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LABORATORY SAFETY GUIDELINE PROGRAM:

CHEMICAL HYGIENE PLAN

JULY 2013

TABLE OF CONTENTS

Jefferson Community College
Laboratory Safety Guideline Program:
Chemical Hygiene Plan

COMPOSITION OF THE COMMITTEE
The creation, implementation, and maintenance of the Chemical Hygiene Plan for Jefferson Community College is the responsibility of the Chemical Hygiene Officer and the Chemical Hygiene Committee. The Chemical Hygiene Officer is the Director of Facility Operations. The committee members are the Assistant Vice President for Math/Science, Technology, Health and Business; the Lab Science Department Chair; a senior faculty member from the Chemistry, Biology and Nursing Departments; the Laboratory Supervisor; and the Director of Facility Operations.

COMMITTEE MEETINGS
This committee will meet each semester to discuss matters that pertain to the Chemical Hygiene Plan.

REVIEW OF THE PLAN
Both the Chemical Hygiene Committee and the Chemical Hygiene Officer shall review changes and additions to the plan before they are incorporated into the plan.

REPORTING AN ACCIDENT
If an accident or chemical spill incident occurs, the procedures in the plan should be followed. In addition, a Jefferson Community College accident form should be completed, and distributed to, the Assistant Vice President for Math/Science, Technology, Health and Business, the Personnel Office, and the Health Office. The Personnel Office will be responsible for distributing a copy of the report to the Chemical Hygiene Officer. Any medical attention that is necessary should be sought at the most convenient medical facility. Follow-up consultations should be made with the physician that the employee chooses.

ORIENTATION TO THE PLAN
When appropriate, new employees will receive orientation to the Chemical Hygiene Plan before they assume their responsibilities. A member of the Chemical Hygiene Committee will conduct this orientation.

SAFETY DATA SHEETS
The Laboratory Supervisor shall maintain the Safety Data Sheets (SDS) and Globally Harmonized System of Classification and Labeling of Chemicals (GHS) for the Science Division. This information should be organized in such a manner that it is accessible by any person having the need to do so. The Chemical Hygiene Officer shall perform an audit of the Safety Data Sheets for chemicals on Campus.

I. GOAL OF LABORATORY SAFETY PROGRAM

The primary objective of this program is to provide a reference guide to laboratory workers who use, or potentially may be exposed to, hazardous substances which could endanger their health. Appropriate use of these procedures should eliminate hazards frequently associated with standard laboratory procedures. Only by conscious effort on the part of all laboratory personnel will a safer work environment be achieved.

No one is excluded from appropriate safety precautions. In particular, science and clinical faculty should serve as role models for their technical staff and students.

Support personnel in proximity to a laboratory may also be exposed to potential physical and chemical hazards associated with a laboratory. These individuals should also be informed and educated about the potential hazards present and what to do in the event of an accident or emergency.

Beyond the laboratory, there must be a sincere concern for the environment. Chemicals must be disposed of in a responsible and environmentally sound method that minimizes the potential harm from laboratory wastes. The College will use acceptable disposal methods for all hazardous substances. The increasing burden of chemical wastes

on the environment is well known and the associated costs of chemical disposal necessitate every effort to reduce, recycle, and reuse all our laboratory chemicals, whenever possible.

II. ENSURING LABORATORY SAFETY

The College is obligated to ensure a safe working environment. Essential to an effective departmental safety program is a Chemical Hygiene Officer. A Chemical Hygiene Officer is to have a background and training relevant to the activities and safety issues of the college. The duties of a Chemical Hygiene Officer are to:

1. Cooperate with administrators and other employees to develop and implement appropriate laboratory safety and hygiene policies and practices specific to their area.

2. Monitor the procurement, use, and disposal of chemicals used in the college.

3. Ensure that the appropriate audits, inventories, and inspections are performed.

4. Assist staff in developing the needed precautions to guarantee adequate facilities.

5. Maintain and disseminate current legal requirements for all regulated substances handled or used within the college.

To ensure safe conditions for laboratory personnel, a laboratory safety program should include:

1. Regular and frequent safety inspections.

2. Disposal procedures that ensure the removal of waste chemicals at regular intervals.

3. Safety training programs that ensure that all personnel are trained in the proper use of laboratory equipment, emergency equipment, and work procedures.

4. Periodic monitoring of ventilation systems to ensure adequate air quality.

All accidents and near accidents should be carefully investigated and analyzed to prevent possible reoccurrence.

The results of such findings and the corresponding recommendations for the prevention of similar occurrences should be documented and distributed to those who might benefit. The intent is not to find fault or fix blame, but rather to contribute towards a safer work environment.

III. GENERAL RECOMMENDATIONS FOR SAFER PRACTICES IN THE LABORATORY

The most important rule to ensure a safe work environment is that everyone involved in laboratory operations must be safety minded. Safety awareness can become part of the workplace attitude through repeated discussions, in-service training, as well as the sincere and demonstrated support of senior faculty, administrators, and staff. It is in everyone's best interest to carry out their own work in accordance with good health and safety practices.

While it is impossible to design a set of rules that encompasses all possible hazards and occurrences, some general guidelines are given here which experience has proven useful to avoid accidents or reduce injuries in the laboratory.

A. GENERAL SAFETY PRINCIPLES

Everyone in a laboratory should observe the following rules:

1. Understand and apply safety rules and procedures that apply to any work being performed. Determine potential hazards (physical, chemical, biological), and appropriate safety precautions to be followed before beginning any new task.

2. Be familiar with emergency procedures by knowing the location of emergency equipment, how to use it, and how to obtain help when needed. Be familiar with the College's Emergency Response Plan and the Emergency Reference Chart which is located in every room on campus.

3. Know the location of emergency exits.

4. Know the various types of protective equipment available. Use the proper type of personal protective equipment for a given task.

5. Be alert to unsafe conditions and work practices. Call attention to them so that appropriate corrections can be implemented as soon as possible.

6. Do not consume food or beverages in areas where chemicals and/or microorganisms are being used or stored.
7. Avoid hazards to the environment by following appropriate waste disposal procedures.

8. Be certain that all chemicals are correctly and clearly labeled. Post and date the designated warning signs or labels when specific hazards, such as radiation, flammable materials, biological hazards, target organs, and any other special hazardous conditions exist.

9. Check all burners and gas outlets to ensure that they are off before leaving the laboratory. Do not place burners by open windows or in a draft. No gas burner shall be left unattended while in operation.

10. Remain out of the area of a fire, chemical spill, or personal injury unless your assistance is required to help meet the emergency.

11. Use laboratory equipment only for its designated purpose.

12. Carefully position and secure equipment. Take the necessary steps to avoid the accidental jarring of an apparatus or piece of equipment. Use caution in handling hot objects.

B. HEALTH AND HYGIENE

The following health practices should be observed:

1. Wear appropriate eye protection, such as safety glasses, goggles, and/or face shields when working with chemicals, microorganisms, or dissections.

2. Use protective apparel, such as gloves, gowns, lab coats, and other special clothing or footwear as needed. It is vital that the possibility of skin contact with chemicals be minimized.

3. Confine long hair and loose clothing when in the laboratory.

4. Do not use mouth suction to pipette chemicals or to start a siphon. A pipette bulb, aspirator, or vacuum assisted pipette aid must be used for this purpose.

5. Avoid exposure to gases, vapors, particles, and aerosols. Use a fume hood whenever such exposure is likely. Appropriate personal protective equipment must be used when work is not conducted under a fume hood. Since the dose determines the hazard, all chemicals that are distributed by the stockroom and that have any kind of respiratory hazard, be prepared

and used under a fume hood. In an emergency situation, if the parts per million of a chemical is considered to be above a safe limit, personnel should leave the area and contact the manufacturer, security, and the local hazardous material team.

