Safety Data Sheets), and be trained in the safe handling of the material. The SDS provide necessary, helpful, and useful information on the properties of the hazardous material. You should familiarize yourself with those properties before you work with the material. It is vital to your safety to be able to refer to the SDS immediately in the event of an emergency and provide a copy to emergency responders. Your instructors or research directors or supervisor will endeavor to alert you to the hazards of materials used in the laboratories; however, you may read the SDS should you desire to review the information provided there in. Updated Safety Data Sheets (SDS) shall be kept readily available.

LAB ATTIRE
Safe laboratory practices mandate proper attire for handling unknown or hazardous chemicals. Departmental policy forbids students from entering the lab if they are non-compliant with safety policy (including attire items 1-7 below).

1. ALWAYS wear eye protection.
2. DO NOT wear sandals or open-toe shoes.
3. If you have long hair, pull it back in a bun or a pony-tail
4. If you have long, baggy sleeves roll them up or bind them close.
5. DO NOT wear nylon hose.
6. Wear a Lab Coat and ensure excess skin is not exposed.

7. Wear proper gloves when appropriate.

CONDITIONS OF YOUR WORK AREA

You should maintain a work area that is free of unnecessary clutter. Store personal items out of the way while working in lab. Clean up all bench tops, balances, hoods, and used glassware before departing lab. Replace all equipment in proper location. If you find a messy lab when you enter, notify the Laboratory Coordinator as to the time, place, and nature of the incident.

CLEANING GLASSWARE

Initially wash all glassware using soap and a brush. If this does not clean residue, a less polar solvent may be used such as acetone. Glassware with restricted flows such as volumetric flasks or round bottoms may be rinsed with methanol or acetone to promote drying. Hang upside down on a glassware drying rack. Large volumes of dirty glassware can be washed using the commercial dish washer. If using the commercial washer, use only the designated soap.

CHEMICAL SPILLS

All chemical spills should be cleaned up immediately by the proper procedure. Always wear gloves when cleaning up spills. Dilute aqueous spills can normally be cleaned up by wiping down with a sponge. A strong acid should first be neutralized with solid sodium bicarbonate (baking soda). Then cleaned up using a dustpan or sponge. Strong base should first be neutralized with household vinegar, then cleaned up with a sponge. Clean up materials from toxic material need to be packaged for safe disposal. If you do not understand, or feel uncomfortable in cleaning up a spill, contact the Lab Coordinator or any other knowledgeable faculty member for assistance.

EYE PROTECTION

Safety goggles must be worn at all times when you are in the laboratory.

CHEMICAL HAZARDS

The complete chemical hazards for all of the chemicals you encounter are too numerous to cover in this document. There is a separate Hazardous Communication (HazCom) which must be reviewed with each student worker concerning the particular chemicals with which they will be working prior to beginning that work. General hazards include:

Strong Acids

Wear gloves, lab coats, goggles. Use caution when handling. Always add acid to water (not water to acid). If contact with skin is made wash with copious amounts of water.

Examples: Sulfuric Acid, Hydrochloric Acid, Glacial Acetic Acid, Nitric Acid.

Strong Bases

Wear gloves, lab coats, goggles. Use caution when handling. Always add base to water (not water to base). If contact with skin is made wash with copious amounts of water.

Examples: Sodium Hydroxide, Potassium Hydroxide.

Fine Solids

Wear gloves, goggles, lab coat. Do not breathe dust. Handle in hood or with other ventilation.

Examples: silica powder

DISPOSAL OF NON CHEMICAL WASTE MATERIALS

Broken glass and syringes should be placed in the broken glass container. Waste paper towels, filter paper, boiling stones and other trash should be discarded in the waste baskets.

CHEMICAL WASTE
Follow the specific directions in the Solution Manual as to the proper method of chemical disposal for each experiment. In the absence of specific directions segregate halogenated and non-halogenated materials. Do not combine materials in a waste container which may react with each other. Combine materials of similar composition and toxicity which will not react with each other. For instance, a series of non-halogenated organic solvents can often be combined in a common waste container.

Do not combine any materials without detailed knowledge of how they will (will not) react with each other. Obtain assistance from any knowledgeable faculty member.

Label each waste container with the following information.

1. Complete name of **each and every** chemical contained.
2. Name of Responsible Individual.
3. Lab Course and experiment number from which it originated.
4. Date

Waste containers must be made of appropriate material that does not react with the waste chemicals. DO NOT use glass waste bottles for materials which could develop pressure. DO NOT use plastic waste containers with materials which could compromise the integrity of the plastic. Waste containers must have secure fitting lids. Waste containers must not be identifiable empty food containers. (Do not use Coke bottles, Soba bottles or any other container which is identifiable as ever having been a food container- either by shape or labeling)

Place properly labeled, filled and sealed waste containers in the designated waste collection area within the prep lab. The Laboratory Coordinator is responsible for transfer of these materials to the university collection site. If there is a problem or an overabundance of collected waste material notify the Laboratory Coordinator.

PIPETTING LIQUIDS
Always use a rubber suction bulb or a syringe attached to the pipette to fill the pipette. NEVER USE YOUR MOUTH TO DO THE WORK OF THE SUCTION BULB OR SYRINGE.

HEATING MATERIALS
Make sure that a boiling stone or stir bar is contained in all liquids before heating. When heating materials in a test tube, always point the opening of the container away from yourself and the other workers in the area. Point the opening toward the back of the hood or up toward the splash guard that runs the length of the work bench. Never heat a closed (sealed) container. Never place your face over a material which is being heated. This includes liquids or solids, beakers, test tubes, and Erlenmeyer flasks. The hot material could contact your face and cause chemical and/or thermal burns.

EATING OR DRINKING
Since there is a possibility of food substance becoming contaminated with toxic chemicals, no eating or drinking will be allowed in the laboratory. No chewing gum and no hard candy. Never taste any chemicals from the laboratory.

UNAUTHORIZED PROCEDURES
Under no circumstances will you be allowed to conduct procedures that have not been assigned for you to do.

FIRE IN THE LABORATORY
Call out "FIRE" and get away from the fire. Immediately notify any faculty member. Small, self-contained fires with limited fuel source may be extinguished by covering with a watch glass or simply allowing it to burn itself out. Small to Medium fires may be extinguished by the instructor using a fire extinguishers located in the lab. Medium to Large fires demand evacuation of the building. Pull the fire alarm, and then evacuate the building.

EVACUATION
In case of Pursley Hall evacuation, leaving behind all personal objects, leave room by nearest exit and using evacuation route proceed directly to Azalea Circle. Check in with instructor at Azalea Circle to ensure your safety and that no rescue is necessary. Do not leave until told to do so.

FIRE ON A PERSON
If your clothing or hair catches fire, DO NOT RUN. Running only fans the flames. Go immediately to and use the safety shower and call out for help. Stay under the shower until the fire is out and the skin temperature has cooled down. If you are in a lab where a person is on fire, it is your responsibility to help that person get under the safety shower and assist them in any way that you can. NEVER USE A FIRE EXTINGUISHER ON A PERSON.

CHEMICAL SPILLS ON

Remember that speed in washing to remove the chemical is most important in reducing the extent of injury. Wash off the contaminated area immediately. Notify the Laboratory Coordinator.

YOUR EYES
Immediately go to the eye wash station and while holding your eye open, irrigate the eye completely for at least 15-30 minutes. Report to the Student Health Center.

YOUR HANDS OR ARMS
Immediately go to the sink and wash your hands until they are no longer contaminated. If a chemical burn has occurred, notify the Lab Coordinator and report to the Health Center. Always wash your hands before you leave the laboratory.

YOUR BODY
Immediately go to the safety showers, pull the shower lever, and with the water running remove any contaminated clothing. Stay under the shower until all of the contamination has been washed away. Notify the Lab Coordinator and report to the Health Center.

ALLERGY/CHEMICAL SENSITIVITY
Due to the possibility of contact with chemicals, please self-notify the Lab Coordinator if you have a known allergy or have a known chemical sensitivity or if you develop of any of these conditions during the semester.

PREGNANCY
Due to the hazardous nature of organic chemicals and the possibility of injury, Departmental Policy forbids pregnant students from actively engaging in organic chemistry laboratory preparations. If you currently are pregnant or become pregnant during your work with the organic laboratory, discuss immediately with the Lab Coordinator.

HEALTH CONDITIONS
If you have a condition that may impact the safety of yourself or others in the lab (such as fainting spells, seizures, tremors, etc) notify the Lab Coordinator. Special safety practices may be put in place.

CHEMICALS
Never use a chemical from an unlabeled container. Never substitute a chemical in an experiment without the Lab Coordinator or a knowledgeable faculty member's permission. Always treat unfamiliar chemicals as if they are dangerous.

