STATE UNIVERSITY OF NEW YORK

COLLEGE OF TECHNOLOGY

CANTON

LABORATORY

CHEMICAL HYGIENE PROGRAM

In accordance with the OSHA "Occupational exposure to hazardous chemicals in laboratories", 29 CFR 1910.1450, the following Chemical Hygiene Plan has been developed.

Revised November 2025

INTENT

The primary objective of this manual is to protect laboratory workers from exposure to hazardous chemicals and situations that may endanger their health and safety. A conscious effort by all laboratory personnel to follow these guidelines is essential to achieve a safe work environment.

The faculty serve as role models for their technical staff, students, and other laboratory support personnel. They must insist that appropriate laboratory procedures be always followed.

To ensure a safe work environment, everyone involved in laboratory operations must be safety conscious. Safety becomes part of the work attitude through repeated discussions, meaningful in-service training and the demonstrated commitment of the College administration, faculty, support staff and students. It is in everyone's best interest to carry out laboratory work in accordance with good health and safety practices.

NO EMPLOYEE, STUDENT, OR VISITING SCIENTIST SHALL CONDUCT ANY RESEARCH, INSTRUCTION, OR PROCEDURE IN A MANNER WHICH JEOPARDIZES THE HEALTH OR SAFETY OF ANY PERSON.

The College also has a commitment to protecting the environment. Hence, all chemical waste must be disposed of in accordance with applicable laws and with environmentally sound procedures that minimize their potential harm. When appropriate, every effort shall be made to reduce, reuse, or recycle any chemicals to remove them from the waste stream.

LABORATORY HEALTH AND SAFETY POLICY

AND

CHEMICAL HYGIENE PROGRAM

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LABORATORY HEALTH AND SAFETY POLICY

I. INTRODUCTION

A. LABORATORY HEALTH AND SAFETY POLICY STATEMENT

It is the policy of the State University of New York College of Technology at Canton (the College) to ensure that all laboratory hazards are identified and information about these hazards is transmitted to employees to provide for their safety and health protection. "Employees" under this policy include custodial and maintenance staff, faculty, instructional support staff, and paid assistants who work in laboratories that utilize hazardous chemicals.

This policy is implemented through the administration of this Laboratory Health and Safety Policy and Chemical Hygiene Program.

B. AUTHORITY

The Laboratory Health and Safety Policy and Chemical Hygiene Program is authorized by Dr. Zvi Szafran, President of SUNY Canton. It has been reviewed and approved by the Chemical Hygiene Committee.

C. FEDERAL LABORATORY STANDARD

This program was developed and implemented pursuant to 29 CFR 1910.1450, "Occupational Exposures to Hazardous Chemicals in Laboratories, Final Rule", published March 26, 2012. A copy of the regulation is in Appendix A.

D. SCOPE AND APPLICATION

This program applies to laboratories that meet the OSHA definition of "laboratory" published in 29 CFR 1910.1450, Occupational exposure to hazardous chemicals in laboratories (the OSHA "Laboratory Standard", a copy of which is in Appendix A.) *"Laboratory" means a facility where the "laboratory use of hazardous chemicals" occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.* The laboratories meeting this definition at the College include chemistry, biology, environmental engineering technology, and automotive technology laboratories. All other laboratories fall under OSHA's Hazard Communication Standard.

E. CHEMICAL HYGIENE OFFICER (CHO)

Mr. Derek Converse, Environmental Health and Safety (EH&S) Manager will serve as the CHO. He is qualified by training and experience to provide technical guidance in the development and implementation of the Chemical Hygiene Program.

II. ENSURING LABORATORY SAFETY

A. ALL PERSONS WHO WORK IN CHEMICAL LABORATORIES

1. Employees who work in laboratories where chemicals are handled are expected to:

    a) complete training on laboratory safety.

    b) follow College-wide standard operating procedures and those of the lab in which the person is working.

    c) report damaged or malfunctioning equipment to the instructional support staff.

    d) report chemical spills or injuries to University Police, the CHO, and EH&S

2. All persons should be responsible for correcting, if possible, or reporting to the chemical safety committee, personal behavior that could endanger people, equipment, or property.

B. CHEMICAL HYGIENE COMMITTEE

1. Meets at least annually.
2. Members include the CHO, laboratory faculty representative(s) and representative(s) of the instructional support technicians.
3. Develops and reviews laboratory health, safety, and housekeeping audits.
    a) Appendix B contains the Laboratory Inspection Audit Form
4. Plans and implements general laboratory safety training for employees.

C. CHEMICAL HYGIENE OFFICER

1. Provides technical guidance in the development and implementation of the Chemical Hygiene Program, College-wide Standard Operating Procedures (SOP's) and specific departmental procedures.
2. Chairs the Chemical Hygiene Committee.
3. Reviews laboratory accident and incident reports and assists University Police in investigations as needed.
4. Participates in health, safety, and housekeeping audits.
5. Receives input on health and safety hazards and actively seeks hazard abatement.

6. Manages the waste disposal program including signing hazardous waste manifests.

D. FACULTY AND/OR INSTRUCTIONAL SUPPORT STAFF

1. Are knowledgeable about the health and safety hazards of the chemicals used in the laboratory and transmit this information to the students; ensure that students handle toxic and hazardous chemicals appropriately.
2. Are responsible for implementing and enforcing health, safety and housekeeping procedures for their laboratory experiments and exercises.
    a) Identify standard laboratory procedures for the use of hazardous chemicals, operations and equipment used by their students.
    b) Develop procedures for hazards for which there are no published safety procedures.
3. Enforce Standard Operating Procedures in their laboratory. These include applicable College and laboratory specific procedures.
4. Monitor student activity, comply with disciplinary action as stated in the Student Handbook according to the Code of Student Conduct, Rights and Responsibilities.
5. If a chemical spill kit is used in their laboratory, relay to the Instructional Support Staff (ISA) who will order replacement material(s).

E. STUDENTS

1. Follow all safety procedures. Adopt a "safety first" attitude.
2. Discuss accidents and incidents with instructors and prepare descriptive reports if needed.
3. Report broken equipment and other laboratory hazards to the instructional support staff or instructor.