6. Wash your hands frequently and thoroughly during the day and especially before eating or before leaving the laboratory. Avoid the use of solvents for washing the skin. Solvents tend to remove the skin and can cause irritation and inflammation. In some cases, washing with a solvent facilitates absorption of toxic chemicals or has a potential health effect itself.

7. Do not attempt to identify chemicals by smell or taste.

8. Minimize your exposure to chemicals by protecting the appropriate route(s) of entry (inhalation, ingestion, injection, and absorption).

C. FOOD, BEVERAGES, AND CHEMICAL CONTAMINATION

The contamination of food and drink is a potential route for exposure to toxic substances. Food must be stored, handled, and consumed in an area entirely free of hazardous substances.

1. Consumption of food or beverages must not be permitted in areas where laboratory operations are being conducted.

2. Glassware or utensils for laboratory operations must never be used to prepare or consume food or beverages. Laboratory refrigerators, ice chests, cold rooms, must not be used for food storage. Separate equipment must be dedicated to that use, and prominently labeled.

D. HOUSEKEEPING

There is a definite relationship between safety performance and orderliness in the laboratory. Where housekeeping standards are lax, safety performance inevitably deteriorates. The work area must be kept clean, with chemicals and equipment properly labeled and stored.

1. Work areas must be kept clean and free from obstructions. Cleanup will follow the completion of any experiment or, at the very least, at the end of each day.

2. Spilled chemicals must be cleaned up immediately and disposed of properly. Disposal procedures must be followed and all laboratory personnel must be informed of them. Chemical accidents and spills are to be attended to promptly.

3. Unknown chemicals and chemical wastes are to be disposed of promptly, using the appropriate procedures. Waste must be deposited in appropriate receptacles.
4. Floors are to be cleaned regularly and kept free of clutter.

5. Stairwells and hallways are not to be used for storage.

6. Access to exits, emergency equipment, valves, controls, and electrical panels must not be blocked.

E. LABORATORY EQUIPMENT MAINTENANCE

Good equipment maintenance is important to maintain a safe and efficient work environment. Equipment must be inspected and maintained regularly.

F. GLASSWARE

Accidents involving glassware are a leading cause of laboratory injuries.

1. Careful handling and storage procedures must be used to avoid damaging glassware. Damaged items are to be discarded or repaired. Inspect all glassware before use. Do not use if broken, chipped, or badly scratched. If it cannot be repaired, discard in containers specifically designated to dispose of broken glass.

2. Adequate hand protection must be used when inserting glass tubing into rubber stoppers or corks, or when placing rubber tubing on glass hose connections. Tubing should be fire polished or rounded and lubricated, and hands should be held close together to limit movement of glass should breakage occur. The use of plastics, rubber, or metal connectors should be considered.

3. All pieces of broken glass should be swept up with a brush into a dustpan designed for broken glass. All broken glass requires special handling and disposal procedures to prevent injury, not only to lab personnel, but to members of the facilities staff as well.

4. Proper instruction must be provided in the use of glass equipment designed for specialized tasks.

G. PROTECTIVE APPAREL AND EQUIPMENT

A variety of specialized clothing and equipment is available for use in the laboratory. The proper use of these items will minimize or eliminate exposure to the hazards associated with most laboratory procedures. All laboratory personnel must be familiar with the location and proper use of protective apparel, safety equipment, and emergency procedures.

Each biology and chemistry laboratory should include:

1. Protective apparel and equipment recommended for the substance being handled.

2. An accessible drench-type safety shower, or a means of providing flushing for chemical splashes, as an immediate first aid treatment.

3. An eyewash fountain or self-contained eyewash station.

4. An appropriate fire extinguisher for the type of fire hazards present in the laboratory. Be aware that combustible metals require specialized fire- fighting materials (Class D Fires).

5. A chemical spill kit for small spills.

6. Access to a fire alarm and a telephone for emergency use.

7. UV cabinet for sanitizing safety goggles.

H. CRYOGENIC HAZARDS

A number of hazards may be present from the use of cryogenic materials in the laboratory. Employees should be properly trained in these hazards prior to use. The transfer of liquefied gases from one container to another should not be attempted for the first time without direct supervision and instruction of someone experienced in the operation.

The primary hazard associated with cryogenic materials is the extreme cold and potential for thermal burns. These burns can be quite severe. Prolonged contact may result in blood clots that have potentially serious consequences.

1. Gloves and a face shield are required when preparing or using dry ice or liquid nitrogen.

2. Neither liquid nitrogen nor liquid air will be used to cool a flammable mixture in the presence of air because oxygen can condense from the air and lead to a potentially explosive condition.

3. Insulated gloves must be used when handling cryogenic material.

4. Avoid lowering your head into a dry ice chest; carbon dioxide is heavier than air and suffocation may result.

5. Appropriate impact resistant containers (Dewar) that have been designed to withstand the extremely low temperatures, must be used.

I. SYSTEMS UNDER PRESSURE

Adequate ventilation must always be used to prevent buildup of vapors or flammable gases such as hydrogen, methane, and acetylene.

Adequate ventilation is also required when using gases such as nitrogen, helium, or hydrogen. In these cases, oxygen can be condensed out of the atmosphere creating a potential for explosive conditions.

1. Reactions must never be carried out in an apparatus that is NOT designed to withstand pressure.

2. All pressurized apparatus MUST have an appropriate relief device.

3. Heat must never be added to an apparatus that is not designed to withstand heating.

4. If a reaction system cannot be vented directly, an inert gas purge and bubblier system should be used to avoid pressure build up.

J. WARNING SIGNS AND LABELS

Laboratory areas that have specific hazards must be posted with warning signs.

1. Use standard signs and symbols that have been established for special situations (i.e. radioactivity hazard, biological hazard, fire hazard, and laser operations).

2. Post signs that show locations of emergency equipment. For example, a safety shower, fire extinguisher, eyewash station, and first aid.

3. Waste containers must be labeled to indicate the type of waste that can be safely deposited.

4. It is the duty of laboratory supervisors and faculty to ensure that all chemicals are labeled properly.

5. All laboratories must post signs indicating where the Safety Data Sheets (SDS) are located and identify the Chemical Hygiene Officer and how he/she may be reached.

K. UNATTENDED OPERATIONS

On rare occasions, it may be necessary to carry out laboratory experiments overnight or run equipment continuously. In these situations it is necessary to plan for interruptions in utilities, such as electricity or water. Such unattended operations must be designed safely, and contingencies provided for potential problems and hazards that may result. Appropriate signs indicating that a particular laboratory operation is in progress must be posted with the name and phone number of the person to contact in an emergency.

L. LABORATORY SECURITY

For the protection of employees, equipment, supplies, and the public, laboratories will be closed and locked when unattended and not in use.

Security within the lab is also important. Locked storage cabinets are advised for sensitive or expensive supplies and equipment. Lockable storage areas or lockers for securing personal property are advised.

Computers and scientific equipment can be the object of theft, vandalism, or damage from fire or utility failure. Appropriate cabinetry designed to protect these items should be considered.

If you observe suspicious persons or activities in your area, contact Campus Security and they will investigate. Also, report all thefts or other crimes immediately. Information from these reports is used to adjust security activities and may prevent further problems.

IV. INFORMATION AND TRAINING

All laboratory personnel will be required to view the "Hazard Communication" presentation annually in order to remain informed of possible chemical hazards in the workplace. In addition, all laboratory personnel are presented with the current version of the Chemical Hygiene Plan.