FUME HOOD
Never place any body part other than your hands inside the fume hood. When working in fume hood, keep the sash line between you and the material being manipulated. When working with particularly hazardous materials, it is recommended that the sash be pulled down so that there is a solid barrier between you and the chemicals. Never dispense chemicals on the air foil sill of the hood. This creates a potential spill hazard and interrupts proper air flow.

This Safety Policy is by no means a complete and absolute statement of laboratory safety instructions. The Lab Coordinator will periodically point out other safety precautions.

SAFETY PROCEDURES PHYSICAL CHEMISTRY LABORATORIES

Safety Policy for Students in Physical and Inorganic Chemistry Laboratory
CLAB 391, CLAB 392, CLAB 476

EMERGENCIES–In case of an emergency when the instructor is unavailable or incapacitated, call University Police at 2222 using the laboratory telephone. When using a cell phone, it is necessary to dial (985)-549-2222.

CONDITIONS OF YOUR WORK AREA
You should maintain a work area that is free of unnecessary equipment, books, coats, purses, excess chemicals, and trash. Keep aisles and exits unobstructed. Books, coats, purses and other personal belongings should be stored in the cabinets beneath the counters. Reagents should be returned to the proper location. At conclusion of lab, clean all used glassware and bench top and replace all equipment in proper location. Before you leave the lab, be prepared to have your station inspected by your instructor.

CHEMICAL SPILLS
All chemical spills should be cleaned up immediately by the proper procedure (if you do not know the correct procedure, notify your instructor for instructions).

EYE PROTECTION
Safety goggles must be worn at all times when you are in the laboratory. Contact lenses are not recommended, however ACS indicates that these lenses are acceptable with proper safety goggles. It is required that you wear safety goggles over your regular prescription glasses.

DISPOSAL OF WASTE MATERIALS
Waste chemicals are to be discarded in the properly labeled waste container. BE SURE TO READ THE LABEL ON THE WASTE CONTAINER. Students should consult with the instructor regarding the safety and viability of combining various waste components that are generated during a laboratory experiment. Before leaving the laboratory, waste should be transferred to lidded containers and stored in the hood until it is removed by safety personnel. Broken glass and syringes should be placed in the broken glass container. Waste paper, towels, and other trash should be discarded in the waste baskets.

PIPETTING LIQUIDS
Always use a rubber suction bulb or a syringe attached to the pipette to fill the pipette. NEVER USE YOUR MOUTH TO DO THE WORK OF THE SUCTION BULB OR SYRINGE.

HEATING MATERIALS
Make sure that a boiling stone or stir bar is contained in all liquids before heating. When heating materials in a test tube, always point the opening of the container away from yourself and others. Point the opening toward the back of the hood or up toward the splash guard that runs the length of the work bench. Never heat a closed (sealed) container. Never place your face over a material which is being heated. This includes liquids or solids, beakers, test tubes, and Erlenmeyer flasks. The hot material could contact your face and cause chemical and/or thermal burns. Never heat a flammable substance over an open flame. Never leave an experiment that is being heated unattended.

MAGNETIC STIR BARS
Magnetic stir bars should **NOT** be thrown in the trash, waste containers, or into the sink. They should be washed and returned to their proper storage location in the laboratory.

GAS TANK STORAGE
Gas tanks should be tethered to a lab bench using the approved restraining devices at all times. You should **NEVER** move gas tanks to other locations in the laboratory or for any other reason remove their restraints.

GAS TANK REGULATORS
Students should not attempt to place a regulator on or remove a regulator from a gas tank. These operations should be performed by the instructor. Before using a gas tank with a regulator, students should be trained by the instructor in their proper operation.

VACUUM SYSTEMS
Before usage, students should be trained in the proper techniques of operating a vacuum system, including set-up, evacuation, gas introduction, and gas discharge. V**ACUUM SYSTEMS SHOULD NEVER BE OVER-PRESSURIZED WITH GAS.**

CONSTANT TEMPERATURE WATER BATHS
Students should be trained by the instructor in the proper usage of oscillating water baths. Chemicals should never be placed directly in the water bath. If chemicals are accidently introduced into the water bath, the instructor should be informed.

EQUIPMENT LOCATION
Several specialized instruments (in particular, spectrometers) may need specific operating environments or have space requirements such that they are located outside the assigned laboratory classroom. When this is the case, students should adhere to the following policies:

1. Never independently go to or exit the instrument room unless this action is acknowledged by the instructor.
2. The transit hallways are likely to be filled with students. Proper precautions must be taken when transporting samples or other materials between laboratory rooms.
3. Students should not attempt to operate any instrument that they are not properly trained for using. Unless given explicit permission, instructors must be present while a student operates the instruments.
4. Instrument logs must be completed, including instrument sign-in and sign-out time.
5. Instrument areas must remain clean. All disposal and clean-up polices which apply in the regular laboratory apply equally in the instrument room.

OPEN FLAMES
Have open flames (Bunsen burners, lighters, matches) **ONLY** when the instructor or the lab manual specifically tells you to do so.

EATING OR DRINKING
Since there is a possibility of food substance becoming contaminated with toxic chemicals, no eating or drinking will be allowed in any of the laboratories. No chewing gum or hard candy. Never taste any chemicals from the laboratory.

SMOKING
Smoking is not allowed in any building on campus.

CONDUCTING EXPERIMENTS
Under no circumstances will you be allowed to conduct experiments that have not been assigned for you to do or to work in the lab alone without proper supervision. If you need to leave the lab during class, you should notify the instructor. Do not leave an experiment unattended.

FIRE IN THE LABORATORY
Call out "FIRE" and get away from the fire. **Notify the instructor.** Your safety is the number one priority. Some small fires may be extinguished as discussed the first day of lab. Medium to Large fires will require evacuation of the building. Pull the fire alarm, and then evacuate the building.

EVACUATION
In case of evacuation, leave behind all personal objects, leave the room by nearest exit and proceed directly to Azalea Circle. Evacuation Routes are posted adjacent to all classroom exit doors. Check in with instructor at Azalea Circle to ensure your safety and verify that no rescue is necessary. Do not leave until told to do so.

FIRE ON A PERSON
If your clothing or hair catches fire, DO NOT RUN. Running only fans the flames and makes them burn faster and hotter. Go immediately to and use the safety shower and call out for help. Stay under the shower until the fire is out and the skin temperature has cooled down. If you are in a lab where a person is on fire, it is your responsibility to help that person get under the safety shower and assist them in any way that you can. NEVER USE A FIRE EXTINGUISHER ON A PERSON.

CHEMICAL SPILLS ON

Remember that speed in washing to remove the chemical is most important in reducing the extent of injury. Wash off the contaminated area immediately. Notify the Laboratory Coordinator.

YOUR EYES
Immediately go to the eye wash station and while holding your eye open, irrigate the eye completely for at least 15-30 minutes. Report to the Student Health Center.

YOUR HANDS OR ARMS
Immediately go to the sink and wash your hands until they are no longer contaminated. If a chemical burn has occurred, notify the Lab Coordinator and report to the Health Center. Always wash your hands before you leave the laboratory.

YOUR BODY
Immediately go to the safety showers, pull the shower lever, and with the water running remove any contaminated clothing. Stay under the shower until all of the contamination has been washed away. Notify the Lab Coordinator and report to the Health Center.

OTHER INJURIES – In the event that you or your lab partner cuts themselves or burns themselves, you should notify your instructor immediately.

CHEMICALS
Never use a chemical from an unlabeled container. Never substitute a chemical in an experiment without the instructor's permission. Always treat unfamiliar chemicals as if they are dangerous.

FUME HOOD
When dispensing or working with volatile chemicals, it is recommended to do so in the fume hood. Be sure that the hood is operating by observing that the flow meter is indicating in the green. Never place any body part other than your hands inside the fume hood. When working in fume hood, keep the sash line between you and the material being manipulated. Never dispense chemicals on the air foil sill of the hood. This creates a potential spill hazard and interrupts proper air flow.

PREGNANCY/ALLERGY/CHEMICAL SENSITIVITY
Due to the possibility of contact with chemicals, please self-notify your instructor if you are currently pregnant, have a known allergy or have a known chemical sensitivity or if you develop of any of these conditions during the semester. Additional safety equipment (such as gloves and lab coats) may be put in place. You may be forbidden from participating in select labs.

HEALTH CONDITIONS
If you have a condition that may impact the safety of yourself or others (such as fainting spells, seizures, or tremors), notify your instructor. Special safety practices may be put in place.

HAZARD COMMUNICATION
While academic laboratories do not fall under the purview of OSHA, students graduating in the sciences are likely to be hired into positions were a basic knowledge of chemical safety and its hazard communication are expected and required by law. OSHA Hazard Communications Standard 29 CFR 1910.1200 requires written communication of the hazards associated with chemicals, proper labeling of hazardous chemicals and access to safety data sheets, and safety training.