F. CUSTODIAL AND MAINTENANCE STAFF

1. Carry out usual cleaning or maintenance activities in laboratories, but in the process ***will not*** (and will not be expected to) handle or move chemical containers, sweep or mop up laboratory chemical spills, or touch waste baskets which contain loose chemicals or partially filled chemical containers.
2. Report to the Faculty or Instructional Support Staff chemical spills or chemicals which have been thrown into waste baskets. At night, University Police should

be notified. University Police should then notify the Instructional Support Staff or CHO and EH&S.

3. Report to their supervisor concerns about their own health or safety working in specific laboratories. These should be conveyed from their supervisor to the CHO and EH&S.

4. Accidental chemical releases (e.g., accidental breaking of a bottle of chemical) will be immediately reported to Faculty, Instructional Support Staff, University Police, or CHO and EH&S.

5. Will be provided training annually on laboratory housekeeping procedures

III. STANDARD OPERATING PROCEDURES

A. INTRODUCTION

The following Standard Operating Procedures (SOPs) apply to personnel in all laboratories. Stricter procedures may be developed by the Chemical Hygiene Committee with assistance from the faculty for specific chemicals, equipment and procedures in various laboratories; these are known as "laboratory specific procedures".

College-wide SOPs may change over time to better meet laboratory good work practices and College needs. Suggestions about additions and changes in this program are encouraged; call or write the CHO to provide input.

B. ULTIMATE RESPONSIBILITY FOR LABORATORY SAFETY

1. The ultimate responsibility for personal health and safety in the laboratory rests with the individual; however, it is the policy of SUNY Canton to provide information about hazardous chemicals, equipment, and experiments so that individuals are forewarned about potential laboratory hazards.

2. Instructional Support Staff and Faculty using the laboratories are responsible for overseeing laboratory conditions. Responsibilities include:

    a) informing students of the hazards of equipment, procedures and chemicals used in the laboratory; information will be provided orally and/or as written Laboratory Specific Procedures or in course-embedded instructions.

    b) overseeing the cleanliness and orderliness of the laboratory.

    c) providing instructions for the appropriate disposal of laboratory waste materials.

d) contacting appropriate individuals in case of a safety incident or chemical spill.

e) reprimanding or rejecting from laboratories students who repeatedly break laboratory rules.

f) supervisors and instructors must ensure that safety procedures are followed and that proper PPE is being used as required.

C. PERSONAL BEHAVIOR IN LABORATORIES

1. Inappropriate personal behavior and irresponsible unauthorized experiments will not be tolerated.
2. Faculty and students should know the hazards of each chemical they handle; safety information will be provided to students and discussed at the beginning of each lab.
3. Faculty and students should know the location and use of first aid kits, fire extinguisher, safety shower, eye wash station, fire blanket, etc. Access to safety equipment must not be blocked.
4. Label chemical storage and hazardous waste containers with generator's initials, chemical contents, hazard, and generation date.
5. Don't store food and beverages in refrigerators meant for chemical storage.
6. Smoking is prohibited in public buildings in New York State.
7. Don't eat or drink in laboratories.
8. Clean work areas daily to the standard of the faculty or instructional support staff.
9. The instructional support staff or faculty members will determine appropriate waste disposal procedures prior to generation of hazardous waste and this information will be relayed to students.
10. All hazardous waste must be disposed of in an environmentally ethical manner.
11. Children are not permitted in instructional laboratories except for previously planned for and organized tours and demonstrations.
12. Animals are not permitted in laboratories except for instructional purposes or as service animals for people/persons with disabilities.

D. GENERAL SAFETY PRACTICES

1. Appropriate laboratory attire includes shoes which cover the top of the foot (no sandals) and shirt and leg protection. It is recommended that long pants be worn.

2. Wear appropriate personal protective equipment (PPE) such as lab coats, safety glasses, or face shields. Instructors will review the experiment and assign PPE based on the activity, considering the hazards, quantities of chemicals, and the type of manipulations (heating, mixing, splashing). Instructors may require additional PPE beyond SDS recommendations if higher risk procedures are being performed.

    a) Wear chemical-resistant gloves when appropriate.

    b) Check gloves (and other PPE) for wear and tear before use.

    c) Wash hands and remove gloves safely after use.

    d) Discard worn or damaged gloves or other PPE.

3. Safety glasses or goggles are required in all labs whenever students are actively conducting experiments. They are not required in the instructional classroom areas of the laboratory. Within biology labs, safety glasses are not required when experiments are conducted without chemicals or biological agents.

4. Do not work in an otherwise unoccupied laboratory building. If this is unavoidable, the employee's supervisor and/or University Police should be notified of arrival and departure.

5. Keep doorways, halls, entrances, and stairways clear; remove delivered or discarded goods from entrances at once.

6. Keep floors dry; clean up water spills immediately.

7. Do not suspend or drape extension cords, rope, rubber tubing, etc. in areas and at heights which interfere with normal traffic.

8. Do not lift or move heavy articles without help. Use correct lifting methods and use a hand truck to move them any distance.

9. Close all drawers and keep all obstacles clear of walkways (book bags etc.).

10. Use insulated gloves when handling hot objects.

11. NO MOUTH PIPETTING!! Use a suction bulb or automatic pipette; use rubber tubing and a suction bulb to start a siphon.

E. LABELING

1. Label Requirements

Every chemical received at SUNY Canton is labeled with the following information:

    a) the identity of the hazardous chemical

b) the appropriate hazard warnings

c) the name and address of the manufacturer

d) the date received

DO NOT REMOVE OR DEFACE THE ORIGINAL LABEL.

2. Transfer of Chemicals

When hazardous chemicals are transferred from their original containers, the new container must be labeled with:

a) the name of the chemical

b) the appropriate hazard warning.

12. Exceptions to Labeling Requirement

a) Portable containers intended for immediate use by the person performing the transfer.

b) Laboratory-use-only containers such as test tubes, flasks, beakers, and petri plates

c) Instructional Support Staff are designated to ensure that all hazardous chemicals used in their laboratories are properly labeled. Instructional Support Staff are also responsible for reviewing the relevant hazards of the chemical and ensuring that the labels are updated.