All laboratory personnel will be informed via SDS sheets of the permissible exposure limits for OSHA regulated substances, other hazardous chemicals and the signs and symptoms associated with exposure to hazardous chemicals.

The laboratory supervisor will train laboratory personnel on the applicable details of the *Laboratory Safety Guideline Program: Chemical Hygiene Plan* which will include but not be limited to:

1. Methods and observations that may be used to detect the presence or release of a hazardous chemical.

2. The physical and health hazards of chemicals found in the laboratory and the various means by which laboratory personnel can protect themselves from
these hazards. Information and training is to be provided at the time of an employee's initial assignment, and prior to assignments involving new exposure situations. Refresher information should be provided on a routine basis and retraining should be conducted every two years.

V. LABORATORY VENTILATION

The best way to prevent or reduce exposure to airborne substances is to control their escape into the work environment by the use of hoods and other ventilation systems.

The two basic types of laboratory ventilation are general dilution and local exhaust ventilation.

A. GENERAL DILUTION VENTILATION

General dilution ventilation refers to the quantity and quality of air supplied. For example, exchanging indoor air with outdoor air. Laboratory air should be replaced continuously (approximately six to twelve air changes

per hour) so that the concentrations of air contaminants are continuously diluted.

General dilution ventilation should NOT BE RELIED ON FOR PROTECTION FROM TOXIC SUBSTANCES RELEASED INTO THE LABORATORY. General dilution ventilation provides only modest protection against toxic gases, vapors, aerosols, and dusts. It is an inefficient way to control highly toxic contaminants because of the amount of air exchange necessary to achieve dilute concentrations within acceptable ranges.

Laboratory air should not be recycled. General dilution ventilation is intended to increase the comfort of the laboratory environment and to serve as a source of airflow through the ventilation system and through dedicated systems, such as fume hoods.

B. LOCAL EXHAUST VENTILATION (LEV)

Local Exhaust Ventilation is a system designed to exhaust contaminants captured near their source without allowing them to escape and disperse into the laboratory atmosphere. Laboratory hoods use LEV to prevent harmful dusts, mists, fumes, as well as toxic gases and vapors from entering the laboratory.

Laboratory hoods offer other types of protection as well. A chemical reaction system located within a hood, with the hood sash correctly lowered, places a physical barrier between the worker and the chemical reaction system. This physical barrier will provide protection from hazards such as chemical splashes, spills, sprays, fires, and minor explosions from an uncontrolled reaction.

C. MODIFICATIONS

Any modification of the existing ventilation system is permitted only if the proper function of the system is not compromised, and the laboratory environment continues to be protected from toxic airborne substances.

D. QUALITY

Airflow through the laboratory should be relatively uniform throughout the laboratory with no high velocity or static areas. Air flow into and within a fume hood should be uniform. The measured face velocity at the fume hood sash is to be approximately 100-120 cubic feet per minute with the sash approximately twelve (12) inches above the fully closed position.

E. EVALUATION

The ventilation system must be evaluated on installation.

F. INSPECTION, MAINTENANCE, AND TROUBLESHOOTING

Local exhaust ventilation systems should be thoroughly inspected on a regular basis (annually). Inspections should include all the associated equipment as well as a review of the operation, exposure level measurements, and air flow measurements.

G. INSTALLATION AND MAINTENANCE

With proper design, use, and maintenance of ventilation systems, an effective and efficient control of occupation health hazards can be achieved. Consulting engineers and vendors should be chosen from those having broad experience in designing ventilation systems for health-hazard control.

H. WORK PRACTICES FOR LABORATORY HOODS

A properly designed hood in a properly ventilated room can provide adequate protection when certain work practices are followed. The following work practices must be followed in order for a hood to perform capably and to provide maximum protection to the worker.

1. Conduct all operations that may generate air contaminations at or above the Threshold Limit Value (TLV) inside the hood.

2. Keep all apparatus at least six inches back from the face of the hood. A stripe on the bench surface is a good reminder.

3. Do not put your head in the hood when contaminates are being generated.

4. Do not use the hood as a waste disposal mechanism except for very small amounts of volatile materials.

5. Do not store chemicals or apparatus in the hood.

6. Keep the hood sash closed as much as possible.

7. Keep the slots in the hood baffles free of obstruction by apparatus or containers.

8. Minimize foot traffic past the face of the hood.

9. Keep laboratory doors closed.

10. Do not remove hood sash or panels.

11. Do not place electrical receptacles or other sparks source inside the hood when flammable liquids or gases are present.

12. Use appropriate barricade if there is a chance of explosion or eruption.

13. Provide maintenance for the hood exhaust system and the building supply system.

14. Working sash height (approximately a maximum of 12 inches) should be labeled.

15. Always assure the hood is operational before initiating an experiment.

VI. HANDLING CHEMICALS IN THE LABORATORY

All employees are required to view the Hazard Communication presentation on an annual basis.

The diversity of laboratory chemicals found are as varied as the purposes for which they are used. For this reason, general precautions for handling categories of chemicals are more appropriate than specific guidelines for each separately. Nevertheless, all laboratories have available Safety Data Sheets (SDS) and/or GHS sheets for all hazardous and toxic substances used, handled, and stored within the work area. They are readily available for employees and visitors during customary working hours. Employees may also access SDS and/or GHS information via the College's computer network share file or the online system.

Further, all laboratories will post a chemical code sheet for the stock solutions and mixtures utilized within the work area.

A. ACUTE AND CHRONIC EXPOSURE

Recommendations for handling procedures for chemicals begin with the admonition that, even for substances with no known significant hazards, it is prudent to observe good laboratory practices, minimizing exposure by working in an exhaust hood, wearing eye and hand protection, as well as a laboratory coat or apron.

The toxicity of a substance is determined by its ability to damage or interfere with the structure or function of living tissue. An acute exposure is one which can cause damage as the result of a single or short duration exposure. Chronic exposure is one that causes damage after repeated or long duration exposure, or becomes evident only after a long period of latency.

The Occupational Health and Safety Administration (OSHA) has established specific regulations regarding the handling of certain compounds designated as carcinogenic. Anyone contemplating work or who work with materials on the list should consult the regulations, and notify the Chemical Hygiene Officer for the necessary approvals, training, working conditions, monitoring, record keeping, and medical surveillance.

The Federal Government has issued very detailed regulations for the 25 chemicals listed below. Any laboratory personnel who use or handle any of these chemicals should contact the Chemical Hygiene Officer for detailed information.

2-Acetylaminofluorence	4-Dimethylaminoazobenzene
Acrylonitrile	Ethyleneimine
4-Aminodiphenyl	Ethylene Oside (ether)
Asbestos	Inorganic Arsenic
Benzidine	Lead
Bis-Chloromethyl Ether	Methyl Chloromethyl Ether
Coke Oven Emissions	Alpha-Naphthylamine
Coal Tar Pitch Volatiles	Beta-Naphthylamine
Cotton Dust	4-Nitobiphenyl
1, 2-Dibromo-3-Chloropropan	4-Nitrosodimethylamine
3, 3' -Dichlorobenzidine	Beta-Propiolactone (and its' salts)
Vinyl Chloride	Formaldehyde

As of January 2013, the College has only two of the above listed chemicals in its inventory: Alpha-Naphthylamine and Lead (approximately 25 grams).

As with any chemical, it is imperative that the Safety Data Sheet (SDS) be consulted before using for proper handling precautions.

B. PROCUREMENT

Before a substance is received, those who will be handling and using the substance should know information on its proper handling, storage, and disposal. No containers are to be accepted without a proper identifying label. Whenever possible, a less hazardous or toxic chemical should be substituted.