Written Communication – In this course, the most important hazards associated with each laboratory experiment are listed at the beginning each procedure. Additional written safety information for each substance can be found in safety data sheets that are kept in a binder in each laboratory. Students should know the location of this binder. In most cases, instructors will also inform students of specific dangers for each experiment during pre-laboratory lectures.

Labeling and Safety Data Sheets – Chemical stock bottles will be labeled with the name of the substance (concentrations are generally included for mixtures), a signal word, and its hazard class. Signal words are **DANGER** for significant hazards and **WARNING** for lesser hazards. The hazard class describes the nature of the physical or health hazard associated with a substance such as flammable, carcinogen, or acute toxin and may be shown in words or pictograms. **Safety Data Sheets** (SDS) were formerly called material safety data sheets and are often still referred to as MSDS. The SDS for a substance is a 16-section written document provided by its manufacturer. You should be familiar with the format of the SDS so that you can find necessary information in the event of an emergency. Each section is briefly described below and an example SDS is given in the appendix of this laboratory manual.

Section 1 Identification: contents and manufacturer information
Section 2 Hazard Identification: hazard class, signal word, pictograms, and precautions
Section 3 Composition: chemical name (with synonyms) and concentration of each substance
Section 4 First Aid Information: description of symptoms and first aid instructions by exposure
Section 5 Fire-fighting Information: extinguishing equipment and personal protective equipment
Section 6 Accidental Release Measures: information on clean-up of spills
Section 7 Handling and Storage: types of containers and incompatible chemical classes
Section 8 Exposure Controls/Personal Protection: exposure limits and PPE
Section 9 Physical and Chemical Properties: appearance, melting points, boiling points, etc.
Section 10 Stability and Reactivity: stable or unstable conditions, conditions to avoid, etc.
Section 11 Toxicological Information: exposure routes, toxicity data (LD_{50}), and symptoms
Section 12 Ecological Information: species specific toxicity, bioaccumulation information, etc.
Section 13 Disposal Considerations: recommended disposal containers and procedures
Section 14 Transport Information
Section 15 Regulatory Information
Section 16 Other Information

Global Harmonized System Pictograms – OSHA hazard communications policies are consistent with the United Nations' Globally Harmonized System of Classification and Labelling of Chemicals (**GHS**). The system employs a series of pictograms. You should be familiar with the GHS pictograms shown below and their associated hazards.

<table>
<tr>
<td>

Flammable
Flammable and pyrophoric substances and those that produce flammable gases by reaction with water

Explosive
Explosive and self-reactive substances

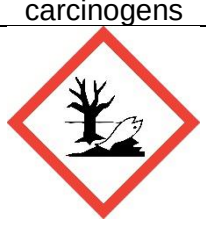
Oxidizer
Substances that act as strong oxidizing agents allowing combustion in the absence of oxygen

Corrosive
Substances that are corrosive to metal or cause skin/eye damage

Compressed Gases
Gases and liquified gases stored under pressure
</td>
<td>Physical Hazards</td>
</tr>
<tr>
<td>

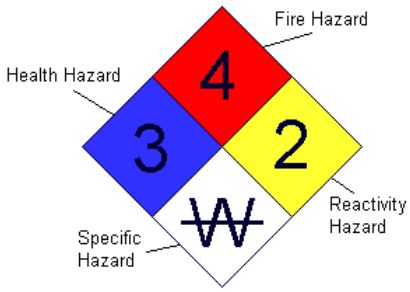
Toxic
Acutely toxic substances when ingested, inhaled, or absorbed through skin that cause severe damage or death

Health Hazard
Substances that adversely affect health such as acute and chronic damage to specific organs, mutagens, and carcinogens

Irritant
Substances that cause respiratory, skin, and eye irritation or less severe acute toxicity
</td>
<td>Health Hazards</td>
</tr>
<tr>
<td>

Environmentally Damaging
Acute and chronic environmetal damage
</td>
<td>Environmental Hazards</td>
</tr>
</table>

Non-GHS Hazard Communication – Many chemical labels and SDS will contain other hazard communication methods in addition to GHS. Two common methods are NFPA (National Fire Protection Association) and HMIS (Hazardous Material Identification System). Older labels may not include the newer GHS pictograms and information necessitating that students be familiar with these methods.

NFPA Diamonds – The NFPA system uses a series of three colored diamond shapes (shown below) containing a number from 0 to 4. The diamond at the left will be blue and the number identifies the level of health risk; the diamond at the top will be red and describes the substance's flammability; and the diamond at the right will be yellow and indicates a substance's instability or reactivity. Higher numbers represent a greater degree of danger. The diamond at the bottom will be white and is used for special information. The specific descriptions of the hazards represented by the numbers in each diamond is available in the appendix of this laboratory manual.



HMIS Color Bar – The HMIS system is similar to the NFPA diamond except the information is arranged as a stack of colored bars (shown below) containing a number from 0 to 4. The top of the label may identify the substance. The first bar will be blue and represents the health hazard; the second bar will be red and describes the substance's flammability; the third bar will be yellow or orange and indicates the physical and reactivity hazards of a substance; and the last bar will be white and provides information on the necessary personal protective equipment used when handling a substance. As with the NFPA system, larger numbers mean greater danger. Specific descriptions for the hazards represented by each bar and number are available in the appendix of this laboratory manual

Training – The training component of the OHSA Hazard Communication Standard is met through the safety training each student receives at the beginning of each laboratory course at Southeastern.

LAB ATTIRE

Safe laboratory practices mandate proper attire for handling unknown or hazardous chemicals. Departmental policy forbids students from entering the lab if they are non-compliant with safety policy (including attire items 1-7 below). The department is not required to provide make up labs due to safety non-compliance.

1. ALWAYS wear eye protection.
2. DO NOT wear sandals or open-toe shoes.
3. If you have long hair, pull it back in a bun or a pony-tail
4. If you have long, baggy sleeves roll them up or bind them close.
5. DO NOT wear nylon hose.
6. DO NOT wear shorts, short skirts, short shirts, low pants or other clothing that leaves excess skin exposed.
7. All skin that would normally be covered by a below the knee length lab coat, needs to be covered when wearing street clothing in the lab.

In the event of inappropriate clothing, the student may remedy the situation by changing clothes or wearing of a lab coat. Alternative clothes may be may be purchased from the union bookstore. A limited amount of lab coats may be available for borrowing. Disposable lab coats are available for purchase from the Retail Bookstore located in the Student Union.

DISPOSABLE LABORATORY GLOVES

If you are handling chemicals that are deemed toxic or otherwise dangerous, or if the properties of that chemical are unknown to you, disposable gloves should be worn. Disposable gloves are provided for students and come in several sizes. Disposable gloves should be changed if they become torn or are otherwise compromised. They should never be worn out of the laboratory, or when you are in contact with surfaces that others may be exposed to where they are not appropriately protected (such as keyboards). If it is known that the gloves have been contaminated, they should immediately be changed, and disposed of in the same fashion as other chemical waste. Otherwise after serving their purpose, disposable gloves should be placed in the regular trash.

Students are forbidden from working in the lab in a non-safety-compliant manner.

This Safety Policy is by no means a complete and absolute statement of laboratory safety instructions. Your instructor will periodically point out other safety precautions.

