

## **Chemical Safety Manual**

**Summary/Purpose:** The Chemical Safety Manual details the minimum requirements and procedures for operations involving Chemicals and Hazardous materials.

### **University of Mississippi - Chemical Safety Manual**

#### **TABLE OF CONTENTS**

#### **EMERGENCY PHONE NUMBERS**

#### **HEALTH AND SAFETY POLICY**

#### **DEFINITION OF ABBREVIATIONS**

#### **1. INTRODUCTION**

#### **2. LAWS AND REGULATIONS**

#### **3. UNIVERSITY DEPARTMENT OF HEALTH AND SAFETY**

##### **3.1 RESPONSIBILITIES AND AUTHORITY**

##### **3.2 ORGANIZATION**

#### **4. RIGHT TO KNOW**

##### **4.1 RIGHTS**

##### **4.2 SERVICES TO PROTECT RIGHTS**

#### **5. CHEMICAL SAFETY**

##### **5.1 SCOPE OF REGULATIONS**

##### **5.2 HAZARDOUS CHEMICALS**

##### **5.3 PROCUREMENT OF HAZARDOUS CHEMICALS**

##### **5.4 RESTRICTED MATERIALS**

##### **5.5 CHEMICAL SAFETY IN THE WORKPLACE**

##### **5.6 STORAGE OF HAZARDOUS CHEMICALS**

##### **5.7 SPECIAL STORAGE REQUIREMENTS**

##### **5.8 DISPOSAL OF HAZARDOUS CHEMICALS**

##### **5.9 LABORATORY CLOSE-OUT PROCEDURE**

#### **6. CHEMICAL SPILLS**

##### **6.1 GENERAL PROCEDURES**

##### **6.2 CHEMICALS SPILLED ON THE BODY OVER A LARGE AREA**

##### **6.3 CHEMICALS ON THE SKIN**

##### **6.4 CORROSIVE CHEMICALS**

**6.5 BROMINE ON THE SKIN**

**6.6 HYDROGEN FLUORIDE ON THE BODY OR IN THE AIR**

**7. EMERGENCY PROCEDURES**

**7.1 WHEN AN EMERGENCY OCCURS**

**7.2 DO WHAT IS NECESSARY TO PROTECT LIFE WHILE WAITING FOR ASSISTANCE. KEEP CALM**

**APPENDIX**

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***EMERGENCY TELEPHONE NUMBERS***

FIRE	9-911
UNIVERSITY POLICE	7234
STUDENT HEALTH SERVICES	7275
BAPTIST HOSPITAL NORTH MISSISSIPPI	9-232-8100
DEPARTMENT OF HEALTH AND SAFETY	5433

**IN THE EVENT OF AN ACCIDENT, SPILL, FIRE, EXPLOSION**

**OR OTHER EMERGENCY INVOLVING CHEMICALS**

**CALL**

**THE HAZARDOUS MATERIALS RESPONSE TEAM**

**DURING NORMAL WORKING HOURS (915)-5433**

**NIGHTS AND WEEKENDS (915)-7234**

**HEALTH AND SAFETY POLICY;**

As a responsible institution of higher education, this University's laboratories, offices and other facilities shall be maintained as clean and healthful places of employment. Every effort shall be made to design and operate all University facilities in compliance with the spirit and letter of federal, state and local occupational health and safety regulations.

The University acknowledges and shall endeavor to satisfy its responsibility to promptly provide current, comprehensive information on potential adverse health effects and appropriate handling procedures for all hazardous materials handled by both our employees and our students.

## The University of Mississippi

It is a basic responsibility of all University employees and students to make the health and safety of fellow human beings a part of their daily concern. This responsibility must be accepted by each one who conducts the affairs of the University, no matter in what capacity he/she may function.

In order to implement this policy, the rules and regulations given in this manual shall be complied with by all University personnel. Assistance with specific health and safety problems may be obtained from the University Department of Health and Safety.

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### **DEFINITION OF ABBREVIATIONS;**

#### DEFINITION OF ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists.
ANSI	American National Standards Institute
ATF	Alcohol, Tobacco and Firearms Regulations
CFR	Code of Federal Regulations.
DHS	University Department of Health and Safety.
DOT	U.S. Department of Transportation.
EPA	U.S. Environmental Protection Agency.
LD 50	Lethal Dose for 50% of those exposed.
MHWM	Mississippi Hazardous Waste Management Regulations.
MSDS	Material Safety Data Sheet.

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### **1. INTRODUCTION;**

This manual contains regulations and procedures specific to the use of hazardous materials at the Oxford Campus and Lafayette county properties of The University of Mississippi, hereafter referred to as the Oxford campus. It is not intended to be exhaustive, and individual laboratories may have specific safety concerns or problems which are not covered. This manual should be considered a minimum requirement for a laboratory safety program. In general, specific federal and state regulations are not restated. However, all such regulations are assumed to be applicable and binding on personnel working with or using hazardous chemical materials at this University. Every laboratory worker is required to read this manual and to complete the chemical safety training program prior to beginning any work with chemicals.

## The University of Mississippi

These regulations and procedures apply to and are binding on all persons who receive, possess, use or dispose of hazardous chemical materials on the Oxford Campus of The University of Mississippi.

Safe work practices are expected of all personnel and students at The University of Mississippi. The procedures and policies in this manual have proven effective over the past several years when followed. All employees and students are responsible for following safety policies in their work areas, and insuring that these regulations are followed by others. It is not the intent of these regulations to affect either the quality, the quantity or the freedoms normally associated with research or with teaching. Nor is it the intent of these regulations to be rigid or inflexible. Certain endeavors may require that exemptions to the regulations be made in order to foster scientific undertakings. The University is willing to hear specific concerns as they arise and to assist personnel involved with these chemical operations in tailoring procedures that will meet the spirit of these regulations while adequately protecting personnel, the University and the environment from unnecessary hazards.

Personnel are expected to bring safety concerns to the attention of their supervisors or their departmental safety committee. If additional assistance is needed with a problem, contact the Department of Health and Safety (DHS). The situation will be investigated and appropriate action recommended where required.

Information is available from the DHS on the development of specific safety programs for hazardous operations not covered in this manual. Additional information on topics in this manual is also available from the DHS. Slide and video cassette programs covering a variety of specific safety topics are also available from the Department of Health and Safety.

The University is committed to working towards providing a safe work environment free from recognized hazards. If everyone cooperates, significant progress can be made in this area, and The University of Mississippi can become a safer place in which to work.

## **2. LAWS AND REGULATIONS;**

### **STATE AND FEDERAL REGULATIONS;**

Some of the state and federal regulations (it should be noted that federal and state regulations are continually being modified and updated) and guidelines applicable to The University of Mississippi in the area of Chemical Safety are the following:

A. "The Resource Conservation and Recovery Act", Public Law 94-580, October 21, 1976. As amended by the "Quiet Communities Act" of 1978; "Solid Waste Disposal Act" of 1980; "Comprehensive Environmental Response, Compensation and Liability Act" of 1980, and "The Superfund Amendments and Reauthorization Act of 1986".

B. "Environmental Protection Agency", Code of Federal Regulations, 40, Parts 100 to 149, and 49, Parts 190 to 399, current revision.

C. "Department of Transportation", Code of Federal Regulations, 49, Parts 100 to 177, current revision.

D. Mississippi Hazardous Waste Management Regulations, Mississippi State Board of Health, current revisions and amendments.

### **3 UNIVERSITY DEPARTMENT OF HEALTH AND SAFETY;**

#### **3.1 RESPONSIBILITIES AND AUTHORITY;**

The Department of Health and Safety will be responsible to the Chancellor of the University for compliance with and enforcement of the U. S. Environmental Protection Agency (EPA) regulations; the U. S. Department of Transportation (DOT) regulations; and the Mississippi Hazardous Waste Management (MHWM) regulations on the Oxford campus of The University of Mississippi. Specific responsibilities and authority are delineated under the items listed below.