C. TRANSPORT

Transporting hazardous substances from one location to another is a serious safety and health issue. Employees, other than those knowledgeable about their use and the handling of leaks or spills, could be unduly exposed through carelessness or neglect. For these reasons, extra precautions are not only prudent, but also necessary.

Since chemical transport is unavoidable, it is essential that unbreakable materials such as Nalgene™ jugs or other containers approved for flammables are to be used to transport bulk amounts of flammable liquids, such as ethanol. Ideally, chemicals such as acetone should be kept in their original metal cans. The lids for such containers should be inspected to insure their integrity. A suitable cart should be used to help transport these chemicals safely. Flammable chemicals supplied in glass containers should be protected with bottle carriers. This is especially true for corrosive materials or noxious organics, such as formaldehyde.

D. STORAGE

The correct storage of chemicals has become increasingly important to maintain a safe working environment, particularly when the number of chemicals in use increases and their possible toxicity becomes known.

Problems related to chemical storage can be significantly reduced, however, by following principles of LIMITING and SEGREGATING the chemicals.

1. Toxic substances should be segregated from other chemicals in an identified area with local exhaust ventilation.

2. Chemicals that are considered highly toxic, carcinogenic, or otherwise hazardous should be placed in an unbreakable secondary container and properly labeled.

3. Stored chemicals should be examined at least on an annual basis for deterioration, container integrity, and possible replacement.

4. The amount of chemicals being stored should be as small as practical.

5. Storage on bench tops and in hoods is prohibited.

6. Do not store bottles on the floor or in carts.

7. Exposure of chemicals to heat and direct sunlight should be avoided.

8. A periodic (annual) chemical inventory should be conducted with proper disposal of unneeded chemicals (also on an annual basis).

E. DESIGNATED AREA

Laboratories working with carcinogens, reproductive toxins, or substances that have a high degree of acute toxicity must establish a "Designated Area." A "designated area" may be an area of the laboratory or a device such as a laboratory hood.

The purpose of the "designated area" is to focus attention on the fact that a particular hazardous substance is being used and to ensure, when necessary, employees working in or near the vicinity are observing appropriate protective measures. "Designated Areas" must be identified by signage.

VII. CHEMICAL HAZARDS

A number of routine procedures in a laboratory involve the use of corrosive, toxic, reactive, or flammable chemicals. These chemicals should be appropriately labeled to indicate the hazards. Read the chemical labels and observe the precautions.

A. CLASSIFICATION

Dangerous chemicals may be grouped into the following:

1. Caustic or corrosive: Acids and alkalis may cause burns of the skin, mouth, lungs, or eyes and may cause irreversible damage to equipment and storage areas.

2. Toxic chemicals: Almost any substance in sufficient quantity can be considered toxic. Toxic chemicals are those that damage biological structure and function through exposure or accumulation in tissues. Usually, this involves relatively small amounts of the toxin, although any chemical can be toxic in sufficient quantity.

3. Carcinogens: Substances designated by the Occupational Safety and Health Administration (OSHA) (29 CFR Part 1910, Subpart Z) as being a carcinogen requires special handling. Specific authoritative sources such as the Registry of Toxic Effects of Chemical Substances (RETECS), the National Toxicology Program (NTP), the Annual Report on Carcinogens, and the International Agency for Research on Cancer (IARC) Monographs serve as primary sources of toxic chemical information. [Note: OSHA 29 CFR Part 1910, Subpart Z is available at www.regulations.gov – 600+ pages)

4. Flammables: Flammables are materials that may easily ignite, burn, and serve as fuel for a fire.

5. Reactives: Reactives are materials that may release large amounts of energy under special circumstances.

B. CAUSTICS AND CORROSIVES

Contact with the skin or eyes represent the greatest risk when dealing with corrosives. Match the hazard presented by the material you are working with the protective equipment recommended by the SDS. Always wear resistant gloves and eye protection when dealing with corrosives. In some cases, this may also include respiratory protection.

GENERAL FIRST AID CONSIDERATIONS FOR CORROSIVES

In the event that a corrosive contacts the skin, remove any contaminated clothing and immediately flush the area with copious amounts of tap water, using care not to rub or damage the skin. Notify your supervisor and seek medical attention, as needed.

In the event that a corrosive chemical contacts the eyes, they must be immediately flushed with large amounts of clean water, including under the eyelids for at least 15 minutes. Seek immediate medical attention. AVOID WEARING CONTACT LENSES WHILE WORKING WITH CORROSIVE MATERIALS! If a corrosive material is ingested do not induce vomiting and seek immediate medical attention through the emergency room.

HANDLING

1. Plan ahead for problems. Make yourself aware of the nearest eyewash station and safety shower in your work location. Wear a suitable apron, resistant gloves, and appropriate eye protection when handling corrosive materials.

2. If acids or alkalis are used, some form of containment to control breaks and spills must be employed. Included among these methods are bench top spill diapers and resistant trays.

3. Do not pipette by mouth. Use a mechanical or vacuum-assisted pipette aid.

4. Dilution of acids. Always add ACID to WATER, never add water to acid. Allow the acid to run down the side of the container and mix slowly by gentle rotation.

5. Become aware of the methods, materials, and procedure for cleaning up corrosive spills. In the event of a significant spill beyond your immediate ability to control, notify the laboratory supervisor.

STORAGE

1. Store corrosives in a cool, dry, and well-ventilated area away from direct sunlight. Use storage materials that are resistant to corrosion. Store caustic and corrosive materials near the floor to minimize danger of bottles falling from shelves. Large amounts of corrosive chemicals may require a dedicated corrosive cabinet.

2. Segregate acids from bases. Store chemicals according to their primary hazard classification. Isolate corrosives from organic materials, flammable materials, and toxic materials.

3. Separate containers to facilitate handling. Organic acids (acetic acid and acetic anhydride) are to be stored separately from strong oxidizing agents (sulfuric, nitric, or perchlorate) to prevent interaction of fumes and corrosion of storage cabinets.

4. Acid bottle carriers must be used for containers over one quart in size.

C. TOXIC CHEMICALS

HANDLING AND STORAGE

1. Isolate, segregate, and clearly label all toxic chemicals.

2. Adequate room ventilation must be provided at the worksite area. A fume hood must be used whenever possible.

3. The appropriate personal protective equipment must be worn as directed by the label or SDS.

4. Limit exposure time.

5. Practice good personal hygiene (hand-washing, wearing a lab coat).

MERCURY

Special consideration must be given to this toxic chemical.

1. Avoid or minimize spills of mercury as much as possible.

2. CLEAN UP SMALL GROSS spills with a pipette or "Sweeper." Ventilate area well to remove mercury vapors. Large spills (>1 ml) should be referred to the laboratory supervisor.

3. Chronic exposure and absorption of mercury may lead to a metallic taste in the mouth, a "lead line" (gray line) around gums, and neurological problems (irritable, hyperreflixic, comatose).

4. Do not place elemental mercury waste in drains. Contact the laboratory supervisor for proper disposal.

D. CARCINOGENS

Carcinogens are a class of toxic chemicals capable of increasing the risk of cancer(s) through exposure, usually over time. Teratogens are toxic chemicals capable of causing an increased risk of birth defects in children of exposed workers.

Prudent practices must be used in dealing with known or suspected carcinogens. The key is to reduce your exposure to these chemicals to within the accepted guidelines and to the lowest possible level through good work habits and common sense.

In many cases, the greatest potential harm is a result of repeated, prolonged exposure to these chemicals.