F. HANDLING CHEMICALS IN THE LABORATORY

The laboratory chemicals found within this college 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 separate chemical. Nevertheless, all laboratories have available Safety Data Sheets (SDS) for all chemicals used, handled, and stored within the work area. They are readily available in the lab to all employees and students.

1. Procurement

a) Before a substance is received, information on its proper handling, storage and disposal should be known. Request an SDS when ordering.

b) Never order more of a chemical than will be used within a reasonable length of time, since chemicals deteriorate with age and disposing of them often costs more than the initial cost of the chemical.

c) No container will be accepted without a proper identifying label.

d) Whenever possible, a less hazardous or toxic chemical should be substituted.

2. Transport

Transporting hazardous chemicals from one location to another within the College can be safely accomplished when:

a) Unbreakable containers or glass bottles, protected with bottle carriers, are used for flammable or corrosive liquids.

b) The lids for such containers are periodically inspected to ensure their integrity.

3. 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 toxicity becomes known.

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

a) Toxic substances should be segregated from other chemicals in a well-identified area with local exhaust ventilation.

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

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

d) The amount of chemicals stored should be as small as practical.

e) Storage of chemicals in laboratory hoods is prohibited unless the hood has been designated as a satellite accumulation area and is not used to conduct laboratory work.

f) Do not store chemicals on the floor.

g) Avoid exposure of chemicals to heat and direct sunlight.

h) An annual chemical inventory review should be conducted with unneeded chemicals given to the CHO for recycling or disposal.

4. Designated Area

a) Laboratories working with carcinogens, reproductive toxins, or acutely toxic substances must establish a Designated Area. A Designated Area may be any part of a laboratory, a device such as a laboratory fume hood, or the entire laboratory.

b) The purpose of the Designated Area is to focus attention on the particularly hazardous substance that is being used and to ensure that the necessary protective measures are observed by all people in the vicinity.

c) Designated Areas must be identified by appropriate signs.

5. Approval

Prior approval must be obtained from the Chemical Hygiene Committee before laboratory procedures can be undertaken involving the following:

a) A newly introduced hazardous chemical substance of moderate, chronic, or high acute toxicity.

b) Working with substances of known high chronic toxicity.

Prior consultation can ensure that appropriate measures are taken to establish safety protocols, minimize exposure, and establish proper waste disposal procedures.

G. HANDLING SPECIFIC TYPES OF CHEMICALS

A description of the hazards of chemicals by hazard class, along with suggested handling procedures is as follows:

1. **FLAMMABLE CHEMICALS**: CHEMICALS THAT MAY EASILY IGNITE OR BURN. See Appendix A.

a) Store only one week's worth (or one gallon, whichever is less) of flammable chemical in the laboratory. Keep larger quantities in a flammable storage room or an approved, vented "flammable" storage cabinet.

b) Note the location and type of firefighting equipment available for the particular need. ABC fire extinguishers are available throughout the college.

c) Flammable chemicals shall not be used near sparks or open flames.

d) Refrigerated flammable chemicals must be stored in FM or UL approved explosion proof or explosion-safe refrigerators.

2. **CAUSTIC AND CORROSIVE CHEMICALS**: Acids and alkalis may cause burns of the skin, mouth, lungs or eyes and cause irreversible damage to equipment and storage areas.

a) Transport large bottles of concentrated acids in rubber carriers.

b) When handling corrosive chemicals, always wear goggles and a face shield.

c) Use chemical resistant gloves and acid aprons when handling corrosive or alkali chemicals. Check gloves for holes before putting them on. Wash exterior of gloves before removing them.

d) Never pour water into concentrated acid. When diluting a strong acid, use a heat-resistant container that will not break due to the temperature rise which occurs during the mixing process.

e) When making a strong caustic solution, use a heat-resistant container and provide cooling.

f) Never pour concentrated acid or caustic down the sink. Acids and caustics should be neutralized and flushed with copious amounts of water.

g) Skin and clothing contamination: immediately use a drench shower if available; otherwise use nearest source of water to flush clothing, removing clothing as needed.

h) Eye contact: Eyewash stations are in each laboratory. Keep eyes open and rinse with a gentle stream of running water (preferably at an eye wash station) for at least 15 minutes to clean and cool the eye. Notify laboratory instructor or instructional support staff and seek medical attention immediately by calling University Police at ext. 7777.

i) Skin contact: wash with soap and water.

3. TOXIC CHEMICALS: Almost any substance in sufficient quantity can be considered toxic. Toxic chemicals are those which damage biological structure

and function through exposure or accumulation in tissues. Usually, this involves relatively small amounts of toxin.

For these purposes, a poison will be defined as a substance which may cause death or serious health effects if relatively small amounts are inhaled, ingested or absorbed by the skin.

a) Wear Personal Protective Equipment when handling toxic chemicals.

b) Store and use small gas cylinders containing toxic gases in a fume hood; use hood precautions.

c) Do not remove health effect warning tags.

d) Do not remain in the vicinity of a toxic gas release. Leave the area and call University Police at ext. 7777.

4. **SPECIFIC TOXIC MATERIALS**:

a) MERCURY: All labs where mercury is used must have a mercury spill clean-up kit. Follow the directions in the kit for clean-up. All mercury waste shall be delivered to the CHO for disposal.

b) BROMINE AND/OR PHENOL: Prior to handling bromine or phenol, prepare a 50 percent ethyl alcohol/isopropyl alcohol solution to use if skin contact occurs. Use this solution to rinse and pack the burned area. Seek medical attention immediately by contacting University Police at ext. 7777.