##### A. Chemical Responsibilities:

1. Responsible for control and disposal of all hazardous chemical substances.
2. Authority to inspect all areas of the campus for violations of federal and state laws governing the safe use and disposal of all hazardous chemical materials.
3. Authority to implement controls for the use and disposal of all hazardous chemical materials.
4. Responsible for providing safety information concerning hazardous chemical materials to all University personnel.
5. Responsible for providing the required chemical safety training.

##### B. Enforcement Authority:

1. The University Department of Health and Safety will have the authority to enforce compliance with the regulations referenced in section 2.1, and other applicable safety regulations for all segments of the Oxford campus.
2. In the event of major noncompliance, action will be taken only after consultation with the Chancellor's office, unless there is an immediate danger to the health of personnel or an immediate danger to University property.
3. Remedial actions required by this office may be appealed to the Chancellor for a final decision.
4. The Chancellor of the University will have final authority and responsibility in these areas.

##### C. Emergency Authority:

In the event of an emergency, the Health and Safety Officer of the Department of Health and Safety and in his absence the Chemical Safety Coordinator have the authority to commit any and all University Resources necessary to carry out the University Contingency Plan.

##### D. Exceptions to Regulations:

The Health and Safety Officer of the Department of Health and Safety is the only person delegated by the Chancellor to make exceptions to the regulations and procedures given in this manual.

### **3.2 ORGANIZATION;**

The University Department of Health and Safety is located in the Health and Safety Building. The following is a list of Personnel and their areas of responsibility in this office.

Mr. Edward M. Movitz,  
Health and Safety Officer  
915-5433  
movitz@olemiss.edu

Mr. W. Scott Rone,  
Radiation Safety Coordinator  
915-5433  
srone@olemiss.edu

Mrs. Suzanne Irby  
Senior Staff Assistant  
915-5433  
sue@olemiss.edu

Mr. Shane Kesler  
Environmental Health and Safety Specialist  
915-5433  
skesler@olemiss.edu

### **4. RIGHT TO KNOW;**

#### **4.1 RIGHTS;**

Employees are guaranteed the following rights with regard to toxic substances:

- A. Right to know the identity of toxic substances encountered during the course of their employment.
- B. Right to refuse to work with a toxic substance, if information about it is not provided within 5 working days after filing a written request with the University Department of Health and Safety.
- C. Right to refuse to work with a toxic or hazardous substance if proper safety equipment or safe guards are not provided by the University.
- D. Right to training within 30 days of employment (annually thereafter) in the safe use of any hazardous material encountered in the course of their employment.
- E. Right to training when a new hazard is introduced into the workplace.

F. Right to protection against discharge, discipline, or discrimination as a result of exercising any of the above rights.

#### **4.2 SERVICES TO PROTECT RIGHTS;**

In order to insure that employees' right to know is protected, the Department of Health and Safety will provide the following services:

##### **A. Material Safety Data Sheets**

The Department of Health and Safety will maintain a Material Safety Data Sheet (MSDS) on all hazardous or toxic materials in use on the Oxford campus. The MSDS will contain the following information:

1. The chemical and/or common name of the substance;
2. The physical and chemical characteristics of the material;
3. The known acute and chronic health risks;
4. The primary routes of entry and symptoms of exposure;
5. The proper precautions, handling practices, protective equipment, and other safety procedures used to limit potential exposure to toxic or hazardous materials;
6. Emergency treatment for overexposure;
7. Emergency procedures for spills, fire, and disposal;
8. A description in common language of the known specific potential health risks posed by the toxic substance.

Copies of the MSDS are available from the Department of Health and Safety. It is the responsibility of individual supervisors to request this information.

##### **B. Safety Training**

The following safety training requirements apply to faculty, staff and graduate students working with chemical materials on the Oxford Campus. These training requirements will also apply to undergraduate students when they are working in these areas in other than a regularly scheduled University course. Use of any of the materials listed below requires the signing of the appropriate "Safety Agreement" form.

**GENERAL CHEMICAL SAFETY TRAINING:** All faculty, staff and graduate students working with chemicals on the Oxford campus are required to take the chemical safety training program and to pass a written examination on chemical safety. Annual retraining is not required. A special safety training program is required for Physical Plant Personnel

**CARCINOGENIC SAFETY TRAINING:** All University personnel and all students are required to have special safety training in the handling and use of carcinogenic materials and written authorization prior to starting any work with carcinogenic compounds. A laboratory with a Class II or better Fume Hood is required for the handling of carcinogenic materials. A pre-requisite to this training is completion of the General Chemical Safety Training. Application to use

carcinogens is made through the Department of Health & Safety. Annual retraining is not required for continued authorization.

## **5. CHEMICAL SAFETY;**

This portion of the manual is concerned with the procurement, use and disposal of hazardous chemicals on The University of Mississippi, Oxford Campus. All applicable regulations are not reprinted here, only those regulations which are relevant to the University community with regard to hazardous chemical substances.

### **5.1 SCOPE OF REGULATIONS;**

The regulations and procedures set forth below apply to all persons who procure, receive, possess, use, generate, or dispose of hazardous chemicals on The University of Mississippi, Oxford Campus.

### **5.2 HAZARDOUS CHEMICALS;**

A laboratory worker may be faced with many different types of hazardous materials. The substances with which they work may be ignitable, corrosive, reactive, toxic, carcinogenic, biologically active or radioactive. Effects of exposure to these materials may lead to an array of effects, some immediate, such as loss of sight, or effect which do not become obvious for a period of time, such as reduced fertility or cancer. Chemicals constitute a major concern for laboratory personnel.

**THE TRANSPORTATION OF HAZARDOUS MATERIALS IN PERSONAL VEHICLES IS PROHIBITED. THE UNIVERSITY WILL NOT TAKE RESPONSIBILITY FOR PERSONS WHO CARRY HAZARDOUS MATERIALS IN VEHICLES NOT OWNED OR OPERATED BY THE UNIVERSITY.**

A hazardous chemical is one that poses a danger to human health or to the environment, if improperly handled. The EPA has divided hazardous chemicals into several categories, including :

#### **A. Ignitable Materials**

These materials give off heat, smoke, soot and may disperse toxic pollutants and by-products into the air. They generally have a Flash Point below 60 deg. C (140 deg F). Examples are Gasoline and Isopropyl Alcohol.

#### **B. Corrosive Chemicals**

These materials can cause injury to the skin or body, or destroy their own containers or other materials and be released into the environment. They generally have a pH below 2 or above 12.5. Examples are Nitric Acid and Sodium Hydroxide.

#### **C. Reactive Chemicals**

These materials can detonate, explode or give off poisonous gases when exposed to light, air,

water or other materials. This category also includes oxidizers, cyanides and sulfides. An example is Sodium metal.

#### D. Toxic Chemicals

These materials can cause serious illness or death from exposure by inhalation, ingestion or absorption through the skin. The quantity of a substance necessary to kill 50 % of an exposed animal population in laboratory tests within a specified period of time is called an LD50. The EPA definition of a toxic chemical is a materials that possesses an LD50 Rat(orally) < 50 MG/KG, an LD50 Rat (inhalation) < 200 ppm, or an LD50 Rabbit (dermally) < 200 MG/KG. An example of this type of material is Lead Acetate.

#### E. Listed Waste

Materials regulated by the US EPA as a hazardous waste.

#### F. Listed Constituent

Materials regulated as hazardous based upon component or constituent levels.

Any material which possesses one or more of the above characteristics is considered hazardous by the EPA, the State of Mississippi, and for the regulatory purposes of this manual.

G. Investigational Compounds and Research Materials. These materials, commonly handled in research laboratories may include Novel / Synthetic Compounds, Extracts, Diagnostic Specimens, or compounds of undetermined toxicity. Always follow established laboratory procedures and techniques, and use appropriate protective equipment while using these materials. Treat all unknown compounds and investigational materials as toxic.