Other behaviors such as diet and cigarette smoking can contribute to the synergistic or antagonistic effects of carcinogenic materials.

Plan ahead for problems with carcinogenic compounds. A protocol should exist for handling, storing, disposal, and emergency procedures to be followed.

Be aware that certain toxic/carcinogenic chemicals may require special record keeping for personal exposure or may have special provisions identified in the OSHA subpart "Z" Substance List.

E. FLAMMABLES

Flammable chemicals represent a major safety concern because of the immediate physical danger that these materials present to all employees. Our primary interest is in reducing the chance of fire involving these materials. In addition, many flammable chemicals have associated health risks as well.

Organic solvents are the most commonly encountered flammable chemicals.

Organic solvents produce vapors capable of mixing with air and only require an ignition source to start a fire. The proper storage and handling of flammable chemicals is essential to fire prevention.

HANDLING AND STORAGE

1. Use small volumes of solvents (100 ml or less) when performing routine tasks. Store larger amounts in approved flammable containers. Never store flammables with reactive chemicals.

2. Transfer solvents in a working fume hood or well-ventilated area. There are to be no open flames.

3. Use solvents at temperatures 10 to 15 degrees below their flashpoint, if possible.

4. Use the necessary grounding on all large drums used for storage or dispensing of solvents. Ensure that all containers are labeled.

5. Plan ahead and note the location and type of fire-fighting equipment needed for your particular situation. Flammable liquid fires are Class B fires. Moreover, note the location of fire blankets and other equipment used to deal with fire hazards.
6. Remember that flammable liquids may have other health consequences as well. Prudent practices need to be observed in storing and disposing of flammable liquids.

7. Quantities of one gallon or more must be stored in a safety can. If a reagent must be stored in glass for purity, the glass container should be placed in a bottle carrier to lessen the danger of breakage.

8. Small quantities (working amounts) may be stored on open shelves, but bulk storage (more than one gallon) must be in a designated flammable storage cabinet.

Container Size for Storage of Flammable and Combustible Liquids

	Flammable Liquids[a]						Combustible Liquids[b]			
	Class IA		Class IB		Class IC		Class II		Class IIIB	
Container	Liters	Gallons	Liters	Gallons	Liters	Gallons	Liters	Gallons	Liters	Gallons
Glass[c]	0.5	0.12	1	0.25	4	1	4	1	4	1
Metal or approved plastic	4	1	20	5	20	5	20	5	20	5
Safety cans	7.5	2	20	5	20	5	20	5	20	5

NOTE: Label safety cans with contents and hazard warning information. Safety cans containing flammable or combustible liquid waste must have appropriate waste labels. Place 20-L (5-gallon) and smaller containers of flammable liquids that are not in safety cans into storage cabinets for flammable liquids. Do not vent these cabinets unless they also contain volatile toxics or odoriferous chemicals. Aerosol cans that contain 21% (by volume), or greater, alcohol or petroleum base liquids are considered Class IA flammables. When space allows, store combustible liquids in storage cabinets for flammable liquids. Otherwise, store combustible liquids in their original (or other Department of Transportation-approved) containers according to Table 4.2. Store 55- gallon drums of flammable and combustible liquids in special storage rooms for flammable liquids. Keep flammable and combustible liquids away from strong oxidizing agents, such as nitric or chromic acid, permanganates, chlorates, perchlorates, and peroxides. Keep flammable and combustible liquids away from ignition source. Remember that most flammable vapors are heavier than air and can travel to ignition sources.

[a] class IA includes those flammable liquids having flashpoints below 73ºF and having a boiling point below 100ºF, Class IB includes those having flashpoints below 73ºF and having a boiling point at or above 100ºF, and Class IC includes those having flashpoints at or above73ºF and below 100ºF.

[b] Class II includes those combustible liquids having flashpoints at or above 100ºF and below 140ºF, Class IIIA includes those having flashpoints at or above 140ºF and below 200ºF, and Class IIIB includes those having flashpoints at or above 200ºF.

[c] Glass containers as large as 1 gallon can be used if needed and if the required purity would be adversely affected by storage in a metal or approved plastic container, or if the liquid would cause excessive corrosion or degradation of a metal or approved plastic container.

Source: NFPA (1991c), Chapter 7-2.3, "Storage" and Prudent Practices in the Laboratory: Handling and Disposal of Chemicals, Board on Chemical Sciences and Technology, Commission on Physical Sciences, Mathematics, and Applications, National Resource Council. National Academy Press, Washington, D.C., 1995, page75.

REFRIGERATION AND COOLING EQUIPMENT

The use of domestic refrigerators for the storage of typical laboratory solvents presents a significant hazard to the laboratory work area and this practice is prohibited.

According to National Fire Protection Standard 99 10-1.2.5, Class I flammable or combustible liquids are not allowed to be stored in any type of refrigerator.

Only explosion-proof or explosion-safe refrigeration equipment that has been approved by an authorized testing laboratory such as FM or UL is to be used. Explosion-proof refrigeration equipment is designed to protect against ignition of flammable vapors both inside and outside the refrigeration compartment.

Flammable materials that require cold storage will be stored in the explosion-proof refrigerator in 2-104 A.

F. REACTIVES

Reactive chemicals are characterized by their tendency to release large amounts of energy under certain conditions.

In many cases, the catalyst for these reactions is found in the everyday environment and special precautions need to be observed to safely use and store these materials. Included in the reactive category are explosives, water reactive materials, air sensitive materials, and mixtures of oxidizing agents and reducing agents.

HANDLING AND STORAGE

1. Know the specific properties of the materials you will be working with prior to initiating your work.

2. Ensure adequate protection against shock, extremes in temperature, other reactive chemicals, and sources of potential ignition.

3. Segregate oxidizers from reducers. Store reactive chemicals according to their primary hazard classification.

4. Isolate reactive chemicals from toxic materials and flammables.

5. Use adequate personal protective equipment. Many reactive chemicals liberate toxic fumes or gases. Small, easily-managed amounts must be used in a ducted fume hood.

Ensure that everyone in the work place is aware of the hazards associated with any reactive chemicals that you are working with and the necessary course of action is understood should you have a problem. This should include what to do in the event of a spill, special fire protection equipment that may be required, and antidotes that may be needed.

VIII. COMPRESSED GASES

Compressed gases are used in the chemistry lab and maintenance area. Regardless of the use or content of the cylinder, compressed gas cylinders represent a serious health and safety hazard. An improperly handled cylinder could result in serious injury or death through the sudden release of a gas that could create an enormous fire and explosion hazard in a matter of seconds. A toxic gas or reactive gas suddenly released into an area could result in asphyxiation. Even a "harmless" gas could create such high concentrations that it would be impossible to breathe.

Moreover, a compressed gas cylinder is a potential projectile or bomb if not properly secured.

A. GENERAL GUIDELINES FOR HANDLING COMPRESSED GASES

These guidelines must be followed for all compressed gas cylinders used at the College.

1. Compressed gas cylinders must be firmly secured at all times using chains or clamps. Compressed gas cylinders are to be located away from traffic areas and clearly labeled as to the content.

2. The correct cylinder valve is to be used for the particular gas in use. Valve threads may be right-handed for non-fuel gases and left-handed for fuel gases. Cylinders not in use are to be capped.

3. Transport gases with an approved cart or hand truck. Never roll or scoot a gas cylinder. Do not lift cylinders by the cap.

4. Keep an unregulated cylinder valve closed at all times. Open the main valve only to the extent necessary and regulate the gas flow using the regulator. Ensure adequate ventilation and precaution when using hazardous gases. Report leaking gas cylinders to the laboratory supervisor. A leaking cylinder should be removed to an outdoor location.