5. REACTIVE AND EXPLOSIVE MATERIALS: Materials that may release large amounts of energy under special circumstances.

a) Disposal of reactive and explosive chemicals is highly regulated. Do not dispose of these materials in the sanitary sewer or garbage. Contact the CHO for assistance.

b) Examples of highly reactive materials include the following: nitric acid, nitrates, permanganates, chromic acid cleaning solutions, peroxides, chlorites, chlorates, perchlorates, and perchloric acid.

c) Handle reactive, unstable, or explosive chemicals carefully. Follow precautions on the label.

d) Do not mix or combine oxidizers such as chlorates, chlorites, and perchlorates with sulfuric acid, phosphorous, antimony and cyanides. Heat, shock, or friction (e.g., grinding) may set off an explosion.

e) If explosive materials must be prepared, prepare the smallest amount practical.

f) Ethers react with oxygen in air to form unstable peroxides which may detonate when concentrated by evaporation or distillation; when combined with other compounds; or when heated, shocked, or subjected to friction. Ethers must be handled with extreme care. The following are recommended storage procedures.

1) Store in explosion proof refrigerator.

2) Containers should be dated as received and when they are opened.

3) Open container shelf life of diethyl ether should be 6 months after which time it should be disposed of. Contact the CHO for assistance.

g) Isolate reactive chemicals from toxic and flammable materials.

6. <u>CARCINOGENS AND TERATOGENS</u>

Carcinogens: Carcinogens are hazardous chemicals capable of increasing the risk of cancer through exposure. Substances designated by the Occupational Safety and Health Administration (29 CFR Part 1910, Sub-part Z) as being a carcinogen require special handling.

Specific authoritative sources such as the Registry of Toxic Effects of Chemical Substances (RTECS), the National Toxicology Program (NTP) Annual Report on Carcinogens, and the International Agency for Research on Cancer (IARC) Monographs serve as primary sources of toxic chemical information.

Teratogens: Teratogens are hazardous chemicals capable of causing an increased risk of birth defects in children of exposed workers.

a) Reduce your exposure to these chemicals to the lowest possible level through good work habits and common sense. Always wear personal protective equipment (gloves, goggles, aprons) as advised by the SDS.

b) If skin contact occurs, thoroughly wash the area with soap and water.

H. USE OF CHEMICAL FUME HOODS

1. Use for operations which use or release toxic chemical vapor or dust, or which have fire or explosion potential.

2. Don't use fume hoods for long-term chemical storage. Certain hoods may be designated as Satellite Accumulation Areas (SAA) for temporary chemical or waste storage. Once containers are full, they must be moved to the Central Accumulation Area (CAA).

3. Confirm adequate hood ventilation (flow of 70 - 125 fpm) before starting the experiment. Each hood is equipped with its own flow meter and alarm. Improper air flow will activate the alarm system.

4. Keep hood closed or with a 2" opening (according to the building ventilation requirements) except when adjusting items within the hood.

5. Place bulky equipment on platforms inside hood to allow flow of air underneath; this provides for smooth flow of air in the hood.

6. Remove unneeded equipment and chemicals to ensure smooth air flow.

7. Report malfunctioning hoods to lab instructor or Instructional Support Staff.

8. As a rule of thumb: handle chemicals with a PEL (permissible exposure level) of less than 100 ppm in a hood. The following is a list of chemicals used in our labs with a PEL <100 ppm.

   Chlorine

   Iodine

   Pyridine

   Bromine

9. Fume hoods are to be tested annually.

I. USE OF SPECIAL LABORATORY EQUIPMENT

1. Use glassware designed for vacuum procedures. Do not apply a vacuum to glassware with flat surfaces except for desiccators and filter flasks.

2. Use a metal safety shield or cloth wrapping when applying a vacuum to a desiccator.

3. Wear safety goggles when doing vacuum distillations and freeze-drying; place a safety shield in front of the apparatus.

4. Place samples in centrifuge such that proper balance is achieved.

5. Centrifuge covers must be closed while spinning. Never open a centrifuge cover until spinning has stopped.

J. USE OF ELECTRICAL AND MECHANICAL EQUIPMENT

1. When performing electrical work on equipment remove fuses (using fuse puller for cartridge fuses) and tag the switch box. Only the person who tags the switch may remove the lock and tag. Only employees who have received Occupational Safety and Health Administration (OSHA) training in Lockout Tagout (LOTO) procedures may perform operator level work on electrical and mechanical equipment.

2. Disconnect the power supply to motors before adjusting belts or pulleys.

3. Do not wear loose clothing (unbuttoned shirt sleeves, ties) when working around rotating equipment. Rotating shafts and couplings and exposed belts are hazardous; they should be covered with a guard whenever possible.

4. Confine long hair in a net or ponytail when working with rotating equipment to prevent scalping.

5. Avoid contact with electrical wiring or other fittings; electrical hazards greatly increase when any part of the body is grounded (e.g., in contact with piping or damp floors). Death has been caused by 110 volts to the grounded body.

6. Properly ground portable equipment; pay special attention to grounding when working in or around damp floors or pipes.

7. Examine extension cords and leads before use. Do not use damaged cords (repair cords when necessary). All electrical devices should be grounded or double insulated. Discard two wire extension cords.

8. Unplug electrical cords by grasping and pulling on the plug, not the wire.

K. COMPRESSED GAS CYLINDERS

1. All compressed gas cylinders must be used and stored vertically either in a cylinder holder or attached to walls or benches. Strap or chain cylinders in place.

2. Keep valve protection caps on out-of-service cylinders.

3. Do not move a cylinder that has a regulator attached.

4. When moving cylinders avoid dragging, rolling and/or sliding them. Use a hand truck for moving cylinders even over short distances.

5. Do not heat cylinders higher than 125 0F (52 0C). Do not let a flame come into contact with any part of a compressed gas cylinder.

6. Do not refill one cylinder from another.

7. Use gas cylinders containing toxic gases in a fume hood.

8. Close valve, remove regulator, and affix cap when taking a cylinder out of service; if empty, attach an "EMPTY" tag.

ORDERING NEW AND DISPOSING OF OLD CYLINDERS

1. Cylinders are delivered directly to the laboratory by the supplier.

2. Cylinder pick-up will take place when deliveries are made.

3. The user ensures that cylinders are chained as soon as received; most laboratories will need "in-transit" cylinder storage spaces in the laboratory.