### **5.3 PROCUREMENT OF HAZARDOUS CHEMICALS;**

Federal and State laws require that a record of the procurement of all chemicals coming on the Oxford Campus of The University of Mississippi be maintained as part of the "cradle to grave" reporting requirements of the regulations set forth in section 2.1 A. Chemicals may be acquired either by purchasing them or, in some instances, by having materials given to the user for free.

#### A. Purchases

A copy of the receiving reports of all chemicals procured through the University Purchasing Department will automatically be sent to the Department of Health and Safety by the Purchasing Dept. No special action is required on the part of the user.

#### B. Gifts

All significant quantities of chemicals which are received by departments, laboratories, or individuals, i.e., free samples, gifts of chemicals, etc. which are not handled through the Purchasing Department, require prior approval from the Department of Health and Safety before they are accepted by the person or department receiving the material(s). Notification of Procurement is to be accomplished by completing form DHS-5 (available from the DHS) and sending the completed form to the Department of Health and Safety.

## The University of Mississippi

The DHS will record information concerning chemicals (chemical name, quantity, date of receipt, etc.) and enter it into a computer database used to monitor the procurement of chemicals at the University. No action is necessary for materials produced (synthesized) at the University.

### **5.4 RESTRICTED MATERIALS;**

Certain materials pose unusual hazards and as a result will have additional restrictions placed upon their purchase and use. In some situations it may be necessary to cancel the purchase or otherwise delay the use of these materials until adequate facilities and/or personnel resources can become available for the particular material. The following are the materials that are RESTRICTED MATERIALS on the Oxford campus together with the specific regulations dealing with their purchase and use.

#### A. Carcinogens

Materials on the "LIST OF CARCINOGENS", are strictly regulated by the Department of Health and Safety. The current list is available from DHS at 5433. The purchase and use of these materials are governed by the following regulations:

1. All faculty, staff or graduate students who order or use these materials must complete Form DHS-81, "Application to Use Carcinogens", in the Appendix. Approval of the Chancellor of this application is required before these materials can be used.
2. The work areas in which these materials are used or stored must be approved by the Department of Health and Safety.
3. The work areas and storage areas for these materials must be posted as to the presence of carcinogens.

#### B. Perchloric Acid

Perchloric acid can become an extremely dangerous material if used incorrectly, and under a variety of conditions, e.g. heating, dehydration, combination with organic materials, and shock. As a result, The following regulations must be adhered to :

The purchase of this material in 72 % or greater concentration will require the prior approval of the Department of Health and Safety. Approval to use this material will require the submission of Form DHS-26, Appendix B, together with the Purchase Requisition to the Department of Health and Safety. Following approval by this office, the Purchase Requisition will be forwarded to the Purchasing Department. The Purchasing Department will not accept Purchase Requisitions for this material without the approval of the Department of Health and Safety

#### C. Radioisotopes

See the current University Radiation Safety Manual.

#### D. Cyanide Compounds

Many cyanide compounds are extremely poisonous, and most have the ability to undergo chemical reactions which may result in a release of toxic vapors. In many instances, these vapors are undetectable by taste or by odor. Therefore, approval is required for processes or experiments involving cyanide containing compounds. Written protocols must be submitted to Health and Safety prior to starting any work with cyanides. DHS may require additional safety measures, monitoring equipment, supplies, and/or training.

#### E. Explosives

All purchases and gifts of explosive materials, including all multi-nitrated materials, must be coordinated through DHS prior to purchases or receipt. Explosive materials located at the University are subject to immediate removal by DHS unless written authorization from the Health and Safety Officer is immediately available at the materials location.

### **5.5 CHEMICAL SAFETY IN THE WORKPLACE;**

The way that a research project is conducted in a laboratory is an important factor in laboratory safety. It is the factor which can be affected most by the attitude of personnel in a laboratory. For a workplace to be safe, everyone must be supportive of, and take responsibility for, laboratory safety - for themselves and their co-workers. Failure to observe regulations, could lead to disciplinary action under employee standards as well as state and federal regulations.

#### A. Departmental Safety Committee

Every department with chemical laboratories, or operations involving the use of chemicals, shall establish a chemical safety committee, or appoint an individual, to be responsible for safety programs within the department. The committee shall be responsible for:

1. Developing a safety program for the department which includes the procedures outlined in this manual plus additional procedures as needed to meet the particular needs of the department;
2. Resolving safety problems within the department, when possible, and
3. Acting as a liaison between the department and the DHS.

#### B. Laboratory chain of command

Post phone numbers for the laboratory chain of command within the laboratory and in the departmental office for emergency use.

#### C. Planning

Appropriate planning can substantially reduce the risks associated with using chemicals. When planning out a research program or classroom related projects, many factors should be considered in addition to whether or not a specific material will serve a desired purpose. These factors may include, but are not limited to :

1. Does the specific material pose any special hazards ?
2. Are there alternative materials or procedures which can be utilized ?
3. Have all personnel involved in the project been informed of the potential risks ? Have they

agreed to participate and accept the risks ?

4. Will specialized training be necessary, and if so, who will do it and what areas will be addressed ?

5. Will the use of specific materials require additional protective equipment ? Are funds available to provide this equipment ?

6. Will the planned research require upgrading of existing facilities ? Are funds available for renovations ?

7. How much material is necessary ? Are storage facilities adequate ?

8. Does the substance degrade rapidly ? Can amounts be kept on hand which will be utilized quickly ?

9. What quantities of hazardous wastes will be generated by the project ?

10. Will the disposal of waste products or reagents pose particular problems ?

11. Will the cost for the disposal of waste products exceed the amount funded for the research ?

If the answer to any of the above questions is yes, it would be prudent to consult the DHS prior to the start of a research project. Discussion with the DHS prior to the start of a project may reduce or eliminate potential problems before they occur.

For academic programs, the responsible person should consult the DHS for assistance.

#### D. Procedures and Accident Prevention

Although accidents can occur during the acquisition process and while chemicals are in storage, the most likely time for them to happen is while chemicals are being handled and used. No manual intended to cover all the laboratory operations at a major research institution can cover every procedure and every precaution which might be involved.

1. It is the responsibility of immediate supervisors as well as department heads to insure that personnel working for them are fully informed with regard to the procedures for safe handling and use of hazardous chemicals.

2. Material Safety Data Sheets (MSDS) which provide all necessary information in this regard are available from the Department of Health and Safety, Room 200, Old Power Plant, 915-5433. Additional information should be sought from the laboratory supervisor, the departmental safety committee, instruction manuals, the labels on chemical containers, or from the DHS at 5433.

3. There are basically two different types of risks which will be involved in laboratories, physical injuries such as would result from fire or explosion and health related problems. Good work practices will minimize the likelihood of both types of problems. Among recommended practices are:

a. Plan the work carefully. Analyze for possible failures and consider the consequences.

b. Make sure the right equipment is available and is in good condition.

c. If a system is involved, make sure it is assembled solidly.

d. If a release of toxic fumes may occur, the work must be done in a hood.

e. An explosion shield is required if an explosion or a runaway reaction is possible.

f. Do not hurry unnecessarily or compromise on safety. Preferably, no one should work alone or, at a minimum, without someone else being aware of their activity and checking occasionally.

g. Wear appropriate clothing and personal protective equipment.

h. Good housekeeping is always conducive to safety.

I. Finally, know all of your safety procedures.

#### E. Laboratory Organization

The space within a laboratory should be organized as much as possible to separate areas of high and low risk activities. It should not be necessary to pass through high risk areas routinely or, in the event of an emergency, escape routes should always be placed through the safest areas within the laboratory. Traffic flow should be minimized in the vicinity of equipment which involves generation of fumes, ( fume hoods, distillation units, etc.), where air disturbances may cause fumes to be dispersed. Flammable materials should be separated as much as possible from sources of ignition, such as Bunsen burners. Safety showers and eyewashes should be readily accessible from every point within the laboratory.