5. Containers must be marked clearly with the name of the contents.

6. Do not use oil, grease, or lubricants on valves, regulators, or fittings.

7. Do not attempt to repair damaged cylinders or to force frozen cylinder valves.

8. Before removing the regulator, close the cylinder valve first, then release all pressure from the regulator.

9. Cylinders that are not necessary for current needs shall be stored in a safe location outside the laboratory work area.

B. FLAMMABLE GASES

Special care must be used when gases are used in confined spaces.

1. No more than two cylinders should be manifold together. Several instruments or outlets are permitted for a single cylinder.

2. No more than one cylinder of highly flammable gas may be in a room without specific review by the Chemical Hygiene Officer.

3. Cylinder size is limited to 200 cubic feet.

4. Valves on all flammable gas cylinders shall be shut off when the laboratory is unattended.

C. ATTACHING REGULATORS

1. Cylinder throats and surfaces must be clean and tightly fitted. Do not lubricate.

2. Tighten regulators and valves firmly with the proper size wrench. (Do not use pliers. They may damage the nuts.) Do not force fittings to ensure a tight seal.

3. Open valves slowly. Do not stand directly in front of gauges (the gauge face may blow out). Do not force valves that "stick."

4. Check for leaks at connections. Leaks are usually due to damaged faces at connections or improper fittings. Do not attempt to force an improper fit. (It may only damage a previously undamaged connection and compound the problem.)

5. Valve handles must be left attached to the cylinders.

6. The maximum rate of flow should be set by the high-pressure valve on the cylinder. Fine tuning of flow should be regulated by the needle valve.

7. Shut off cylinder when not in use.

D. LEAK TESTING

Cylinders and connections should be tested by "SNOOP"™ or a soapy water solution. Test the cylinders before regulators are attached and again after the regulators or gauges are attached.

E. EMPTY CYLINDERS

1. Must be marked as empty.

2. Empty or unused cylinders must be returned promptly.

3. Replace valve safety caps.

F. CRYOGENIC LIQUIDS

1. Store in well-ventilated area to prevent displacement of air.

2. Use only approved storage vessels having fittings to relieve pressure.

3. Always wear eye protection, preferably a face shield.

4. Always wear hand protection, preferably heavily insulated gloves.

IX. BREAKS AND SPILLS

A. PRELIMINARY CONSIDERATIONS

Responding to chemical spills in the laboratory is a likely and foreseeable event for anyone who handles chemicals. Regardless of the chemical(s) involved, your response to a chemical spill must be appropriate and prompt. All significant chemical spills, aside from the routine, must be reported to the laboratory supervisor.

You should never attempt to clean up a spill of an especially hazardous substance, such as a chemical with a TLV (threshold limit value) of less than 50 ppm, regardless of the amount. **NEVER** attempt to clean up a chemical spill if you are uncertain as to how to do so safely or lack the proper protective equipment. Contact the lab supervisor for assistance.

Safely handling a small chemical spill (less than one liter) in the laboratory is easily accomplished provided that you have the proper materials and appropriate training. Commonly encountered spills include acids and bases, polar and non-polar solvents.

There are two basic options available to you when handling a chemical spill. The first is chemical absorption and the second is neutralization.

ABSORPTION

For most organic solvents (either water soluble or non-soluble) it is best to collect the spilled liquid by absorbing it with a dry absorbent. In doing so, absorption reduces the chance of fire by suppressing flammable vapors and collecting the spilled liquid. The resulting waste is still hazardous and must be properly bagged and stored for disposal.

NEUTRALIZATION

Most common laboratory acids and bases can be safely neutralized by the proper use of a commercially prepared neutralizer. These neutralizers contain pH indicators that allow you to know when the neutralization process is complete. It is important that you follow the directions that accompany each neutralizer carefully and avoid over-neutralization.

Whereas most neutralized acids and bases are no longer hazardous, the resulting liquid waste can be disposed of via a laboratory sink.

In the event of a major spill or one that involves an especially hazardous chemical, you should leave the area and report the spill immediately.

Be prepared to report the location, chemical, and amount spilled. Evacuate the area and let the lab supervisor clean up the spill.

B. FIRST RESPONSE TO CHEMICAL CONTACT

1. Skin, eye, or mouth contact: Wash the affected area immediately with copious amounts of fresh clean water for at least fifteen minutes, and then seek medical attention through the local hospital's emergency room.

2. Chemical contamination of clothing: Take the item of clothing off immediately to avoid soaking through to the skin.

3. Contain chemical spills with sand or an absorbent material. Wash the contaminated area thoroughly after clean-up. Collect the contaminated materials and store them in a suitable container for disposal.

C. TYPICAL CONTENTS OF A CHEMICAL SPILL KIT

2	pounds of acid neutralizer	1	set of spill waste disposal labels
2	pounds of base neutralizer	2	waste disposal bags
5	pounds of clay absorbent for organic solvents	4	chemical sorbent sheets
		1	pair goggles
1	pair nitrile gloves		

X. MEDICAL CONSULTATION AND MEDICAL EXAMINATION

Laboratory personnel who work with hazardous chemicals have the right to receive medical attention, including any follow-up examination that the examining physician determines to be necessary, under the following circumstances:

1. Whenever a lab worker develops signs or symptoms associated with a hazardous chemical to which they were exposed in the laboratory.

2. When exposed monitoring reveals an exposure level routinely above the action level or the permissible exposure level, where no action level exists.

3. Whenever an event takes place in a work area such as a spill, leak, explosion, or other occurrence resulting in the likelihood of a hazardous exposure.

XI. BIOLOGICAL HAZARDS

A set of universal precaution guidelines is to be followed in dealing with human blood, body fluids, and tissue. See www.cdc.gov/niosh/topics/bbp/universal.html. The "Avoiding Exposure to Blood borne Pathogens" presentation is viewed annually by those employees designated by Jefferson Community College's Human Resources Office. Ensure that biohazards and potentially biohazardous materials are handled and disposed of in accordance with Guidelines for Disposal of Infectious Waste (see "Managing Regulated Waste" found at www.health.ny.gov/facilties/waste). Where applicable biohazardous waste is generated, infectious waste should be discarded according to CDC guidelines.

Any work that involves the use of potentially infectious body fluids, recombinant DNA, or animal studies must be submitted for approval to the Associate Vice President for Math/Science, Technology, Health and Business.

The Associate Vice President for Math/Science, Technology, Health and Business has the authority to ensure that CDC guidelines are followed.

XII. LABELING

A. LABEL REQUIREMENTS

The Federal Hazard Communication Standard requires that all chemicals sold contain the following information: The identity of the chemical, an appropriate warning, and the name and address of the

manufacturer. These labels should not be removed or defaced. As long as a chemical is in its original container, there are no other label requirements expected.

All containers containing chemicals (regardless of hazard) must be labeled during use or storage. A chemical that has been transferred from its original container to another must be labeled with the name of the chemical, the date of transfer, and person responsible.

The laboratory supervisor is responsible for ensuring that all hazardous chemicals are properly labeled. The hazard warning can be words, pictures, or symbols which provide an immediate understanding of the primary health and/or physical hazard(s) of the material and the appropriate personal protective equipment to be used while handling the chemical. The lab supervisor is responsible for ensuring that labels are used and updated as appropriate.

A unique and increasingly common labeling system being used by various chemical manufacturers and which may also appear on the Safety Data Sheet is the National Fire Protection Association (NFPA) labeling system at www.nfpa.org (NFPA 704: Standard System for the Identification of the Hazards of Materials for Emergency Response). The elegance of this system is that, regardless of the education or background of the employee, the extent of the hazard is easily recognizable.