4. If the cylinders must be moved more than several feet, a cylinder hand truck must be available.

L. UNATTENDED USE OF EQUIPMENT OR SERVICES

1. Unattended use of experimental equipment is prohibited.

M. FIRST AID PRACTICES

1. EYE CONTACT: immediately rinse the eye with water at eye wash station and continue flushing for 15 minutes. Call University Police at 7777 for assistance.
2. SWALLOWING: if possible, determine what the victim swallowed; follow first aid practices if given on the label. Call University Police at 7777 for assistance.
3. SKIN CONTACT: flush contaminated area with water; remove contaminated clothing. Wash contaminated area with soap and water; if irritation persists or other symptoms occur, seek medical assistance.
4. SUDDEN ILLNESS: call University Police at 7777 for assistance.

N. PERSONAL INJURY AND ACCIDENTS

1. Know where the closest first aid kit and automated external defibrillator (AED) are located for each laboratory you work in.
2. Immediately notify the Instructional Support Staff, a faculty member, or others in the area.
3. Call University Police at 7777 and explain the situation; they will call for additional assistance from the fire department, rescue squad, etc.
4. In the meantime:
    a. Provide first aid/or CPR if possible and you are properly trained.
    b. After the victim is taken care of, seek assistance from the CHO or ISA if necessary to properly clean up any chemical spill.
    c. Do not ask custodians to clean up chemical spills.
5. All accidents must be reported. Written reports must be prepared for all accidents or incidents that caused (or nearly caused) personal injury or major property damage. Both victims and witnesses may be asked to prepare a report. Formats for accident and incident reports are on the next page. Click on link for a printable version.

    https://www.canton.edu/forms/

O. EMERGENCY PREPAREDNESS

1. Know the location of and how to use emergency equipment, such as first aid kits, fire blankets, fire alarm pull stations, eye-wash stations, fire extinguishers, emergency gas shut-off, and safety showers.
2. If you are working with hazardous materials or equipment, plan an emergency response before you start the experiment.
3. Be alert to unsafe conditions in your own work and that of others. Report and/or correct unsafe conditions immediately.
4. In case of fire or explosion, pull the fire alarm. If there is a chance of putting the fire out, use a fire extinguisher; otherwise, leave the building and meet University Police so you can show them where the fire is.
5. Call University Police at 7777 in case of spills or emergencies; they will contact the appropriate emergency response agency.
6. If Bunsen burners are in use during a fire or explosion, activate the emergency gas shut-off button

P. LABORATORY SECURITY

1. For the protection of employees, students, equipment, supplies and the public, laboratories must be locked when unoccupied.
2. Security within the laboratory is also important. Locked storage cabinets are advised for sensitive or expensive supplies and equipment. Locking storage areas or lockers for securing personal property are advised.
3. 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. Upon request, University Police can assist laboratories with crime prevention surveys and recommendations.
4. If you observe suspicious people or activities in your area, contact University Police at X7777 and an officer will be sent to investigate. Report any thefts or other crimes immediately. Information from these reports is used to adjust patrol activities and may prevent further problems.

FOR ANY EMERGENCY INFORM THE LABORATORY INSTRUCTOR OR STAFF AND/OR CALL UNIVERSITY POLICE (x7777)

IV. LABORATORY SPECIFIC PROCEDURES (LSP)

1. Faculty, in conjunction with Instructional Support Staff, develop specific laboratory procedures designed to protect the health of employees and students from hazards not identified as a college-wide SOP.

2. Laboratory Specific Procedures identify hazardous chemicals, operations and equipment and discuss the nature of the hazard and how to prevent injury. LSP's are developed for experiments which use particularly toxic or reactive chemicals; which generate explosive, flammable, or hazardous chemicals; which generate high- or low-pressure conditions; or which take place in confined spaces (e.g., cold room). A suggested format for LSPs follows on the next page. LSP’s are developed into each course and are available upon request from the instructor.

A. LABORATORY SPECIFIC PROCEDURE

HAZARDOUS CHEMICAL, EQUIPMENT, PROCEDURE OR EXPERIMENT)

NAME OF LABORATORY TO WHICH THIS APPLIES:

NAME OF HAZARDOUS ITEM:

DESCRIPTION OF HAZARD:

SPECIAL INSTRUCTIONS:

RESTRICTIONS ON USE OF ITEM:

PREPARED BY: _____

DATE: _____

V. FIRE PREVENTION, CONTROL AND REPORTING

A. PREVENTING LABORATORY FIRES

1. Do not use open flames or open electrical heating elements near flammable materials. Use steam baths or heating mantles to heat flammable materials.
2. Don't use spark-creating equipment (e.g., most switches and electrical outlets) inside hoods because explosive conditions may prevail. Disconnects and switches should be outside of the hood.
3. Store highly volatile flammable liquids in refrigerators designed for flammable material storage.
4. Attach rubber hoses securely to gas outlets to ensure they do not leak. Check hoses for cracks and leaks. Turn outlets off at source when they are not in use.
5. Do not leave gas flames burning unattended.
6. If there is a release of flammable vapor or gas do not make or break electrical contacts in the area; if equipment can be turned off from outside of the room, do so.

B. FIRE-FIGHTING AND RESCUE OPERATIONS

1. Be sure that the correct type of fire extinguisher is in each laboratory. Fire extinguisher classification and testing is the responsibility of EH&S.
2. Know how to use the fire alarm and extinguisher; if there is a fire be sure to pull the fire alarm pull station before attempting to put out the fire. For any serious emergency such as toxic gas release or an explosion call University Police.
    a) If there is a gas leak, cease all operations immediately and evacuate the area notifying others to leave. DO NOT pull the fire alarm, open electrical overhead doors, doors and windows or switch lights on or off. Activating those devices could create an electrical spark that may ignite the gas.
3. Call EH&S at 386-7631 if you have used an extinguisher. EH&S will see that the extinguisher is replaced with one that is fully charged.
4. Use laboratory fire extinguisher only if the following conditions are met:
    a) the building is being evacuated,
    b) University Police have been called, or the fire alarm pull station has been pulled,
    c) you are between the fire and a clear exit,
    d) you have the proper type of fire extinguisher,
    e) you can stay low and avoid breathing the smoke,
    f) you are trained and confident about using the fire extinguisher,

g) the fire is not too large (generally the size or smaller than a typical office waste basket).