#### F. Safety Equipment

It is the responsibility of individual work units or departments to provide any safety equipment necessary to use a given hazardous chemical. It is the duty of unit supervisors to insure that safety equipment is used properly. These items may include, but are not limited to, fumehoods, gloves, safety glasses, respirators, etc. The University Department of Health and Safety should be contacted for advice in this regard.

#### G. Accidents

Accidental spills, injury of personnel, or releases to the environment involving a hazardous chemical must be reported immediately to the University Department of Health and Safety. Within three (3) working days, form DHS-3 must be completed and filed with the University Department of Health and Safety. Guidelines for chemical spills and other emergencies are given in Sections 6 and 7 below.

#### H. Eating, Studying and Other Social Activities

It must be recognized that in the absence of a convenient, nearby area specifically set aside for eating, studying, and other social activities, that the laboratory area will be used for these purposes. An area within the laboratory may be set aside and clearly defined where these activities are permissible and these activities must be strictly prohibited outside this area. An educational program, based on the actual risks within the laboratory, should be established by the laboratory supervisor and reviewed with each new employee and graduate student. The actual use of the laboratory for these purposes should be discouraged as much as possible. In certain high risk facilities, such uses must, in fact, be prohibited and alternative convenience areas established. Examples of such high risk areas would be carcinogenic research laboratories, biological research laboratories and radiological laboratories. Under no circumstances are eating or drinking to be allowed in undergraduate academic laboratories or work areas which use chemicals or hazardous materials.

## I. Contact Lenses

The use of contact lens has certain advantages in many situations outside of the laboratory. However, in wet chemistry laboratories, or wherever the likelihood exists of chemical injury to the eyes, contact lenses may pose additional problems should chemicals get into the eyes. This is due to the fact that chemicals are drawn under the lenses by capillary action. This action increases the risk that water from an eyewash fountain could be prevented from reaching the injured area. Therefore, the University has arranged for a series of no-vent goggles (which meet ANSI Z87.1-1979 standard) to be available for purchase at the bookstore which will satisfy the safety equipment requirements of section 5.5 F (Safety equipment) while allowing for the use of contact lenses by persons in laboratories using or storing chemicals. In the event that these specific goggles or their no-vent equivalent are not utilized, the use of contact lenses by persons in laboratories using or storing chemicals will be forbidden.

## J. Children and Hazardous Chemicals

Children, i.e., those under the age of 16, are prohibited from being in, touring, or visiting, any area where hazardous materials are used or stored.

## **5.6 STORAGE OF HAZARDOUS CHEMICALS;**

Chemicals must be identified and stored properly to avoid unwanted reactions, and to reduce risks to response personnel during emergency situations.

### A. Definition of Chemical Storage

The storage of chemicals implies the accumulation or retention of chemical substances for use in other than current activities.

### B. Labeling

Prior to storing a chemical, it must be properly labeled. Often the label provided by the manufacturer or distributor will include most of the required information. However, in some cases, laboratory or stockroom personnel must provide additional information to a label, e.g., the dating of an ether container. If the manufacturer's label is found to be inadequate, laboratory personnel should take time to add the extra information to a label, as necessary. Additional information on container labeling can be obtained from the DHS.

The chemical label should include a minimum of the following information :

1. The chemical name of the material.
2. The date received or produced (to be added by the user).
3. Hazardous properties such as flammability, reactivity, corrosiveness, toxicity, etc..
4. Additional safety information or precautions such as use in hoods, protective equipment recommended, etc..

Additional optional information may include fire fighting equipment or first aid measures. Additional information can be acquired as necessary from the DHS.

### C. Stockroom Storage

Stockroom personnel will be required to:

1. Date all chemicals,
2. Separate incompatible materials, i.e., store chemicals in accord with the compatibility chart, Tale 1 in the Appendix,
3. Keep a separate record of time-limited chemicals,(Ethers, etc.),
4. Reduce unnecessary storage of chemicals that may deteriorate, and
5. Maintain reagent labeling and container integrity.

### D. Laboratory Storage and Individual Requirements

Individual users and laboratories which store chemicals will be required to label all chemical containers as to:

1. Chemical composition, or an appropriate lab notebook reference number if the exact composition has not been determined.
2. Date the substance was made or the container filled,
3. Laboratory or responsible person, and,
4. Store chemicals in accordance with the compatibility chart in Appendix A.

### E. Storage Cabinets

Maximum storage limits for flammable liquids in approved safety cabinets are sixty (60) gallons of liquids with a flash point less than 140 deg. F and 120 gallons of liquids with a flash point greater than 140 deg. F. Storage cabinets should, but are not required, to be vented.

### F. Refrigerated Storage

Standard refrigerators and freezers must not be used for the storage of flammable liquids. The vapors collected in these confined spaces represent a major explosion hazard if ignition occurs. Ether, for example, will ignite at temperatures below minus 40 deg. C. A normal refrigerator has several components which will generate sparks including the light switch and the thermostat. Self defrosting models frequently have a drain hole in the bottom which may allow the vapors to be ignited by the compressor motor.

The following refrigerators are acceptable for the storage of flammable substances :

1. "Flammable Storage" refrigerators and freezers which have been modified inside the refrigerator (this can be done by Physical Plant), and
2. "Explosion Proof" refrigerators and freezers which, in addition to protecting against flammable vapors inside the unit, are designed to operate in atmospheres where excessive concentrations of flammable vapors are expected to be present. These units must be permanently wired into the laboratory. The extra protection afforded by explosion proof refrigerators and freezers is not required for solvent storage under normal laboratory conditions. These units would be of little additional value unless all sources of ignition were eliminated from the room.

## G. Food Storage

**STORAGE OF FOOD IN REFRIGERATORS INTENDED FOR LABORATORY USE, INCLUDING STORAGE OF CHEMICALS, FLAMMABLE MATERIALS, ETC., MUST NEVER BE USED FOR THE STORAGE OF FOOD PRODUCTS BY LABORATORY PERSONNEL !**

## H. Gas Cylinders

### 1. High pressure cylinders (>240 psig)

High pressure cylinders are extremely dangerous, even if the gas is not reactive. A ruptured cylinder or one with a broken valve will emit the released gases at high velocities with great force, converting the cylinder into the equivalent of an uncontrollable rocket.

The following requirements must be adhered to in order to safely store and transport high pressure gas cylinders:

- a. Safe cylinder storage areas must be provided which cannot be in stairwells or within a required exit corridor.
- b. All cylinders must be secured by chains or straps in an upright position at all times so that they cannot fall.
- c. Manual transportation of cylinders must always be done with a cylinder cart or similar hand truck on which the cylinders are securely fastened with a strap or chain. They are never to be lifted by the valve protection cap or dragged, rolled, slid, dropped or permitted to strike hard objects or another cylinder.
- d. Cylinders must not be used without a regulator valve.
- e. Cylinders not in use must have the valve protection cap in place. The cap must be securely attached and screwed on.
- f. Empty cylinders should be segregated and marked "EMPTY" or "MT"
- g. Never lay a cylinder down as the top valve may be damaged.

### 2. Low pressure gas cylinders (< 240 psig)

Low pressure cylinders should be handled, stored and used with the same care as high pressure cylinders. A regulator is suggested for all cylinder applications, however, some procedures involving low pressure cylinders will not require the use of a regulator. These applications should be reviewed by Health and Safety prior to a project start. Acceptability of a procedure involving the use of a low pressure cylinder without a regulator will depend upon several factors including, but not limited to:

- a. Is the apparatus capable of withstanding the full pressure of the cylinder should the entire contents uncontrollably pour in, and,
- b. Is the ventilation system available capable of removing hazardous vapors from the work area efficiently enough to prevent personnel injury should the cylinder release too much gas either too quickly or at too high a pressure.