SAFETY TEST CLAB 103, 104, 123, 124, 256, 456

Course Number_____ **Section**_____ **Semester**_____ **Year**_____

Name_____

1. Where should backpacks, purses, etc. be kept while in lab?

2. When should you wash your hands in the lab?

3. Should you ever eat, drink, smoke or taste anything in the lab?

4. Should you ever do an experiment in the lab that has not been assigned?

5. Should you ever use a chemical from an unlabeled container?

6. Should you ever substitute a chemical for the one that is specified in the procedure?

7. Should you ever work in the lab alone?

8. Should running, pushing, "horse play," or "practical joking" ever occur in the lab?

9. When should safety goggles be worn in the lab?

10. What type of clothing is appropriate for lab?

11. What type of shoes should be worn in lab?

12. How should hair be styled for lab?

13. What type of eyewear is acceptable in lab?

14. What should you do if there is an emergency in the lab and the instructor is not available?

15. What should you do if you get a chemical in your eye?

16. What should you do if you spill chemicals on your body?

17. If a toxic substance is spilled in the lab, what should you do?

18. How should you treat a chemical whose properties are unknown to you?

19. How should you pipette liquids?

20. Should you ever put your head in the fume hood?

21. What should you do if you or your partner gets cut or burned and the wound is bleeding?

22. Where should volatile chemicals be dispensed?

23. What should you do if fire occurs in the lab?

24. What should you do if your clothing or hair catches fire?

25. What is the evacuation route for your class in the event of a fire alarm?

26. How should liquid in a test tube be heated?

27. Should you ever heat a closed or sealed system (such as a stoppered) flask?

28. Should you ever place your face over a heated material?

29. How should you heat a flammable or combustible substance?

30. Should you ever leave an experiment which is being heated unattended?

31. Where are the eye wash stations located in the lab?

32. Where is/are the safety shower(s) located in the lab?

33. Where should the chemical waste from an experiment be placed?

34. Where should you dispose of used boiling stones, filter paper, weigh boats, paper towels, etc.?

35. Where should broken glass be placed?

36. Should waste from an experiment be poured in the sink or eyewash?

37. What should you do if you need to leave the lab during class?

38. Where can you find necessary, helpful, and useful information on the properties of the hazardous materials?

39. I have read, understood and agree to abide by all of the rules in the Student Safety Procedures. True / False

Signature _____

Date_____

SAFETY TEST CLAB 263, 267, 268, 274

Course Number_____ Section_____ Semester_____ Year_____

Name_____

1. Where are the fire extinguishers located in the lab?

2. Where are the eye wash stations located in the lab?

3. Where is/are the safety shower(s) located in the lab?

4. Where do books, coats, and backpacks belong when working in lab?

5. When should safety goggles be worn in the lab?

6. What type of clothing is appropriate for lab?

7. What type of shoes should be worn in lab?

8. What should be the last two things you do each day before leaving lab?

9. What should you do if you think you have a chemical in your eye?

10. What should you do if you spill chemicals in your hood?

11. What should you do with a broken beaker?

12. What should you do if you spill chemicals on your body?

13. What should you do if a small fire occurs in a beaker in your hood?

14. What should you do if a huge fire occurs in the lab?

15. Where should you go in the event of an evacuation?

16. What should you do if your clothing or hair catches fire?

17. What do you do if your electrical equipment is in poor working condition or your glassware has a small fracture in it?

18. How should you pipette liquids?

19. Should you ever eat, drink, smoke or taste anything in the lab?

20. When should you have an open flame in the lab?

21. Should you ever do an experiment in the lab that has not been assigned?

22. Should you ever use a chemical from an unlabeled container?

23. When should you ever substitute a chemical for the one that is specified in the procedure?

24. Should you ever work in the lab alone?

25. Should you ever place your head inside the fume hood?

26. Where should the chemical waste from an experiment be placed?

27. Where should you dispose of used matches, boiling stones, used paper towels, etc.?

28. Should waste from an experiment be poured in the eyewash?

29. How should liquid in a test tube be heated?

30. How should you heat a flammable or combustible substance?

31. Should you ever heat a closed or sealed system (such as a stoppered) flask?

32. Should you ever leave an experiment which is being heated unattended?

33. Should you ever place your face over a material that is being heated?

34. What should you do if you need to leave the lab during an experiment?

35. Should running, pushing, "horse play," or "practical joking" ever occur in the lab?

36. How should you treat a chemical whose properties are unknown to you?

37. What should you do if you get a cut or burn and the wound is bleeding?

38. What should you do if your hood partner gets a cut or burn and the wound is bleeding?

39. What should you do if there is an emergency in the lab and the instructor is not available?

40. Where can you find necessary, helpful, and useful information on the properties of the hazardous materials?

41. I have read, understood and agree to abide by all of the rules in the Student Safety Procedures. True or False. Signature _____ Date_____

SAFETY TEST FOR CLAB 283, 485, 486

Course Number_____ Section_____ Semester_____ Year_____

Name_____

1. Where are the fire extinguishers located in the lab?

2. Where are the eye wash stations located in the lab?

3. Where is/are the safety shower(s) located in the lab?

4. When should safety goggles be worn in the lab?

5. What is the proper type of clothing to be worn in the lab?

6. What is the proper type of shoes to wear in lab?

7. What should you do if you think you have a chemical in your eye?

8. What should you do if you spill chemicals on your body?

9. When should you wash your hands in the lab?

10. What is the evacuation route for Pursley 221 in the event of a fire and where is our "Safe Haven"?

11. What should you do if your clothing or hair catches fire?

12. How do you pipet liquids?
13. Should you eat, drink, smoke or taste anything in the lab?

14. Should you ever do an experiment in the lab that has not been assigned?

15. Should you ever use a chemical from an unlabeled container?

16. Should you ever substitute a chemical for the one that is specified in the procedure?

17. Should you work in the lab alone?

18. Where should the chemical waste from an experiment be placed?

19. How would you heat liquid in a test tube? Should you heat a closed or sealed container?

20. Should you ever place your face over a heated material?

21. If a toxic substance is spilled in the lab, what should you do?

22. Should you ever place your head inside a fume hood?

23. How should you safely spin a single sample in a centrifuge?

24. Should exposure to UV light be limited or are long periods of exposure acceptable?

25. Where should pipettor tips be placed that have come into contact with bacteria?

26. What should you do if your partner gets cut or burned and the wound is bleeding?

27. What three types of safety attire should be worn to handle a known mutagen such as ethidium bromide?

28. What should you do if there is an emergency in the lab and the instructor is not available?

29. Where can you find necessary, helpful, and useful information on the properties of the hazardous materials?

30. I have read, understood and agree to abide by all of the rules in the Student Safety Procedure. True or False.

Signature_____

Date_____

SAFETY TEST CLAB 391, 392, 476

Course Number_____ Section_____ Semester_____ Year_____

Name_____

1. Where are the eye wash stations located in the lab?

2. Where is/are the safety shower(s) located in the lab?

3. When should safety goggles be worn in the lab?

4. What type of clothing is appropriate for lab?

5. What type of shoes should be worn in lab?

6. Where should backpacks, purses, etc. be kept while in lab?

7. What should you do if you get a chemical in your eye?

8. What should you do if you spill chemicals on your body?

9. When should you wash your hands in the lab?

10. What should you do if fire occurs in the lab?

11. What should you do if your clothing or hair catches fire?

12. How should you pipette liquids?

13. Where should volatile chemicals be dispensed?

14. Should you ever put your head in the fume hood?

15. Should you ever eat, drink, smoke or taste anything in the lab?

16. Should you ever do an experiment in the lab that has not been assigned?

17. Should you ever use a chemical from an unlabeled container?

18. Should you ever substitute a chemical for the one that is specified in the procedure?

19. Should you ever work in the lab alone?

20. Where should the chemical waste from an experiment be placed?

21. Where should you dispose of used boiling stones, filter paper, weigh boats, paper towels, etc.?

22. Where should broken glass be placed?

23. Should waste from an experiment be poured in the sink or eyewash?

24. How should liquid in a test tube be heated?

25. Should running, pushing, "horse play," or "practical joking" ever occur in the lab?

26. Should you ever heat a closed or sealed system (such as a stoppered) flask?

27. Should you ever place your face over a heated material?

28. How should you heat a flammable or combustible substance?

29. What should you do if you need to leave the lab during class?

30. Should you ever leave an experiment which is being heated unattended?

31. If a toxic substance is spilled in the lab, what should you do?

32. How should you treat a chemical whose properties are unknown to you?

33. What is the evacuation route for your class in the event of a fire alarm?

34. What should you do if you or your partner gets cut or burned and the wound is bleeding?

35. What should you do if there is an emergency in the lab and the instructor is not available?

36. Should gas storage tanks be moved to un-tethered at any time?

37. Should a gas tank regulator be removed, replaced or in any other way altered”

38. What should be done with magnetic stir bars after an experiment?

39. How should a vacuum system be charged with gas?

40. What should be done with the chemical waste container at the conclusion of an experiment?

41. How should chemicals or other materials be transferred from one laboratory classroom to another?

42. When should you change your disposable laboratory gloves?

43. Should disposable laboratory gloves be worn out of the laboratory classroom?

44. Where can you find necessary, helpful, and useful information on the properties of the hazardous materials?

45. I have read, understood and agree to abide by all of the rules in the Student Safety Procedures. True / False

Signature _____

Date_____

RESEARCH LABORATORY SAFETY TEST CLAB 211, 411

STUDENT LABORATORY TECHNICIAN SAFETY TEST

Lab Number _____Professor_____

Semester_____ Year_____

Name_____

1. Where are the fire extinguishers located in the lab?

2. Where are the eye wash stations located in the lab?

3. Where are the safety showers located in the lab?

4. Where are the spill kits located in the lab? (Acid, Base, Sodium Bicarbonate, Vinegar, Neutral Absorbent)

5. Where is the phone located in the lab?

6. What number should you call in case of EMERGENCY?

7. What should you do if the fire alarm sounds?

8. When should safety goggles be worn in the lab?

9. What type of clothing is appropriate for lab?

10. What type of shoes should be worn in lab?

11. What should you do if you think you have a chemical in your eye?

12. What should you do if you spill chemicals on your body?

13. When should you wash your hands in the lab?

14. Should you ever look down into a heated vessel?

15. Should you ever place your head inside fume hood?

16. What should you do if a small confined fire occurs in the lab?

17. What should you do if a medium contained fire occurs in the lab?

18. What should you do if a large- or small non contained- or easily spread fire- occurs in the lab?

19. What should you do if an electrical fire occurs?

20. What should you do if you get cut?

21. You make a new material and put it in a container. How should you label the container?

22. You have forgotten the specific hazards associated with a particular chemical. How can you find these out? (give 3 options)

23. You've been shown how to carry out a procedure. it is now time for you to do it yourself. You are feeling uncomfortable. What should you do?