Each diamond of a NFPA label addresses a specific area of concern to the employee. The blue diamond is devoted to health effects, the red diamond concerns flammability, the yellow diamond represents the reactivity, and the white diamond is reserved for special notices. A hazard-rating index is used to represent the extent of the hazard for each of the colored diamonds. The scale ranges from 0 through 4, and there are no other numbers to be used. The hazard ratings 0-1 indicate a non-hazardous or slightly hazardous chemical. A hazard rating of 2, 3, or 4 indicates a moderate (2), significant (3), or highly hazardous (4) chemical.

B. LABELING EXEMPTIONS AND ALTERNATIVES

There are four situations where labeling is exempted or that allow alternatives to the labeling requirement: (1) container labeled under other federal laws, (2) portable containers labeled under other federal laws, (3) laboratories, and (4) stationary containers.

1. CONTAINERS LABELED UNDER OTHER FEDERAL LAWS

SOME LABELS REQUIRED BY OTHER AGENCIES

Agency	Authority	Jurisdiction
Environmental Protection Agency	Federal Environmental Pesticide Control Act*	Insecticides, fungicides, and rodenticides
Consumer Product Safety Commission	Federal Hazardous Substance Labeling Act	Packaging and labeling of food, drugs, cosmetics, and medical devices
Bureau of Alcohol, Tobacco, and Firearms	Federal Alcohol Administration Act	Distilled beverages, wine, and malt beverages

* Formerly the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

2. PORTABLE CONTAINERS

Portable containers into which hazardous chemicals are transferred from labeled containers and which are intended only for the immediate use of the employee performing the transfer are exempt from the labeling requirements.

Hazardous chemicals left in portable containers beyond the employee's work shift must be labeled according to the standard. This labeling exemption is intended to prevent the ineffectiveness of labels for certain activities, such as the few ounces of a pesticide or fertilizer placed in a hand-held spray applicator. However, labels may be appropriate for any container where confusion may subsequently occur if it is not properly labeled.

3. LABORATORIES

The issue of what and when to label becomes more complicated in a laboratory since more than one chemical is often combined to create stock solutions, buffers, washing solutions, and other specialized reagents. In most cases it is easiest to refer to these mixtures by using a cryptic code. Since personnel outside of this laboratory are not going to be aware of these codes, some provision must be made to post a code sheet within the laboratory. Whenever a new code is used, it must be noted on the list. Old or changed codes can be simply crossed off the list. In laboratories only, containers such as test tubes, flasks, beakers, petri plates, and the like need not be labeled with an identity and hazard warning. Common sense and good scientific method dictates, however, that labeling and record keeping be kept current.

4. STATIONARY CONTAINERS AND VESSELS

Alternative methods of labeling; such as signs, placards, and other written forms of warning, are permitted in lieu of affixing labels to individual stationary process containers (e.g., reaction vessels, storage tanks) may be used for several different materials.

It is not necessary to re-label the container each time the contents are refilled. Signs, placards, or batch/process sheets can be placed or posted in close proximity to the container. The alternative methods of labeling must provide the same information as a label, the substance identity and the primary hazard(s). Moreover, affected employees must be informed (as part of their hazard communication training) of the alternative labeling methods used in their work areas.

XIII. ELECTRICAL CONSIDERATIONS - GENERAL INSTRUCTIONS

1. All 110V outlets receptacles in laboratories are to be of the standard design that accepts a three-prong plug and provides a ground circuit.

2. All AC-powered electrical devices used in the laboratory must be equipped with a three-pronged plug.

3. All frayed or damaged line cords must be placed out of service and replaced before the equipment is put into use.

4. Electrical cords should be plugged into the wall, and unplugged by pulling on the plug itself, never by pulling on the power cord.

5. Turn electrical power switches to the OFF position before either connecting or disconnecting the plug from the outlet.

6. Tape may not be applied to power cords except to provide additional protection from abrasion. Splices are not permitted in power cords. All cuts, abraded, or otherwise damaged power cords must be replaced.

7. Do not handle electrical devices with wet hands or standing on a wet floor.

8. Electrical equipment is to be carefully located so as to minimize the possibility that water or chemicals could accidentally be spilled on it.

XIV. STATIC ELECTRICITY AND SPARK HAZARDS

Static electricity is a potential hazard in the laboratory due to its ability (under some conditions) to accumulate voltages great enough to ignite flammable vapors.

Proper grounding and bonding of containers and equipment obtain protection from static electricity in handling flammable and other chemicals. In some cases, a blanket of an appropriate inert gas is needed. Some common potential sources of sparks and electrostatic discharges are:

Metal tanks and containers
Plastic laboratory aprons
High-pressure gas cylinders upon discharge
Brush motors
Areas with low relative humidity and fiber carpeting

XV. FIRE PREVENTION AND EMERGENCY PROCEDURES

A. FIRE PREVENTION

1. Be cognizant of potential ignition sources. Included in this list are open flames, heating elements, and electrical sources (motors, light switches, friction, and static).

2. Flammable liquids give off vapors that may burn or explode. Therefore, do not use flammable materials in the presence of ignition sources.

3. Do not store flammable materials in a conventional (non-explosion proof) refrigerator.

4. Do not store any flammable liquids in areas exposed to direct sunlight.

B. FIRE EMERGENCY PROCEDURES

1. Upon discovering a fire, immediately sound a building fire alarm.

2. If safe to do so, call Campus Security by dialing "2222," or dialing “911,” giving your name, telephone number, department, and location of fire.

3. Evacuate the building immediately. Inform others in the building who may not have responded to the alarm to evacuate.

4. When you evacuate, DO NOT stop for personal belongings or records. Leave immediately using exit stairways, not elevators.

5. Notify either a campus security officer or firefighter on the scene if you suspect someone may be trapped inside the building.

6. Do not walk through or stand in a smoke cloud. Crawl under the smoke and use a wet cloth, if available, to cover your face.

8. Evacuate according to posted Emergency Reference Chart. Do not return to the building until instructed to do so by authorized personnel.

XVI. WASTE DISPOSAL PROCEDURES

The disposal of waste chemicals is a serious problem and every effort must be made to take care of it legally, safely, and in an environmentally-proper and efficient manner. The duty for the identification and handling of waste chemicals within the laboratory rests with each faculty and staff member who has generated the waste.

PROCEDURES

1. The instructor/staff person must plan a procedure for waste disposal before a project or activity is started. The waste disposal procedure should be reviewed with the students prior to the start of the laboratory activity.

2. Label waste properly after your experiment or project is finished. Each person must identify waste materials properly before disposal.

3. The priority for reducing chemical inventory is: Reduce, Reuse, Reclaim, Destroy, Dispose.

4. For any project or experiment, opportunities for reusing the chemical should be explored.

5. Reclaiming used chemicals by such methods as distilling or precipitating compounds may reduce waste.

6. Small quantities of volatile substances may be safely vaporized in hoods only if the method is approved.

7. If chemicals are to be disposed, call the lab supervisor to arrange a pick up.

XVII. INSPECTIONS, AUDITS AND REPORTS

Formal inspection of laboratory facilities and equipment, and an audit of work practices are to be performed at least annually. The Chemical Hygiene Officer and appropriate Division and Department personnel will conduct laboratory inspections and audits. The "Flammable and Combustible Liquids Safety Checklist" will be used (Appendix A). Results of the inspections and audits will be sent to the Chemical Hygiene Officer, the Associate Vice President for Math/Science, Technology, Health and Business, and the Lab Science Department Chairperson for review and corrective action, if needed.