## **5.7 SPECIAL STORAGE REQUIREMENTS;**

### **A. Ethers**

In addition to being flammable, explosive peroxides may be formed in ethers that have been stored for a long period of time. A minor shock, such as the twisting off of the top, may be sufficient to detonate the material. Peroxide formation is also increased by exposure to light and contact with air.

Ethers should, therefore, be ordered in small quantities so that the material is used quickly, the container must be dated when received, and discarded through the DHS after six (6) months from the date the material is opened. Unopened containers should be discarded twelve (12) months after the material is received.

Table 2 in the Appendix lists some of the more common materials which have been known to form peroxides. For additional information on materials which may form peroxides, contact the DHS at 5433.

Although ethers should definitely be discarded once they have aged past the acceptable time limits outlined above, it is both prudent and appropriate to test these materials periodically for the presence of peroxides.

To test for peroxides, shake 10 ml. ether with 1 ml. 10 %Potassium Iodide in a small glass stoppered cylinder of colorless glass that is protected from light. View the mixture against a white background. The absence of any color in either layer indicates that no peroxides are present. **IF YOU HAVE ANY DOUBTS CONCERNING THE SAFETY OF A MATERIAL, DO NOT ATTEMPT TO TEST THE MATERIAL. IMMEDIATELY CONSULT WITH THE DHS FOR ASSISTANCE OR INFORMATION.**

### **B. Flammable Liquids**

Flammable and combustible liquids must be stored in appropriate containers according to their characteristics.

Table 3 in the Appendix lists the maximum size containers to be used for the storage of flammable liquids. Larger sizes may be stored if the material is housed in approved safety cans or DOT approved shipping containers.

Within a laboratory, the maximum amounts of flammable liquids that may be stored outside of approved safety containers or storage cabinets are as follows :

## **RESEARCH LABORATORIES**

10 GALLONS OF FLAMMABLE LIQUIDS or,

20 GALLONS OF COMBINED FLAMMABLE AND COMBUSTIBLE LIQUIDS

## TEACHING LABORATORIES

5 GALLONS OF FLAMMABLE LIQUIDS or

10 GALLONS OF COMBINED FLAMMABLE AND COMBUSTIBLE LIQUIDS

Exceptions may be made, on a case by case basis, in areas that house several research laboratories in one large area.

Any amount of flammable and combustible liquids in excess of the above stated amounts must be stored in either approved storage cabinets, storage rooms, or approved safety cans. Bulk quantities of flammable liquids in thirty (30) or fifty five (55) gallon drums are only permitted in storage areas equipped with explosion-proof electrical wiring.

Flammable liquids in a laboratory should not be stored between the normal work area and an exit from the laboratory.

### C. Perchloric Acid

Perchloric acid is an extremely corrosive agent that requires special precautions. It becomes explosive under a variety of conditions, such as heating, dehydration, combination with organic material, and shock. Due to these hazards, approval from the DHS is required before Perchloric acid in concentrations greater than 72 % can be purchased.

Prior to working with Perchloric acid, an individual should thoroughly review the procedures to be followed and the risks posed by its use. An excellent reference on the risks is the CRC Handbook of Laboratory Safety, 3rd Edition.

Any procedures which involve heating of Perchloric acid must be carried out in a specially designed and dedicated Perchloric acid fume hood. These hoods include a wash down system, a vertical duct system without organic materials used at the joints, and an exhaust duct which exhausts fumes well above the roof top.

If concentrations above 85% are to be used, protection in addition to that normally used for acids must be used. This protection must include thick gauntlets, a face shield and an explosion shield within the hood. A second informed person should be available nearby to provide routine and emergency assistance.

Unused Perchloric acid should be disposed of through the DHS as the material becomes more unstable with time. Discoloration of anhydrous Perchloric acid indicates that immediate disposal is needed.

#### D. Reactive Materials

Sodium, potassium, and phosphorous react vigorously with water or with humidity in the air and must be kept in oil filled containers which protect them from such exposure. If the materials are inadvertently exposed to moisture, excessive heat can be generated which could cause a fire, or within a confined space, an explosion due to high pressures. Laboratories in which reactive metals are used should be provided with class D fire extinguishers. Work using these materials should be within a fume hood behind an explosion shield. Personnel should wear safety goggles or a face shield and heavy gloves when working with reactive materials.

#### E Explosives

Explosives shall not be stored in laboratories under normal circumstances. However, where storage of explosives is necessary, they shall be stored in magazines according ATF Regulations, 27 CFR 55. Call the DHS at 5433 for details.

#### F. Gasoline

In accordance with applicable federal regulations, the storage of gasoline in any building on the Oxford campus is strictly forbidden.

### **5.8 DISPOSAL OF HAZARDOUS CHEMICALS;**

The disposal of hazardous chemicals is strictly regulated under the Resource Conservation and Recovery Act, the Mississippi Hazardous Waste Management Regulations, and the EPA regulations CFR 40, parts 100 - 399. Chemicals must be disposed of only through the Department of Health and Safety. This will normally be done at no cost to the generator if the following procedures are strictly adhered to. Individuals who do not follow procedures in complying with state and federal regulations are individually responsible for possible fines and/or imprisonment. Call the DHS at 5433 when you have waste materials for disposal. Waste Chemicals are normally picked up on Monday and Wednesday, weather permitting. Only the Chemical Safety Coordinator is authorized to pick up waste chemicals. **THE TRANSPORT OF WASTE CHEMICALS TO THE DHS FACILITIES BY PERSONS OTHER THAN THE CHEMICAL SAFETY COORDINATOR IS PROHIBITED.**

#### A. Sewage Disposal

**NO HAZARDOUS CHEMICAL SUBSTANCE SHALL BE DISPOSED OF INTO THE SANITARY SEWAGE SYSTEM, INTO THE ATMOSPHERE, OR INTO THE NORMAL UNIVERSITY TRASH SYSTEM.** All chemical waste must be collected in suitable containers as described in Section 5.8.D.1 for processing and disposal by or under the supervision of the Chemical Safety Coordinator. In the event of uncertainty, call the DHS for advice.

## B. Recoverable Materials

Any person or unit wishing to dispose of a chemical must first investigate the possibility of recovery, exchange, or returning the material to stock.

## C. Chemical Exchanges

Excess, unwanted, or unneeded chemicals in good condition need not be disposed of, if they can be reused. The University Department of Health and Safety has set up a retained-chemical storage area where unwanted or partially used containers of chemicals can be stored, provided they are properly labeled with the chemical name and the identity of the material can be reasonably assured. A list of available chemicals is published periodically by the Department of Health and Safety. This exchange will work provided that:

1. The donor of the chemical can give a reasonable assurance of the chemical's identity,
2. The recipient accepts full responsibility for the identity and quality of the chemical, and,
3. Chemicals that form peroxides or are explosive cannot be exchanged.

Requests for materials will be taken by phone at 5433.

## D. Request for Hazardous Material Disposal (DHS-4)

When a chemical cannot be reused or exchanged, then a request for disposal must be filed with the Department of Health and Safety using Form DHS-4. A chemical and physical analysis of the material must be submitted with Form DHS-4. In the event of uncertainty, call the DHS. Pickups of hazardous chemical waste will be accomplished by the Chemical Safety Coordinator. Hazardous chemical waste must be shipped off site within a period of time specified in the most current revisions of the regulations listed in section 2.1 of this manual.