24. You are working in the lab, and you have a question about a procedure. What should you do?

25. The particular non-chemical hazards associated with this lab such as thermal, pinching, pressure and cutting hazards were reviewed with me?

26. The specific chemical hazards associated with this lab such as flammables, acids, bases, and water reactive chemicals were reviewed with me?

27. The proper personal protective equipment (PPE) such as gloves, hoods, and goggles, lab coats were discussed with me and I have access to these necessary items?

28. I was provided with a written copy of the safety policy and procedures we have discussed?

29. What should you do if there is an emergency in the lab and the supervisor is not available?

30. Where can you find necessary, helpful, and useful information on the properties of the hazardous materials?

31. Will you be allowed to conduct experiments or procedures that have not been assigned for you to do?

32. I have read, understood and agree to abide by all of the rules in the Student Safety Procedures. True or False

Signature _____

Date_____

SAFETY DOCUMENTATION PLAB 123, 142, 193, 194, 223, 224, 225, 303, 314, 334, 353, 425 AND ESSL 103, 104

Course and Number_____

Section_____ Semester_____ Year_____

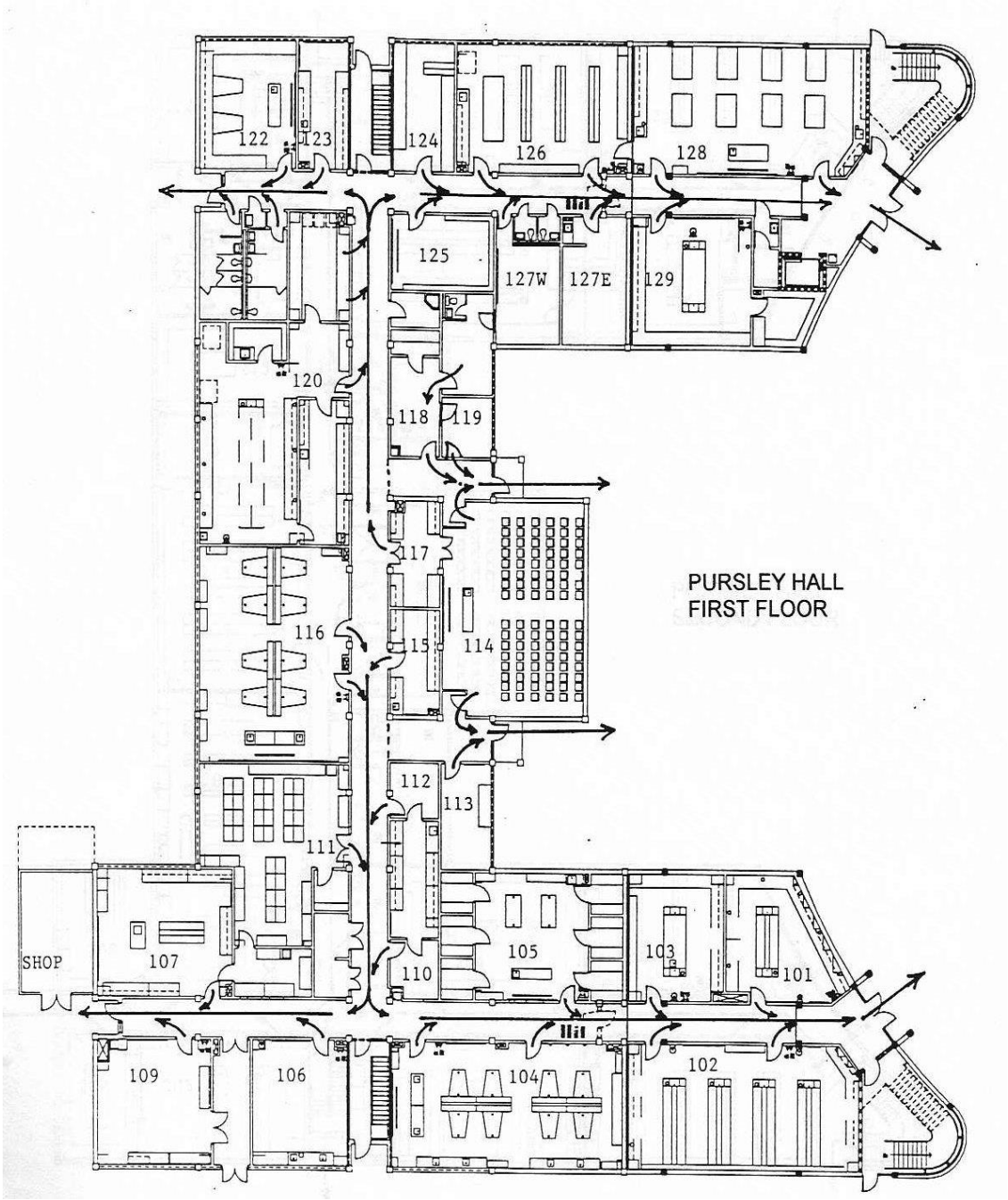
Name_____

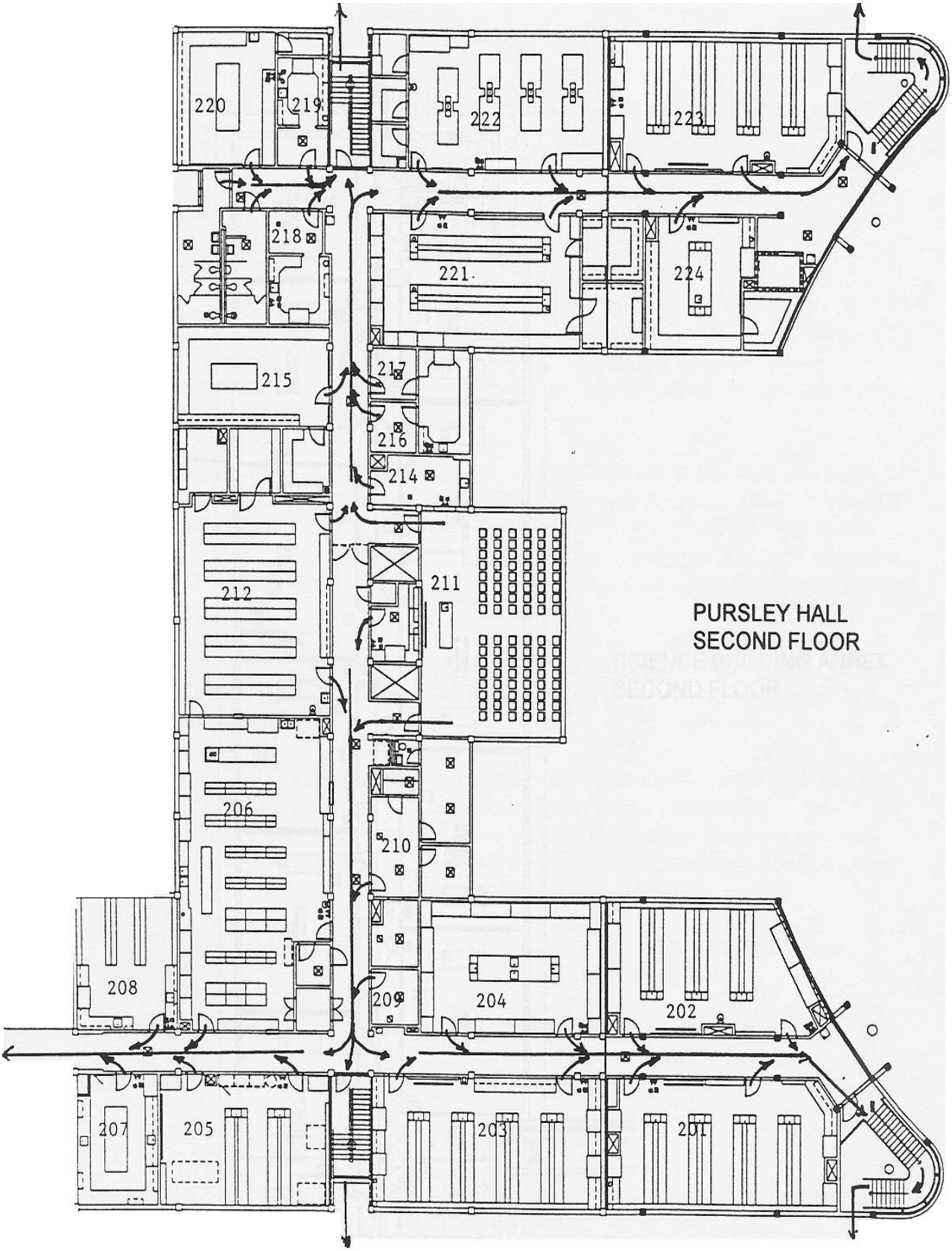
I have attended course specific safety training for the laboratory course listed above. I have read and understand what is expected and agree to abide by all rules.