5. If you hear a fire alarm in your building, leave the building--don't look for the fire. Immediately leave. Close any open doors on your way out of the building. People who refuse to abandon a building upon request of the University Police are subject to arrest.

6. If a person's clothing catches fire, wrap them in a fire blanket (if available) and roll them on the floor to extinguish flames.

a) Keeping the person horizontal helps prevent the flame from reaching the victim's face and hair. It is preferable to use a safety shower if one is readily available.

VI. HANDLING HAZARDOUS WASTE

A. COLLECTION, STORAGE AND DISPOSAL

NOTE: By law, many chemicals can't be discarded in the sink or in garbage cans. The College abides by environmental laws for both legal and ethical reasons. Therefore, don't dispose of a chemical if you don't know the regulatory requirements. If the information below does not answer your question, ask the CHO. If there is any question about correct disposal contact the CHO for instructions.

1. See if material is listed on Hazardous Chemical list (page 40). If it is, follow the instructions below. If not, contact the CHO for further instructions. Additional information may be obtained from the EPA and OSHA web sites. (www.osha.gov; www.epa.gov)

2. Put waste material in a 1-pint to 1-gallon chemical resistant container. Containers must be completely sealed except when adding chemicals to the container. Do not leave container open with a funnel or other filling device. When about 3/4 full, contact Instructional Support Staff to arrange for removal.

3. Attach a completed "HAZARDOUS WASTE" label to the container. Labels are available in each laboratory. Labels may also be obtained from the CHO. Note example on next page. You must keep track of the identity of waste materials. Each time an addition is made to a waste mixture, add to the label what was added, and approximately how much. Dating of the label is not necessary until waste is moved into final storage prior to disposal.

4. Final storage of hazardous waste is in the flammable storage vault located behind the chemistry laboratories in Cook Hall. The Automotive Technology Laboratory shall store their waste in Nevaldine Hall South 123.

5. When waste is collected and stored in the laboratory, the site is considered a Satellite Accumulation Area and must be clearly labeled as such. It is wise to establish a Satellite Accumulation Area in the laboratory near the point of generation. If a fume hood is utilized, then it may not be used for any other

purpose. Satellite waste storage must not exceed 55 gallons and must be under the control of the generator.

6. It is not advised to mix waste.
7. If you find unlabeled containers contact the CHO.

B. HAZARDOUS WASTE DISPOSAL LABEL

C. CHEMICAL SPILL CLEAN UP AND DECONTAMINATION PROCEDURES

1. In the event of a spill, evaluate the situation. If the spill is too large or dangerous to manage, evacuate the area and contact University Police at X7777.
2. When chemical spills occur: FIRST, if necessary, provide first aid and remove contaminated clothing. THEN clean up the spill using personal protective equipment and appropriate spill absorbent materials, if available.

3. Laboratories have spill clean-up equipment. Know where these materials are stored.

4. There are several specific types of spill clean-up materials. Know what material is to be used for the chemicals you handle.

5. When a flammable material is spilled, do not trip any switches that could create a spark; do turn off pilot lights and other flames in the area.

6. Collect spilled chemical and absorbent material in a plastic bag (it is best to place the plastic bag(s) in a box). Label both the bag and the box with approved hazardous waste tag and store it in an appropriate place. Contact the CHO for proper disposal of the waste.

7. Do not ask custodians to clean up chemical spills.

VII. ADMINISTRATIVE AND ENGINEERING CONTROLS

Engineering controls and safety equipment include chemical fume hoods, laminar flow hoods, walk-in hoods, glove boxes, ventilated chemical storage cabinets, fire extinguishers, fire alarms, eye wash stations, showers, fire blankets, etc. Standardized performance criteria, testing methods, testing frequency and record keeping formats follow.

A. SAFETY EQUIPMENT PERFORMANCE CRITERIA

1. INSPECTION OF HOODS

a) All chemical fume hoods have flow detectors that indicate face velocity. The appropriate flow rate for chemical fume hoods is between 70 and 125 fpm; flows beyond that range indicate the fume hood is not operating properly and a work order must be submitted so it can be fixed.

b) Some chemical fume hoods have a high flow setting to be used in case of a chemical spill; however, the hood should not be left at this high setting except during spills. (In the case of hoods, more flow is not better.)

c) An outside contractor certifies fume hoods annually. They will apply a tag to each hood stating flow rate and operating condition. The college's HVAC department performs annual preventative maintenance on the hoods. The HVAC department has continuous computerized monitoring of all hoods, and any failure is recorded immediately. All records are maintained by the HVAC department.

2. INSPECTION OF EYE WASH STATIONS AND SAFETY SHOWERS

a) The EH&S department is responsible for testing eyewash stations and safety showers on a weekly basis. Barcodes are applied to each eyewash station, and the date and time of inspections are digitally recorded once completed. Records of testing are maintained by the EH&S department.

b) Weekly inspections include making sure the eyewash station is accessible, well-lit with a highly visible sign and there are no visible broken parts.

c) Quarterly inspections include actuating the valve to the fully open position, making sure it operates correctly continuing to flush until the water is clear.

d) Annual inspections include verifying its position is within allowable limits and is providing proper flow, diameter, and temperature.

3. FIRE EXTINGUISHERS

a) EH&S department is responsible for inspecting fire extinguishers monthly. Barcodes are applied to each fire extinguisher, and the date and time of inspections are digitally recorded once completed. Records of testing are maintained by EH&S department.

B. LABORATORY SAFETY AUDITS

1. Laboratory Safety Audits are performed biannually by EH&S Department. These audits will be reviewed by the Chemical Hygiene Committee.

2. Records shall be maintained by the EH&S Department.

VIII. TRAINING

Prior to initial work assignment, "general" laboratory safety training for employees who work in laboratories (including faculty, custodians, maintenance personnel and student workers) is planned and implemented by the Chemical Hygiene Committee. The training program reviews elements of the CHP and reviews College-wide Standard Operating Procedures and relevant Laboratory Specific Procedures. Additional training will be performed as deemed necessary by the Chemical Safety Committee.