**NO CONTAINERS OF CHEMICAL WASTE WILL BE REMOVED BY THE CHEMICAL SAFETY COORDINATOR UNLESS THEY ARE PROPERLY LABELED ACCORDING TO 5.6.D.1 AND A COMPLETED FORM DHS-4 HAS BEEN FILED AND REVIEWED BY THE DEPARTMENT OF HEALTH AND SAFETY. CHEMICAL WASTE MUST BE NONPATHOGENIC, NONINFECTIOUS, NONEXPLOSIVE, NON-COMPRESSED, AND NONRADIOACTIVE.**

### 1. Containers

Chemicals for disposal must be placed in a nonreactive, sealed container with a screw type cap. The exterior of the container must be CLEAN. Containers with cracked or corroded caps will not be accepted. These containers must be conspicuously labeled as follows:

- a. "WASTE",
- b. Chemical Name or names,
- c. Laboratory or Responsible Person,
- d. Date container was filled or purchased,
- e. Appropriate hazard warnings (Request MSDS, if needed).

## 2. Mixtures

Incompatible wastes shall not be placed or mixed in the same container, see the compatibility table in the Appendix for more information. This restriction is intended to prevent any potentially dangerous reaction, explosion, or release of toxic gases, vapors, or fumes during the waste handling process.

## 3. Unusual Waste Disposal

Explosives, PCB contaminated materials, equipment containing PCBs or any waste possessing unusual disposal problems outside of the normal operations of the University waste management plan will be handled provided that the department submitting the waste will assume financial responsibility for the costs involved. For additional information in this regard, contact the Health and Safety Officer of the Department of Health and Safety, 915-5433.

## 4. Unknown Chemical Disposal

Disposal of unknown chemicals will be handled by the Department of Health and Safety, on a case by case basis, provided the department submitting the chemicals for disposal are willing to assume financial responsibility for the costs of the analyses required to determine the identity or composition of the material.

## E. Used Motor Oil

All persons on the Oxford Campus, including the residents of the University operated dormitories and apartments, the Faculty and Staff houses and apartments, and the residents of the Fraternity and Sorority Houses, are now responsible for collecting Motor Oil, and for ensuring proper disposal and handling of this material. The Physical Plant Service Station (915-7304) will collect used motor oil from all campus residents, at no charge. The service station will not pick up used oil. Please call the station or the Physical Plant (915-7051) if you need additional instruction or directions.

## F. Battery Disposal

Certain types of rechargeable batteries are now regulated as hazardous waste for disposal purposes. The amount of Cadmium in common rechargeable NiCad batteries is causes these items to be regulated as a hazardous waste. The same is true for lithium, lead acid, led-Gel and for mercury batteries. In order to fully comply with applicable regulations, DHS will accept these batteries from all campus sources for proper disposal. Common batteries, and alkaline batteries are to be discarded with normal trash. Vehicle batteries should be delivered to the Physical Plant Service Station.

## G. Chemical Waste Storage Facility

The chemical waste storage facilities for temporary storage and processing of chemical waste is located behind the University Waste Water Treatment Plant.

## **5.9 LABORATORY CLOSE-OUT PROCEDURE;**

Please give a minimum of 30 days notice to the DHS at 5433 before moving or closing out a laboratory. The following items must be evaluated by the DHS during closeout:

### A. Unwanted Chemicals

Chemicals that are no longer wanted maybe offered for return to campus stockrooms or offered for reuse to other campus laboratories through the chemical exchange. As storage space on the Exchange is limited, your cooperation in promptly notifying the DHS will help with an orderly transfer, and avoid lengthy delays in closing out a laboratory.

### B. Unusable Materials

Chemicals that cannot be reused by other laboratories must be disposed of in compliance with the regulations set forth under section 5.8 "Disposal of Hazardous Chemicals". Complete identification of waste chemicals is required; analysis of unknowns will be required by the DHS.

### C. Unstable Materials

Materials which may have become unstable, such as old ethers, must be brought to the attention of the DHS as soon as they are discovered. Arrangements will be made with disposal teams to remove the explosives safely. As these arrangements take time, prompt notification is again emphasized to avoid delays.

### D. Equipment

Equipment that may build up corrosive deposits, such as Kjeldahl acid digestion units, must be decontaminated before the laboratory is closed out. This applies even if the equipment will not be moved.

### E. Moving

Prudent practices should be used in transferring hazardous chemicals and materials from one lab to another. Contact the DHS for assistance.

## **6. CHEMICAL SPILLS;**

### **6.1 GENERAL PROCEDURES;**

Minor spills should be cleaned up immediately by laboratory personnel, using a procedure such as those outlined below, providing the material is not immediately dangerous to life and health (IDLH) and equipment is available. Otherwise, evacuate the immediate area. For spills of moderate size, **call the DHS at 5433 (days) or 7234 (evenings and weekends)**. Again assuming the material is not IDLH level, DHS personnel will provide technical assistance and guidance to laboratory personnel in cleaning up spilled materials. For moderate to large spills of ordinarily

## The University of Mississippi

dangerous materials, e.g. acid, etc., evacuate the building, either personally or through the building alarm system, call 5433 to report the incident or call the University Police Department at 7234 and report the incident asking the dispatcher to notify the DEPARTMENT OF HEALTH AND SAFETY. Those involved in the incident are to remain available outside the building to assist the Emergency Response Team. After the initial notification, the laboratory supervisor, and the department head are to be notified.

In the event of a fire of any but the smallest size, where you are confident that it can be put out without risk of spreading or danger to yourself, call 9-911 and report the fire. The building is to be evacuated. If the fire is in a building that normally houses hazardous materials, the fire department will notify the DHS.

In the event of an emergency involving personal injury, call 7234 and ask for an ambulance. If an eye injury or skin exposure is involved, assist the injured person to use either an eyewash station or safety shower, or both. For more specific information on chemical exposure, see the applicable sections which follow. Personnel should become familiar with emergency procedures before they are needed. It is suggested that all laboratory personnel familiarize themselves with the proper emergency procedures for those materials with which they work. For additional information, see section 4.2 for requesting a Material Safety Data Sheet (MSDS).

The following information should serve as a general guide in the event some of the more common emergency situations found in operations involving chemicals and laboratory work. This information is not meant to cover all situations. However, the following steps should provide an acceptable guide to personnel if an emergency should arise:

### A. Stop, Think, Stay Calm!

Immediately alert your neighbors and your supervisor.

### B. Clothing

All contaminated clothing must be removed immediately and the skin washed with soap and cool water. Flush skin with cool water for no less than fifteen minutes. Health and Safety should be consulted before contaminated clothing is reused, laundered or discarded.

### C. Can You Clean It Yourself?

If there is not a fire hazard and the material is not particularly volatile or toxic, clean it up as directed by your supervisor. To facilitate cleaning up liquids, use an absorbent material, preferably one that will neutralize the liquids if possible. Always use appropriate protective equipment as directed by your supervisor, or consult with Health and Safety for additional information or assistance.

### D. Volatile, Flammable, or Toxic Material

## The University of Mississippi

If a volatile, flammable, or toxic material is spilled, immediately warn everyone to extinguish flames and turn off spark producing equipment such as brush-type motors. Shut down all equipment and vacate the room until it is decontaminated. Notify the Hazardous Material Response Team at 5433 (**days**) or 7234 (**evenings and weekends**) to supervise the decontamination. The supervisor will be responsible for designating the extent of the proper cleanup procedure. The following substances are very hazardous and cleanup should be handled by the Hazardous Material Response Team:

Aromatic Amines	Bromine	Carbon Disulfide	Cyanides
Ethers	Organic Halides	Perchloric Acid	Picric Acid

Avoid skin contact and, to prevent inhalation, wear appropriate breathing apparatus. It has been demonstrated that chemical spills or splashes on clothing allows the materials a greater surface contact area with the skin and facilitates skin absorption. Therefore, spills on the clothing, and even the clothing if necessary, should be immediately removed to prevent skin penetration.