XVIII. PROGRAM EVALUATION

The Chemical Hygiene Officer will conduct periodic inspection checks to evaluate and determine the effectiveness of the policy and training components of the *Laboratory Safety Guideline Program: Chemical Hygiene Plan*. This will be done annually. The *Laboratory Safety Guideline Program: Chemical Hygiene Plan* document will be reviewed on a biennial basis.

APPENDIX A

Date: _____/_____/_____

FLAMMABLE & COMBUSTIBLE LIQUIDS
SAFETY CHECKLIST

YES	NO	STORAGE	COMMENTS
O	O	1. Is the minimum, practical amount of flammable & combustible liquids kept on hand?	
O	O	2. Are combustible liquids used in preference to flammable liquids whenever possible? (A flammable liquid has a flash point less than 100° F; a combustible liquid has a flashpoint over 100°F. The flashpoint is the lowest temperature at which enough vapors collect at a liquid's surface to catch fire in the presence of a source of ignition.)	
O	O	3. Are there containers larger than one gallon (or two-gallon safety cans) in classrooms?	
O	O	4. Are flammable and combustible liquids stored in glass containers?	
O	O	5. Are flammable and combustible solvents stored in safety cans?	
O	O	6. Are large quantities of flammable and combustible liquids stored in approved flammable storage cabinets or in proper storage rooms? (OSHA regulations require more than 25 gallons of Class IA liquids or more than 120 gallons of Class I, II, and III liquids to be stored in flammable storage cabinets or approved storage rooms.)	
O	O	7. Are more than 60 gallons of Class I and Class II liquids, or more than 120 gallons of Class III liquids stored inside one flammable storage cabinet?	
O	O	8. Are flammable storage cabinets capped and kept closed (or vented if required by local regulations)?	
O	O	9. Is more than one day's supply of flammable or combustible liquids stored near a designated spraying are?	
O	O	10. Are water-reactive materials stored in the same room as flammable and/or combustible liquids?	
O	O	11. Are old containers of flammable and combustible liquids removed?	
YES	**NO**	**HANDLING**	**COMMENTS**
O	O	12. Are areas where flammable and/or combustible liquids transferred from one container to another separated from other operations?	
O	O	13. Are there written emergency procedures for the control of spills and leaks of flammable and/or combustible liquids?	
O	O	14. Are spills cleaned immediately?	

YES	NO	HANDLING	COMMENTS
O	O	15. Are containers of flammable and/or combustible liquids covered when not is use?	
O	O	16. Are flammable and/or combustible liquids used near open flames or other nearby sources of ignition? (Possible sources of ignition include, but are not limited to, flames, smoking, lightning, cutting and welding, hot surfaces, frictional heat, static, electrical and/or mechanical sparks, spontaneous combustion, including heat-producing chemical reactions, and radiant heat.)	
O	O	17. Are flammable and/or combustible liquids transferred from container to container by air pressure?	
O	O	18. When dispensing flammable and/or combustible liquids, are nozzle and receptacle electrically connected to each other and grounded?	
O	O	19. Does all electrical wiring and equipment in locations where flammable and/or combustible vapor-air mixtures may exist under normal conditions meet Class I Division 1 requirements of the National Electrical Code? (A Division 1 location is defined as five feet in all directs from all points of vapor liberation.)	
O	O	20. Does all electrical wiring and equipment in locations where flammable and/or combustible vapor-air mixtures may exist under abnormal conditions meet Class I Division 2 requirements of the National Electrical Code? (Division 2 locations are defined as 20 feet horizontally, and three feet above floor or grade level of a 25-foot distance from any pump or other device handling flammable liquids.)	
O	O	21. Are waste solvents stored in approved solvent waste cans?	
O	O	22. Are oil and solvent-soaked rages placed in approved oily waste cans which are emptied daily?	
YES	NO	FIRE CONTROL	COMMENTS
O	O	23. Is there a written emergency action plan and fire prevention plan, as required by OSHA?	
O	O	24. Does the fire plan allow employees to use fire extinguishers?	
O	O	25. If employees can use fire extinguishers, have they received proper training and education in their use and in the hazards of incipient stage fire-fighting?	
O	O	26. Is there a Class B fire extinguisher of at least 12B rating located within 10-25 feet of Class I or Class 11 storage areas?	

YES	NO	FIRE CONTROL	COMMENTS
O	O	27. Is there a Class B fire extinguisher of at least 12 B within 10 feet of any inside storage room?	
O	O	28. Is the maximum travel distance to a Class B fire extinguisher less than 50 feet?	
O	O	29. Are fire extinguishers properly mounted and identified?	
O	O	30. Are fire extinguishers properly inspected, maintained, and tested?	
O	O	31. Does the building have a sprinkler system? If so, is the sprinkler system regularly tested?	

Checklist completed by: _____/_____/_____

Lab Supervisor: _____
Signature

Checklist reviewed by: _____/_____/_____

Chemical Hygiene Officer/ Director of Administrative Services: _____
Signature

Checklist reviewed by: _____/_____/_____

Associate VP for Math/Science, Technology, Health & Business: _____
Signature

Appendix B

HAZARD COMMUNICATION EMPLOYEE TRAINING RECORD

I, _____ , verify that of today _____ ,
(Print Employee Name) **(Date)**

received training on the Hazard Communication Standard. Training information was provided on:

- Purpose and requirements of the Hazard Communication Standard*.
- Overview of written Hazard Communication Program.
- A list of chemicals used in the workplace and the location of Safety Data Sheets (SDS).
- Information and use of a SDS; information on labels and how to use this information.
- Proper use and selection of personal protective equipment.
- General chemical safety.
- Medical waste training

Opportunity was given during training to assess my understanding of the Hazard Communication Standard and to ask questions.

_____

Employee Signature

_____

Trainer

_____

Laboratory Manager Signature

***Hazard Communication Standard** – A law requiring employers to provide their employees with the information and training they need to protect themselves from chemical hazards in the workplace.

SAFETY EQUIPMENT/HAZARDOUS COMMUNICATION CHECKLIST

Employee name (print): _____

Employee signature: _____

I have been shown the following safety equipment and understand how it functions and where it is located:

Item/Equipment	Yes/No
Have seen the Hazardous Communication presentation.	
Understanding warning labels and how to locate and read Safety Data Sheets (SDS).	
Locates and operates eye wash station in Chemistry prep room.	
Locates and operates safety shower in Chemistry prep room.	
Locates fume hood in Chemistry prep room and understands proper function, such as proper height and keeping the area as clean as possible.	
Locates spill kits and spill supplies in Chemistry prep room.	
Locates fire extinguisher in Chemistry prep room.	
Locates the appropriate personal protective equipment in Chemistry prep room and understands its use.	
Locates and understands Chemical Hygiene Plan**.	
Locates the chemical inventory list and understands the division of chemicals by compatible family codes.	
Understands OSHA regulations in regards to the right to request, in writing, and obtain information on exposure on the hazardous substances.	
Understands the right to file a complaint with OSHA.	
Locates First Aid Kit in Chemistry prep room.	
Locates and operates eye wash station in Biology prep room.	
Locates fume hood in Biology prep. room and understands proper function, such as proper height and keeping the area as clean as possible.	
Locates First Aid kit in Biology prep room.	
Locates fire extinguisher in Biology prep room.	
Locates the appropriate personal protective equipment in Biology prep room and understands its use.	
Understands that if there is a chemical spill and the SDS sheet does not give useful information, then the manufacturer of the chemical should be contacted.	

****Chemical Hygiene Plan** – A written document that describes work practices, procedures, and policies intended to keep employee exposure below hazardous levels.