Training covers subjects mandated by 29 CFR 1910.1450, Section f(3) and (4) (see Appendix A).

Attendance logs are maintained by the CHO.

A. FACULTY AND STAFF TRAINING PROGRAM

1. Topics: Background information on the laboratory standards and review and request for comments on the Chemical Hygiene Plan

a) Background and philosophy of the OSHA Laboratory Standard.

b) Enforcement of OSHA Standards; agencies that care.

c) Elements of the Laboratory Standard.

d) Basis of the Chemical Hygiene Plan.

e) Overview of Standard Operating Procedures.

f) Preparation of Specific Laboratory Procedures.

g) Discussion: emergency response.

h) Discussion: injury response.

i) Discussion: spill clean-up materials: types available and location

j). Discussion: providing information sources.

B. STUDENT TRAINING PROGRAM

1. Background information about the Laboratory Safety Policy

    a) OSHA Laboratory Standard

    b) Basis of Safety Policy

2. Individual responsibility for laboratory safety.

    a) Ultimate responsibility rests with individual.

    b) Role of custodial staff in laboratory safety.

3. Review of Laboratory Safety Information

4. Resource materials and people:

    a) SDS's

    b) Compendia of information

    c) Computer systems

    d) Chemical Hygiene Officer’s Office

    e) Instructional Support Staff

    f) Faculty

IX. EMPLOYEE EXPOSURE TO HAZARDOUS CHEMICALS

A. OVEREXPOSURE BY INHALATION

1. Employees shall not be exposed to levels of hazardous chemical in excess of the OSHA Permissible Exposure Limits (PEL's) as specified in 29 CFR Part 1910 Subpart Z.

2. If there is reason to believe that an employee is routinely exposed to greater than the Action Limit (50 % of the PEL), then:

a) Exposure level will be measured using acceptable industrial hygiene air monitoring and analytical methods; surveys will be carried out by certified Industrial Hygienists and analyzed by a certified air monitoring laboratory.

b) If exposure is greater than the Action Limit, all exposure and medical monitoring provisions of the standard will be met, and steps taken to reduce exposure level to less than the Action Limit.

B. OVEREXPOSURE BY OTHER ROUTES

1. Prevention of direct skin contact and ingestion of chemicals is addressed by the following means:

a) by providing proper personal protective equipment.

b) by providing proper handling devices.

c) And through training employees in good laboratory practices, including how to properly handle toxic and hazardous chemicals.

X. MEDICAL CONSULTATIONS, EXAMINATIONS AND RECORD KEEPING

A. EMPLOYEE RIGHTS AND RESPONSIBILITIES

1. After a spill, accident or routine chemical exposure resulting in symptoms of overexposure, employees may require medical consultation to determine if treatment or further examination is necessary.

2. Medical examinations will be provided without loss of pay and at reasonable times and places. The College will pay for these services under any of the following conditions:

a) If air monitoring data indicate that an employee is exposed to greater than the action limit (½ the Permissible Exposure Limit) if the chemical is regulated by an OSHA health standard which requires medical surveillance.

b) If an employee develops signs or symptoms associated with a chemical to which the employee may have been exposed to within the laboratory.

c) If a spill, leak, explosion, or other event results in the likelihood of hazardous exposure.

3. The following information will be provided to the physician:

a) Qualitative and quantitative information.

b) Conditions of exposure.

c) Signs and symptoms at exposure and later.

4. The physician shall submit to the College this information:

    a) medical examination and test results.

    b) recommendations for follow-up.

    c) medical conditions which place the employee at increased risk due to exposure to laboratory chemicals.

5. The physician shall inform the employee (in writing or verbally) of:

    a) 4 (a, b, and c) above.

    b) medical conditions discovered in the examination which are unrelated to occupational exposure. (Note that this information is not transmitted to the College.)

B. RECORD KEEPING

Chemical exposure monitoring and medical records are maintained in accordance with OSHA's Record keeping Standard, 29 CFR 1910.1020.

https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1020

XI. HAZARDOUS WASTE CHEMICALS

A. LIST OF HAZARDOUS CHEMICALS

To determine if a chemical is a hazardous waste, it is necessary to ascertain if the chemical in question is either a listed or characteristic hazardous waste. The following includes some of the most common chemicals considered hazardous by the EPA. Information resources pertinent to waste classification are listed on the next page.

1. Chlorinated hydrocarbons: carbon tetrachloride, chloroform, methylene chloride.
2. Aromatic and aliphatic hydrocarbons and their derivatives: benzene, toluene, xylenes, hexanes, hydrocarbon mixtures such as mineral spirits, naphthas, etc.
3. Aliphatic and aromatic amines: aniline, p-phenylenediamine, benzidine.
4. Alcohols, ketones, aldehydes, ethers, and organic acids. (Very small amounts can be poured down the drain and followed by several liters of water; anything more than several milliliters should be collected).
5. Amides: acetamide, dimethylformamide, dimethylacetamide.
6. Organic and inorganic nitrogen compounds: nitro-, azo- and n-nitroso compounds.
7. Non-cured epoxy compounds.
8. Carcinogenic materials: see list in Appendix B.
9. Monomers of various polymers and plastics, and their decomposition products.

10. All heavy metals and phosphorous organic/inorganic compounds: metal dust and fume, mercury, barium salts, chromium salts, chromic acid, cadmium, arsenic, lead, selenium, silver salts bismuth.