### E. Small Spills

Many small liquid spills (<100 ML) can be absorbed with paper towels, sand, or an absorbent. However, paper towels can increase the surface area and evaporation, increasing the fire hazard. Most small solid spills can be brushed up and disposed in appropriate solid-waste containers, but care must be exercised to avoid reactive combinations. Don't leave paper towels or other materials used to clean up a spill in open trash cans in the work area, or in any manner which may cause an unnecessary exposure to a fellow employee. Contact the DHS for the proper disposal of all waste chemical materials

### F. Acid Chlorides

For acid chloride spills use calcined absorbent products, such as Oil-Dri(tm) or Zorb-All(tm), or dry sand. Avoid contact with skin.

### G. Mercury

Mercury is used in many laboratory instruments, such as thermometers, manometers, and diffusion pumps. One of the most common laboratory accidents is to have a mercury spill. Because of the high toxicity of mercury vapor, spilled mercury should be immediately and thoroughly cleaned up using an aspirator bulb or vacuum device. In these accidents, it is quite easy to exceed the permissible exposure limits of 0.05 mg/cubic meter since mercury has a substantial vapor pressure at room temperature. If not cleaned up promptly, the levels will increase as the mercury becomes divided into smaller and smaller droplets. The DHS should be called at 5433 in the event of an accidental spill if you require either specific instructions or supervision and assistance with a cleanup of spilled mercury. If a mercury cleanup unit is available, become familiar with its location and proper use. Domestic vacuum cleaners must not be used because they will only redisperse mercury aerosols and spread the contamination.

Mercury vapor monitors are available for determining the effectiveness of the cleanup from the DHS. Notify the DHS if you have waste materials for disposal.

#### H. Alkali Metal

A spill of an alkali metal should be smothered with powdered graphite or Met-L-X(tm) extinguisher. Sodium-potassium alloys (NaK) present even greater hazards than either sodium or potassium alone; strict observation of suppliers' recommendations must be followed. Particles of alkali metal splattered on the skin should be rapidly removed and the skin flushed quickly with cool water. If any metal on the skin becomes ignited, deluge it with large amounts of cold water immediately.

#### I. White (yellow) Phosphorous

A spill of white (yellow) phosphorous should be blanketed with wet sand or wet absorbent and disposed of by the University Department of Health and Safety. If any white phosphorous is splattered on the skin, flush the skin with cold water and remove adhering phosphorous. Copper sulfate solution provides a visual aid in removing particles because it produces a dark color in contact with elemental phosphorous.

#### J. Natural Gas

Gases are found in virtually every laboratory, even if only in the form of the gas supply for the ubiquitous Bunsen burner. Gas services usually have an odor so that gas leaks are easily detectable. If the odor of gas is clearly detectable, do not make or break any electrical connections, such as using a light switch, but immediately call the Physical Plant at 7051 and report the problem. Care should be taken with lighted gas outlets to insure that the flame does not go out with the gas on.

### **6.2 CHEMICALS SPILLED ON THE BODY OVER A LARGE AREA;**

#### A. Remove Contamination

Quickly remove all contaminated clothing while using the safety shower. Seconds count, and no time should be wasted because of modesty. However, be careful not to spread the chemical on the skin, especially the eyes. Immediately flood the affected body area in cold water for at least 15 minutes. Resume if pain returns. Wash off chemicals with a mild detergent and water, but do not use neutralizing chemicals, unguents, creams, lotions, or salves. Get medical attention as soon as possible.

#### B. Know the Spilled Materials

Your supervisor should make certain that the medical personnel understand exactly what chemicals are involved and that physicians, nurses, and paramedics recognize and use proper

treatment for that exposure. Preferably this should be ensured in advance of any potential emergency. The exact chemical name should be supplied. For example, exposure to hydrochloric acid is very different medically than exposure to hydrofluoric acid, yet both are sometimes called simply "acids".

### **6.3 CHEMICALS ON THE SKIN;**

Immediately flush with cold water for no less than fifteen minutes and wash with a mild detergent, preferably soap and water. If there is no visible burn, wash with warm water and soap, removing any jewelry to facilitate removal of any residual materials. If a delayed reaction is noted (often the next day), seek medical attention immediately and explain carefully what chemicals were involved.

### **6.4 CORROSIVE CHEMICALS;**

All chemicals should be treated with care, but acids and bases, especially in high concentrations, need to be handled with special care. If they are allowed to get on the skin, they can cause severe injuries. In reactions, they can generate excessive heat and pressure, causing equipment to be damaged, possibly leading to injuries as well.

Corrosive chemicals should always be transported in unbreakable safety carriers. Carts used for moving chemicals must have a lip to prevent accidents. Chemical splash goggles, aprons, and rubber gloves must be worn when handling corrosive chemicals. The goggles should be supplemented with a face mask where the probability of splashing exists.

If corrosive chemicals do get on the skin or in the eyes, the area should be immediately washed thoroughly with copious amounts of cool water, up to 15 minutes for the eyes. Promptly seek medical attention. Burns from acids are typically more painful than those from alkalis since acids precipitate a protein barrier on contact with tissue, which causes pain but also helps prevent further penetration of the tissue. Alkaline substances do not cause this barrier to be created which is less painful but also allows an alkaline burn to be more penetrating and possibly even more damaging.

The generation of heat is the basis of the familiar rule of always adding acid to water, never the reverse. The generation of localized heat could cause the boiling of solutions or the spattering of the hot liquid.

### **6.5 BROMINE ON THE SKIN;**

Flush with cold water as soon as possible and apply a compress saturated with a dilute thiosulfate solution. No other chemicals should be used either as a first aid or as a cleanup agent on the skin. Seek medical attention immediately.

## **6.6 HYDROGEN FLUORIDE ON THE BODY OR IN THE AIR;**

Hydrogen fluoride is a very serious hazard. Both its gas and solutions are toxic, and it is rapidly absorbed through the skin and deep into the body tissues, causing long-term excruciating pain and burns that are slow to heal. Prompt removal of contaminated clothing while the injured person is being flushed with water under a safety shower is essential. Continuous flushing with cool water is vital until any whitening of the tissue has disappeared. Swath the injured person with soaking wet, iced cloths. Wrap to protect from shock and exposure. Get immediate medical help. Under no circumstances should ointments be applied. Although immediate pain is felt from the concentrated acid, action of the acid may be insidious, and contact with less concentrated solution may go unnoticed for hours. In all cases of body contact with hydrogen fluoride obtain medical aid. Simple flushing with water does not remove hydrogen fluoride deep in the tissues, and additional treatment is required. (Whenever hydrogen fluoride is being used, medical personnel likely to be involved in treating victims of exposure should be alerted to the need for preparation of the special treatment that is promptly required.)

**ALL HAZARDOUS MATERIALS SPILLS AND ACCIDENTS MUST BE REPORTED TO THE DEPARTMENT OF HEALTH AND SAFETY.**

## **7. EMERGENCY PROCEDURES;**

### **7.1 WHEN AN EMERGENCY OCCURS;**

#### **A. Report**

Report the nature and location of the emergency to the appropriate fire (9-911), police (7234), Health and Safety (5433 - days, 7234 - nights and weekends) , or medical facility; give your name, telephone number, building and floor number, and an estimate of the type and amount(s) of hazardous materials involved (if known). Tell where you will meet the emergency vehicle. If individuals are involved, report how many, whether they are unconscious, burned, or trapped; whether an explosion has occurred; and whether there has been a chemical or electrical fire.

#### **B. Notify**

Notify others in the area and your supervisor about the nature of the emergency. Do not forget to notify staff members such as janitors and secretaries.

#### **C. Wait for Response Personnel**

Meet the emergency crews at the place you indicated in 7.1.A above. Send someone else if you cannot go.

#### **D. Leave Communication Lines Open**

Do not make any other telephone calls unless they directly relate to the control of the emergency.

**7.2 DO WHAT IS NECESSARY TO PROTECT LIFE WHILE WAITING FOR ASSISTANCE. KEEP CALM ;**

A. Safeguard Injured Personnel

Do not move any injured persons unless they are in further danger. Keep them warm. Unnecessary movement can severely complicate neck injuries and fractures.