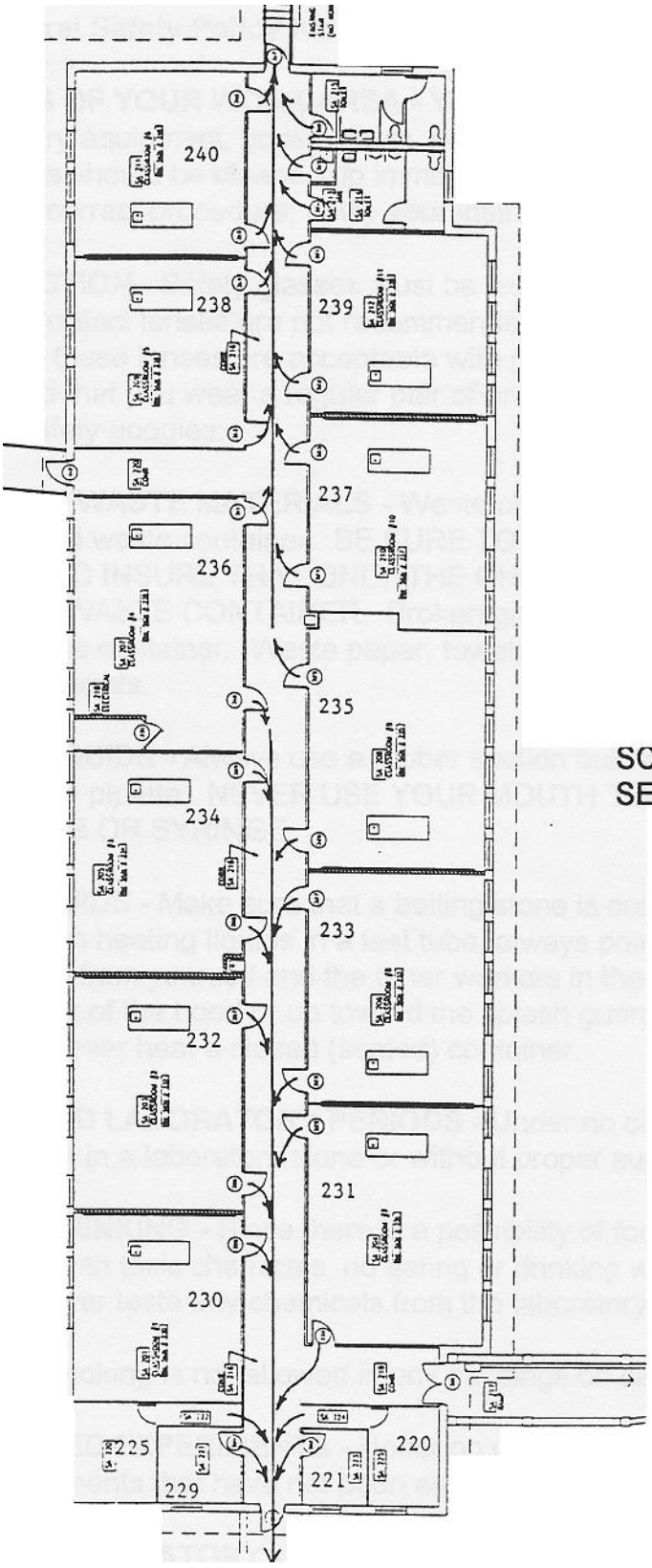
Signature _____ **Date:** _____

Appendix I – CHEMISTRY & PHYSICS EVACUATION ROUTES

EVACUATION ROUTES, FIRST AND SECOND FLOOR PURLEY AND SECOND FLOOR SCIENCE BUILDING ANNEX.




220
219
222
223
218
221
224
215
217
216
214
212
211
PURSLEY HALL
SECOND FLOOR
206
210
208
209
204
202
207
205
203
201



SCIENCE BUILDING ANNEX
SECOND FLOOR

Appendix II – NON-GHS HAZARD COMMUNICATION METHODS

NFPA 704 Diamonds and HMIS Color Bars

Section	Number	Explanation
Health (Blue - both)	0	No hazard
	1	May lead to significant irritation of exposed area
	2	May lead to temporary incapacitation or injury
	3	May lead to serious or permanent injury
	4	May be fatal
Flammability (Red - both)	0	Non-combustible
	1	Requires pre-heating prior to combustion
	2	Requires heat or high ambient temperature to combust
	3	May be ignited at most ambient temperatures
	4	Easily ignited at normal temperatures
Stability/Reactivity (Yellow - NFPA) (Yellow or Orange – HMIS)	0	Stable
	1	Stable except at extreme temperatures
	2	Reacts violently at high temperatures or pressures
	3	Can explode at high temperatures or due to physical shock
	4	Can explode at normal temperatures and pressures
Special Information (White – NFPA)	**OX**	Oxidizer: supports combustion of chemicals without oxygen
	~~W~~	Reacts violently with water
	SA	Simple asphyxiant
Personal Protection (White – HMIS)	**A**	Goggles
	B	Goggles and gloves
	C	Goggles, gloves, and apron
	D	Face Shield, gloves, and apron
	E	Goggles, gloves, and dust respirator
	F	Goggles, gloves, apron, and dust respirator
	G	Goggles, gloves, and vapor respirator
	H	Goggles, gloves, apron, and vapor respirator
	I	Goggles, gloves, dust respirator, and vapor respirator
	J	Goggles, gloves, apron, dust respirator, and vapor respirator
	K	Mask with supplied air, gloves, full hazmat suit, boots

Appendix III – EXAMPLE SAFETY DATA SHEET

Safety Data Sheet
2 N Nitric Acid

Section 1: Chemical Product and Company Identification

Product Name: Nitric Acid, 2 N

Catalog Codes: SLN1405

CAS#: Mixture.

RTECS: Not applicable.

TSCA: TSCA 8(b) inventory: Water; Nitric acid, fuming

CI#: Not applicable.

Synonym: Nitric Acid solution, 2 N

Chemical Name: Not applicable.

Chemical Formula: Not applicable.

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**
Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887
For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS#	% by Weight
Water	7732-18-5	87.4
Nitric acid, fuming	7697-37-2	12.6

Toxicology Data on Ingredients: Nitric acid, fuming LD50: Not available. LC50: Not available

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion. Hazardous in case of skin contact (corrosive, permeator), of eye contact (corrosive). Slightly hazardous in case of inhalation (lung sensitizer). Non-corrosive for lungs. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Prolonged exposure may result in skin burns and ulcerations. Over-exposure by inhalation may cause respiratory irritation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to lungs, mucous membranes, upper respiratory tract, eyes, teeth. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Slightly explosive in presence of reducing materials, of organic materials, of metals, of alkalis. Non-explosive in presence of open flames and sparks, of shocks.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:
Reacts explosively with metallic powders, carbides, cyanides, sulfides, alkalies and turpentine. Can react explosively with any reducing agents. Arsine, phosphine, tetraborane all oxidized explosively in presence of nitric acid. Cesium and rubidium acetylides explode in contact with nitric acid. Explosive reaction with Nitric Acid + Nitrobenzene + water. Detonation with Nitric Acid + 4-Methylcyclohexane. (Nitric acid, fuming)

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

Large Spill:
Corrosive liquid. Oxidizing material. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Avoid contact with a combustible material (wood, paper, oil, clothing...). Keep substance damp using water spray. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of Sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities

Section 7: Handling and Storage

Precautions:
Keep container dry. Keep away from heat. Keep away from sources of ignition. Keep away from combustible material. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as alkalis. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

Storage:
Keep container tightly closed. Keep container in a cool, well-ventilated area. Separate from acids, alkalies, reducing agents and combustibles. See NFPA 43A, Code for the Storage of Liquid and Solid Oxidizers.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
Nitric acid, fuming TWA: 2 STEL: 4 (ppm) from ACGIH (TLV) [United States] [1999] TWA: 2 STEL: 4 (ppm) [Australia] TWA: 2 STEL: 4 from NIOSH TWA: 5 STEL: 10 (mg/m3) from NIOSH TWA: 2 STEL: 4 (ppm) from OSHA (PEL) [United States] TWA: 5 STEL: 10 (mg/m3) from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Disagreeable and choking. (Strong.)

Taste: Not available.

Molecular Weight: Not applicable.

Color: Clear Colorless.

pH (1% soln/water): Acidic.

Boiling Point: Weighted average: 97.5°C (207.5°F)

Melting Point: May start to solidify at -41.6°C (-42.9°F) based on data for: Nitric acid, fuming.

Critical Temperature: Not available.

Specific Gravity: Weighted average: 1.06 (Water = 1)

Vapor Pressure: Weighted average: 2.9 kPa (@ 20°C)

Vapor Density: Weighted average: 0.87 (Air = 1)

Volatility: Not available.

Odor Threshold: The highest known value is 0.29 ppm (Nitric acid, fuming)

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility: Easily soluble in cold water, hot water. Soluble in diethyl ether.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with alkalis. Slightly reactive to reactive with reducing agents, combustible materials, organic materials, metals, acids.

Corrosivity: Extremely corrosive in presence of aluminum, of copper. Non-corrosive in presence of glass, of stainless steel (304), of Stainless steel (316).

Special Remarks on Reactivity:
A strong oxidizer. Reacts violently with alcohol, organic material, turpene, charcoal. Violent reaction with Nitric acid + Acetone and Sulfuric acid. Nitric Acid will react with water or steam to produce heat and toxic, corrosive and flammable vapors. (Nitric acid, fuming)

Special Remarks on Corrosivity: Severe corrosive effect on brass. No corrosive effect on bronze.

Polymerization: Will not occur.

Section 11: Toxicology Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals: LD50: Not available. LC50: Not available.

Chronic Effects on Humans: Contains material which may cause damage to the following organs: lungs, mucous membranes, upper respiratory tract, eyes, teeth.

Other Toxic Effects on Humans: Extremely hazardous in case of inhalation (lung corrosive). Very hazardous in case of skin contact (irritant), of ingestion. Hazardous in case of skin contact (corrosive, permeator), of eye contact (corrosive).

Special Remarks on Toxicity to Animals: LDL - Lowest Published Lethal Dose [Human] - Route: Oral; Dose: 430 mg/kg
(Nitric acid, fuming)

Special Remarks on Chronic Effects on Humans: May cause adverse reproductive effects (effects on newborn and fetotoxicity) based on animal data. (Nitric acid, fuming)

Special Remarks on other Toxic Effects on Humans: Acute Potential Health Effects: Skin: Severely irritates skin. Causes skin burns and may cause deep and penetrating ulcers of the skin with a characteristic yellow to brownish discoloration. May be fatal if absorbed through skin. Eyes: Severely Irritates eyes. Causes eye burns. May cause irreversible eye injury. Ingestion: May be fatal if swallowed. Causes serious gastrointestinal tract irritation or burns with nausea, vomiting, severe abdominal pain, and possible "coffee grounds" appearance of the vomitus. May cause perforation of the digestive tract. Inhalation: May be fatal if inhaled. Vapor is extremely hazardous. Vapor may cause nitrous gas poisoning. Effects may be delayed. May cause irritation of the mucous membranes and respiratory tract with burning pain in the nose and throat, coughing, sneezing, wheezing, shortness of breath and pulmonary edema. Other symptoms may include nausea, and vomiting. Chronic Potential Health Effects: Repeated inhalation may produce changes in pulmonary function and/or chronic bronchitis. It may also affect behavior (headache, dizziness, drowsiness, muscle contraction or spasticity, weakness, loss of coordination.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation: Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal: Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: Nitric Acid UNNA: 2031 PG II

Special Provisions for Transport: Marine Pollutant

Section 15: Regulatory Information

Federal and State Regulations: New York release reporting list: Nitric acid, fuming Rhode Island RTK hazardous substances: Nitric acid, fuming Pennsylvania RTK: Nitric acid, fuming Florida: Nitric acid, fuming Minnesota: Nitric acid, fuming Massachusetts RTK: Nitric acid, fuming New Jersey: Nitric acid, fuming TSCA 8(b) inventory: Water; Nitric acid, fuming SARA 302/304/311/312 extremely hazardous substances: Nitric acid, fuming SARA 313 toxic chemical notification and release reporting: Nitric acid, fuming CERCLA: Hazardous substances: Nitric acid, fuming: 1000 lbs. (453.6 kg)

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS E: Corrosive liquid.

DSCL (EEC):
R8- Contact with combustible material may cause fire. R35- Causes severe burns. S1/2- Keep locked up and out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S36/37- Wear suitable protective clothing and gloves. S39- Wear eye/face protection. S45- In case of accident or if you feel unwell, seek
medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 0

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield

Section 16: Regulatory Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 10:59 AM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

Appendix IV – CHEMICAL HAZARDS AND APPROPRIATE RESPONSE

CHEMICAL HAZARDS

Call University Police at 2222 in case of an accident involving a chemical. Since the Departmental Faculty are not allowed to render first aid to the students unless they are properly trained, the instructor must call 2222 and indicate to the University police the nature of the emergency.

It is the intent of the Departmental Faculty to offer the information contained in this Appendix for their (University Police) information and use.

CHEMICAL	EYES	LUNGS	SKIN	MOUTH
Acetaldehyde	*	A		O
Acetic acid	*	A	F	P
Acetic anhydride	*	A	F	P
Acetonitrile	*	B	Ga	O
Acetyl chloride	*	B	F	P
Acrolein	*	E	F	O
Allyl alcohol	*	B	F	O
Allyl bromide	*	A	G	O
Allyl chloride	*	B	G	O
Aluminum chloride anhydrous	*	B	F	P
Ammonia & solutions	*	B	F	Q
Ammonium hydroxide	*	B	F	Q
Ammonium sulfide solution	*	B	F	O
Amyl nitrite	*	B		O
Aniline	*	B	G	O
Antimony compounds			G	O
Arsenic & compounds	*	B	G	O
Barium compounds				R
Benzene	*	B	Ga	O
Benzidine & salts	*		G	O
Benzoyl chloride	*	A	G	P
Benzyl bromide	*	A	G	O
Benzyl chloride	*	A	G	O
Beryllium compounds	*	C	K	O
Boron halides	*	B	F	P
Bromine	*	B	H	T
Bromoacetic acid	*		I	P
Bromoethane	*	B	G	O
Bromomethane	*	B	J	T
Cadmium compounds		B		O
Carbon disulfide	*	E		O
Carbon monoxide		E		
Carbon tetrachloride	*	E	Ga	O

CHEMICAL	EYES	LUNGS	SKIN	MOUTH
Chlorine	*	B	F	
Chloroacetic acid	*		J	P
Chloroaniline	*	A	G	O
1-Chloro-2,4-dinitrobenzene	*	B	G	O
1-Chloro-2,3-epoxypropane	*	B	G	O
2-Chloroethanol	*	C	G	O
Chloroform	*	E		O
Chloro-nitro-anilines	*		G	O
Chlorophenols	*	A	C	S
Chlorsulfonic acid	*	B	I	P
Chromates & Dichromates	*	A	F	O
Chromic acid	*	A	F	P
Chromium trioxide	*	A	F	P
Copper compounds	*	A		O
Cresols	*	A	G	
Cyanides	*	D	F	U
Diaminoethane	*	A	F	O
1,2-Dibromoethane	*	A	G	O
1,2-Dichloroethane	*	E		O
1,2-dichloroethene	*	A		O
Dichloromethane	*	B		O
Diethyl ether	*	B		O
Dimethylamine & solutions	*	B	F	T
N,N-Dimethylaniline	*	B	G	O
Dimethyl sulfate	*	C	F	P
Dinitro-o-cresol	*	B	G	O
Dinitro phenols	*	B	G	S
Dioxane	*	B		O
Epichlorohydrin	*	B	G	O
1,2-Ethanediol	*			O
Ether	*	B		O
Ethyl bromide	*	B	G	O
Ethyl chloroacetate	*	B	G	O
Ethyl chloroformate	*	B	G	O
Ethylene chlorohydrin	*	C	G	O
Ethylene chloride	*	E		O
Ethylene dibromide	*	A	G	O
Ethylene dichloride	*	E		O
Ethylene diamine	*	A	F	O
Ethylene glycol	*			O
Ethylene oxide	*	E	Ga	V
Ferric chloride anhydrous	*	A	F	P
Fluorides	*	B	G	O