B. Remove Contamination if Possible

If chemicals have been spilled on someone, get the individual under a shower or spigot to wash the affected area thoroughly. If chemicals are in the eyes, irrigate with plenty of cool water for at least 15 minutes. It is always a good idea to check for and remove any contact lenses before irrigation. However, contact lenses may be difficult to remove, and the irrigation must not be delayed. Seek immediate medical attention.

C. Cover Injuries

A blanket should be readily accessible for shock cases and for the protection of an injured person from exposure en route to medical aid.

D. Assist Personnel

If a person's clothing is on fire, douse the individual with water or wrap the person in a coat, blanket, or whatever is available to extinguish the fire, or roll the person on the floor, if necessary. Quickly remove any clothing contaminated with chemicals. Use caution when removing pullover shirts or sweaters to prevent contamination of the eyes. Douse with cool water to remove heat and place clean, wet, ice-packed cloths on burned areas. Wrap the injured person to avoid shock and exposure. Get medical attention promptly.

E. Put Out Fires If Possible

If there is a fire and there is little personal risk, use the proper extinguishers. If the fire is very small, it may be extinguished by smothering it with a nonflammable material such as an inverted beaker or watch glass. Fight the fire from a position of escape. Close fire doors. Do not use elevators to leave the building; use the stairs; and keep the lights on in your laboratory or work area.

F. Get Everyone to Fresh Air

Anyone overcome with smoke or fumes should be removed to uncontaminated air and treated for shock (provide oxygen inhalation, if possible).

#### G. Find Out the Materials Involved

If hazardous chemicals are ingested, encourage the victim to drink large amounts of water while en route to medical assistance. However, never give anything by mouth to an unconscious person. Attempt to learn exactly what substances were ingested and inform the medical staff (while the victim is en route, if possible).

#### H. CPR and Resuscitation

If the injured person is not breathing, provide mouth-to-mouth resuscitation. The following procedure is recommended: Place the person face up, clear the mouth of any obstruction, and loosen tight clothing. Lift the neck and tilt the head back, so the chin is pointing upward. Insert your thumb in the mouth, grasp the lower jaw, and lift it forcibly upward and forward. Pinch the nose and blow vigorously through the mouth to make the chest expand. Repeat every four to five seconds. If the victim's chest does not expand, recheck the mouth for any obstruction, tilt the head back farther, and resume blowing into the mouth.

#### I. Control Bleeding

If an individual is bleeding severely, control the bleeding by compressing the wound with a cloth or whatever is available. (WHENEVER ONE IS EXPOSED TO HUMAN BODILY FLUIDS, PRECAUTIONS MUST BE TAKEN TO PROTECT AGAINST POSSIBLE HIV OR HBV INFECTION, SEE UNIVERSITY BIOLOGICAL SAFETY MANUAL) Elevate the injury above the level of the heart. If blood is spurting, place a pad directly on the cut, apply firm pressure, wrap the injured person to avoid shock, and get immediate medical attention. In the case of a less severe cut, wash the cut and remove any pieces of glass, wrap the injured person to avoid shock (except in the case of a trivial cut), and get medical attention. A pressure pad may be applied firmly on the wound. Pressure points are tried before tourniquets. Tourniquets may be used by persons trained in first aid if the injury appears to be severe. Do not treat the cut yourself, not even to bandage it. Seek medical attention.

#### J. Watch Out for Live Circuits

Do not touch a person in contact with a live electrical circuit. **DISCONNECT THE POWER FIRST OR YOU MAY BE SERIOUSLY INJURED.**

#### K. Leave the Area if Directed

If you are directed to leave the room, promptly cease any additions of reagents or reactants, stop the experiment, turn off all burners or other energy-producing and energy-consuming devices (if practical), and immediately evacuate the area as directed.

#### L. Report the Incident

**ALL ACCIDENTS INVOLVING CHEMICALS MUST BE REPORTED TO THE DEPARTMENT OF HEALTH AND SAFETY.**

## APPENDIX;

**TABLE 1****COMPATIBLE CHEMICALS**

A common practice is to store all chemical materials alphabetically. However, in order to prevent unwanted reactions from occurring in a storage area, chemicals should be stored in compatible groups. The table below indicates which materials may be safely stored together. Within a group, materials may be stored alphabetically. This list is not intended to cover all materials. Please call DHS at 5433 for detailed information on specific compounds.

Chemical Group Name	Reactivity Group #	Do Not Store With Group #
INORGANIC ACIDS	1	2-8,10,11,12,13,15-18,20,21
ORGANIC ACIDS	2	1,3,4,7,13,15-18
CAUSTICS	3	1,2,6-8,12-17,19,21
AMINES AND ALKANOLAMINES	4	1,2,5,7,8,12-17,21
HALOGENATED COMPOUNDS	5	1,3,4,11,13,16
ALCOHOLS, GLYCOLS, GLYCOL Ethers	6	1,7,13,15,19,21
ALDEHYDES	7	1-4,6,8,14-16,18,19,21
KETONES	8	1,3,4,7,18,19
PETROLEUM OILS, SATURATED HYDROCARBONS	9	19
AROMATIC HYDROCARBONS	10	1,19
OLEFINS	11	1,5,19
ESTERS	12	1,3,4,18,19
MONOMERS, POLYMERIZABLE Esters	13	1-6,14,15,18,19,20,21
PHENOLS	14	3,4,7,13,15,18,19
ALKYLENE OXIDES	15	1-4,6,7,13,14,16-18,21
CYANOHYDRINS	16	1-5,7,15,18,21
NITRILES	17	1-4,15,21
AMMONIA	18	1,2,7,8,12-16,19,21
HALOGENS	19	3,6-14,18,20
ETHERS	20	1,13,19
ACID ANHYDRIDES	21	1,3,4,6,7,13,15-18

**TABLE 2**

**COMMON PEROXIDE FORMING MATERIALS**

Explosive peroxides may form in the following materials :

Acetal	Cellosolve (2-Ethoxy Ethanol)
Cumene	Cyclohexadiene
Cyclohexene	Decahydronaphthalene
Diacetylene	Dicyclopentadiene
Diethyl Ether	Diethylene Glycol
Dimethoxyethane	Dimethyl Ether (Diglyme)
Dioxane	Divinyl Acetylene
Ether (Glyme)	Ethoxyethyl Acetate
Ethylene Glycol Monoethyl Ether	Isopropyl Ether
Isopropyl Benzene	Isopropyl Alcohol
Methyl Acetylene	Tetrahydrofuran
Tetrahydronaphthalene	Vinyl Benzene (Styrene)
Vinyl Ethers	Vinylidene Chloride

Peroxides also form in the following chemical groups :

**DIENE ETHOXY METHOXY GLYME ISOPROPYL**

This list does not cover all materials known to form peroxides, but should serve as a conservative guide to alert personnel to the types of materials which possess this capability. For additional information on peroxide formers contact the DHS.

**TABLE 3**

**FLAMMABLE LIQUIDS CONTAINER REQUIREMENTS**

These are the maximum flammable liquids container sizes and required container materials for laboratories and for classrooms on the Oxford campus. Boiling Points (Bp) and Flash Points(Fp) are in Degrees Farenheit.

Classification	Fp	Bp	Container Requirements		
			Glass	Metal	Safety Can
Flammable Liquids					
Class 1A	Below 73	Below 100	1 Pint	1 Gallon	2 Gallons
Class 1B	Below 73	Above 100	1 Quart	5 Gallons	5 Gallons
Class 1C	73 - 100	N.A.	1 Gallon	5 Gallons	5 Gallons
Combustible Liquids					
Class 2	100 - 140	N.A.	1 Gallon	5 Gallons	5 Gallons
Class 3	140 - 200	N.A.	1 Gallon	5 Gallons	5 Gallons

N.A. = Not Applicable