CHEMICAL	EYES	LUNGS	SKIN	MOUTH
Fluoroboric acid & salts	*	A	F	T
Fluorosilicic acid & salts	*	A	F	T
Formaldehyde solution	*	B	F	Y
Formalin	*	B	F	Y
Formic acid	*	A	F	P
Fuming sulfuric acid	*	B	F	P
Hydrazine hydrate	*		F	T
Hydroiodic acid	*	A	F	P
Hydrogen iodide	*	A	F	P
Hydrobromic acid	*	A	F	P
Hydrogen bromide	*	A	F	P
Hydrochloric acid	*	A	F	P
Hydrogen chloride	*	A	F	P
Hydrocyanic acid	*	D	F	U
Hydrogen cyanide	*	D	F	U
Hydrofluoric acid	*	B	L	P
Hydrogen fluoride	*	B	L	P
Hydrogen sulfide	*	E		
Hydroxy-ammonium salts	*		F	T
Hydroxylamine salts	*		F	T
Iodic acid	*	A	F	P
Iodine	*	A	H	W
Iodine pentoxide	*	A	F	P
Iodomethane	*	B	F	O
Lead salts				R
Mercury		B	M	X
Mercury compounds	*	C	G/M	Y
Methanol	*	B	Ga	O
Methylamine & solutions	*	B	F	T
N-methylaniline	*	B	G	O
Methyl bromide	*	B	J	T
Methyl cyanide	*	B	Ga	O
Methylene chloride	*	B		O
Methyl iodide	*	B	F	O
Methyl sulfate	*	C	F	P
Naphthylamine & salts	*		G	O
Nickel salts	*	A	G	O
Nitric acid	*	B	F	P
Nitroanilines	*	A	G	O
Nitrobenzene	*	B	G	O
Nitrogen dioxide		B		
Nitrophenols	*	A	F	S
p-Nitrophenylhydrazine	*	A	G	O

CHEMICAL	EYES	LUNGS	SKIN	MOUTH
Nitrotoluenes	*	B	G	O
Nitrous fumes		B		
Oleum	*	B	F	P
Orthophosphoric acid	*		F	P
Oxalate salts	*		G	O
Oxalic acid	*	C	F	P
Pentachloroethane	*	B	G	O
Pentachlorophenol	*	B	G	S
Perchloric acid	*		F	P
Perchloroethylene	*	A	G	O
Phenol	*	A	J	S
Phenol-disulfonic acid	*		F	P
Phenylenediamines	*		G	O
Phenylhydrazine	*	B	G	O
Phosgene	*	C	Ga	O
Phosphoric acid	*		F	P
Phosphoric oxide	*	B	F	P
Phosphorus (yellow)	*	B	N	O
Phosphorus oxychloride	*	B	F	P
Phosphorus pentachloride	*	B	F	P
Phosphorus pentoxide	*	B	F	P
Phosphorus trichloride	*	B	F	P
Phosphoryl chloride	*	B	F	P
Picric acid	*		G	Y
Potassium metal	*		K	V
Potassium dichromate	*	A	F	O
Potassium bisulfate	*		F	P
Potassium cyanide	*	D	F	U
Potassium hydrogen sulfate	*		F	P
Potassium hydroxide	*		F	Q
Prussic acid	*	D	F	U
Pyridine	*	A	F	O
Resorcinol	*		G	S
Selenium & compounds	*	A	G	O
Silicon tetrachloride	*	A	F	P
Silver nitrate	*		F	O
Sodium metal or amalgam	*		K	V
Sodium chromate	*	A	F	O
Sodium bisulfate	*		F	P
Sodium cyanide	*	D	F	U
Sodium dichromate	*	A	F	O
Sodium ethoxide	*	A	F	Q
Sodium fluoride	*	B	G	O

CHEMICAL	EYES	LUNGS	SKIN	MOUTH
Sodium hydrogen sulfate	*		F	P
Sodium hydroxide	*		F	Q
Sodium hypochlorite solution	*		F	T
Sodium methoxide	*		F	Q
Sodium oxalate	*		G	O
Sodium sulfide	*		F	O
Stannic chloride anhydrous	*	A	G	P
Sulfonic acids	*		F	P
Sulfur chloride	*	B	I	P
Sulfur dichloride	*	B	I	P
Sulfur dioxide	*	B		
Sulfuric acid	*		I	P
Sulfuryl chloride	*	B	I	P
Tellurium & compounds	*	A	G	O
Tetrachloroethane	*	B		O
Tetrachloroethylene	*	A	G	O
Thallium & salts	*	B	G	O
Thionyl chloride	*	B		P
Titanic chloride	*	B	G	P
Titanium tetrachloride	*	B	G	P
Toluene	*	A	Ga	O
Toluidines	*	A	G	O
Trichloroacetic acid	*		I	P
Trichloro ethylene	*	A		O
Trimethylamine & solutions	*	B	F	T
Uranium compounds	*	B		O
Vanadium compounds	*	B		O
Xylenes	*	A	Ga	O
Xylenols	*	A	G	S

Call or have someone call the University Police (2222) and notify them of the problem:

Affected Area		First Aid Measures
EYES	*****	Irrigate the eyes thoroughly with water for 15-30 minutes. OBTAIN MEDICAL ATTENTION
LUNGS	**A**	Remove from exposure, rest and keep warm.
	B	Remove from exposure, rest and keep warm. In severe cases, or if exposure has been great, OBTAIN MEDICAL ATTENTION.
	C	Remove from exposure, rest and keep warm. OBTAIN MEDICAL ATTENTION.
Affected Area		**First Aid Measures**

LUNGS	**D**	Remove from exposure, rest and keep warm. OBTAIN MEDICAL ATTENTION IMMEDIATELY. If breathing, break a capsule of amyl nitrate and give to casualty by inhalation for 15-30 seconds. Repeat every 2-3 minutes. Apply artificial respiration if breathing has stopped. Cyanide kit is located in the main stockroom on a shelf by the computer
	E	Remove from exposure, rest and keep warm. OBTAIN MEDICAL ATTENTION and apply artificial respiration if breathing has stopped.
SKIN	**F**	Drench the skin with plenty of water until chemical is completely removed. Remove any contaminated clothing while washing. In severe cases OBTAIN MEDICAL ATTENTION. Clothing should be aired then washed before re-use.
	G	Drench the skin with water and wash with soap and water until chemical is completely removed. Remove any contaminated clothing while washing. Clothing should be aired then washed before re-use. (**Ga**: Clothing should be thoroughly aired instead of washed.)
	H	Drench the skin with water and then bathe with a dilute solution of sodium thiosulfate in water (If contamination is on the hand one can soak in a beaker of this solution). OBTAIN MEDICAL ATTENTION.
	I	Drench the skin with water until chemical is completely removed. BLISTERS OR BURNS MUST RECEIVE MEDICAL ATTENTION. Remove contaminated clothing while washing and clothing must be washed before re-use.
	J	Drench the skin with water and wash thoroughly with soap and water until chemical is completely removed. BLISTERS OR BURNS MUST RECEIVE MEDICAL ATTENTION. Remove contaminated clothing while washing and clothing must be washed before re-use.
	K	Remove any adhering metal or penetrating particles then drench.
	L	Irrigate the skin immediately and continuously with cold water until MEDICAL ATTENTION is obtained. Pay particular attention to the skin under the finger nails. If MEDICAL ATTENTION IS DELAYED, apply a dilute solution of ammonia in water. Remove contaminated clothing during the washing process and discard using the correct disposal procedure.
	M	If skin contact is believed to have been prolonged, MEDICAL OBSERVATION will be required
	N	Drench skin with plenty of water and then swab with a 3% solution of copper sulfate in water. (This will convert phosphorus to a black copper salt which can be readily seen and removed.) OBTAIN MEDICAL ATTENTION.
Affected Area		**First Aid Measures**
MOUTH	**O**	Wash out the mouth thoroughly with water and give an emetic. OBTAIN MEDICAL ATTENTION.

	P	Wash out the mouth thoroughly with water and give plenty of water to drink, followed by milk of magnesia. OBTAIN MEDICAL ATTENTION
	Q	Wash out the mouth thoroughly with water. Give plenty of water, followed by vinegar or 1% acetic acid to drink. OBTAIN MEDICAL ATTENTION.
	R	Wash out mouth thoroughly with water. Give two tablespoons of magnesium sulfate (Epsom Salts) in water, and then an emetic. OBTAIN MEDICAL ATTENTION.
	S	Wash out the mouth thoroughly with water. Give plenty of water to drink, followed by two tablespoons of magnesium sulfate (Epsom Salts) in water. OBTAIN MEDICAL ATTENTION.
	T	Wash out the mouth thoroughly with water and give large quantities of water to drink. OBTAIN MEDICAL ATTENTION
	U	Give cyanide antidote. If breathing, break capsule of amyl nitrite and give to inhale for 15-30 seconds. Repeat every 2-3 minutes. Apply artificial respiration if breathing has stopped. OBTAIN MEDICAL ATTENTION IMMEDIATELY. See **D** page 10
	V	Wash out the mouth with water. OBTAIN MEDICAL ATTENTION.
	W	Wash out the mouth thoroughly with a 1% solution of sodium thiosulfate in water and give some of this solution to drink, followed by an emetic. OBTAIN MEDICAL ATTENTION.
	X	If swallowed OBTAIN MEDICAL ATTENTION.
	Y	Wash out the mouth thoroughly with water and give a large quantity of milk to drink. OBTAIN MEDICAL ATTENTION

The information contained in this chart was taken with some modification from the Laboratory Safety Guide of the University of California, Irvine