11. All halogens: chlorine, bromine.

12. Poisons such as pesticides, cyanide salts (such as sodium cyanide), and other items labeled "poisonous".

B. HEALTH AND SAFETY RESOURCES

1. OSHA Occupational exposure to hazardous chemicals in laboratories
    a) https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1450

2. OSHA Permissible Exposure Limits (PELs) for General Industry
    a) https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1000
    b) https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1000TABLEZ1
    c) https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1000TABLEZ2
    d) https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1000TABLEZ3

3. NIOSH - OSHA Occupational Health Guidelines for Chemical Hazards.
    a) https://www.cdc.gov/niosh/docs/81-123/default.html

4. NIOSH - OSHA Pocket Guide to Chemical Hazards.
    a) https://www.cdc.gov/niosh/npg/default.html

5. Prudent Practices for Handling Hazardous Chemicals in laboratories
    a) https://www.ncbi.nlm.nih.gov/books/NBK55872/

XII. HAZARD IDENTIFICATION

A. Information about the hazards of specific chemicals is transmitted to employees in the following ways:

1. Labels on shipping containers.

2. Safety Data Sheets. (SDS)

3. Health effect compendia e.g., Sax, Merck, Sigma-Aldrich. A list which includes the location of such holdings is included in Appendix C.

4. The Chemical Hygiene Program contains information about a variety of hazardous materials including proper handling and first aid for certain special hazards.

B. To ensure transmission of hazard information:

1. Labels on shipping containers are not removed or defaced until the container is empty and rinsed.

2. The contents of portable containers are identified on the container. Portable containers include all non-shipping containers such as storage bottles, volumetric flasks, beakers, graduated cylinders, wash bottles, etc.

3. SDSs received are retained.

    a) SDS files or binders are in the laboratory.

    b) SDSs are arranged alphabetically, by chemical name.

4. SDSs or "caution statements" for all chemicals used and generated in laboratory experiments are in the laboratory.

    a) If an SDS is unavailable, a "caution statement" based on information gathered in a literature search (or phone calls to manufacturers) is prepared.

    b) No employee or student is expected to work with a chemical with unknown toxicity.

ANNUAL REVIEW

Date	Revision Number	Author	Revision Description
October 16, 2023	Original Issue	Derek Converse	N/A
November 17, 2025	Revision 1.0	Derek Converse	Various minor updates

APPENDIX A

23 CFR 1910.1450

Occupational Exposure to Hazardous Chemicals in Laboratories

https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1450

APPENDIX B

Laboratory Safety Audit Checklist

Environmental Health & Safety
Laboratory Safety Audit Checklist

Auditor's Name:_____ **Date of Inspection:**_____

Building Name:_____ **Room No(s):**_____

1.0 GENERAL HOUSEKEEPING PRACTICES	C	NC	NA	S	REGULATORY GUIDENCE	COMMENTS
1.1 Walkways in and around the lab are clear, with no chemical storage. Aisles and exits are also clear of obstructions					New York State (NYS) Fire Code C 1003 OSHA 29CFR 1910.37	
1.2 Laboratory is neat, clean with no excess accumulation of combustibles					NYS Fire Code 315.3.2	
1.3 Trash is emptied when full/appropriate containers are used					NYS Fire Code 304.3	
1.4 Laboratory surfaces are clean and sanitary-no excess visible contamination					OSHA 29 CFR 1910.22(a)(1) OSHA 3404-11R 2011 pg.26 Chemical Hygiene Plan pg.12	
1.5 Proper disposal containers are available for sharps, containers not filled above fill line					OSHA 29 CFR 1910.1030	
1.6 Unrestricted access to eye washes, safety showers, and fire extinguishers					NYS Fire Code 107.1.1	
1.7 Storage clearance from ceiling is a minimum of 24"					NYS Fire Code 315.3.1	
1.8 Chemicals not in use are stored in cabinets not on open benches near drains or sinks					OSHA 3404-11R 2011 pg.26 OSHA CFR 1910-1450 NYS Fire Code 5003.3	
1.9 No food or drink is present in lab refrigerators or on benches					Chemical Hygiene Plan pg. 12	
1.10 No chemicals are present in non-lab areas or other designated eating areas					Chemical Hygiene Plan pg. 65	
1.11 Glassware is free of cracks, sharp edges, chips, and other defects					Chemical Hygiene Plan pg. 65 National Research Council	
1.12 Laboratory coats and gloves are never worn outside the laboratory or into areas where food is stored and consumed					OSHA CFR 1910-1450	
2.0 CHEMICAL STORAGE	**C**	**NC**	**NA**	**S**	**REGULATORY GUIDENCE**	**COMMENTS**
2.1 All chemicals are properly labeled and legible (primary & secondary containers)					OSHA 29CFR 1910.1200 Chemical Hygiene Plan Pg. 14	
2.2 All chemical containers are in good condition					Chemical Hygiene Plan Pg. 15	
2.3 Chemicals are stored and classes of incompatible chemicals are segregated properly					40 CFR 264.17 30 CFR 56.16012	

2.4 No more than 3 flammable cabinets in a single fire area					OSHA CFR 1926.152	Fire Area is designated by fire rated structures
2.4 No more than 3 flammable cabinets in a single fire area					OSHA CFR 1926.152	Fire Area is designated by fire rated structures
2.5 Not more than 60 gallons of Category 1, 2 and/or 3 flammable liquids or 120 gallons of Category 4 flammable liquids shall be stored in any one storage cabinet					NYS Fire Code 5704.3.2.2 OSHA 1926.152	
2.6 Flammable liquids in excess of 25 gallons will be stored in approved storage cabinet					OSHA 1926.152(b)(1)	
2.7 Ethers are dated when received and upon opening, diethyl ethers must be disposed of after 6 months					Chemical Hygiene Plan pg. 19	
2.8 Flammable liquids are not be stored by sources of ignition (electrical power panels, open flames, etc.)					OSHA CFR 1926.152	
2.9 Refrigerators used for the storage of flammables are properly rated and explosion proof/intrinsically safe (labeled "Chemicals Only No Food")					Chemical Hygiene Plan pg. 17 OSHA CFR 1910.1450	
2.10 Lips/guards are installed on shelving containing chemicals					OSHA CFR 1910.1450	
2.11 An up-to-date chemical inventory list is available					OSHA CFR 1910.1450	
3.0 PERSONAL PROTECTIVE EQUIPMENT	**C**	**NC**	**NA**	**S**	**REGULATORY GUIDENCE**	**COMMENTS**
3.1 Proper personal protective equipment is available for employees and visitors and in use/proper sizes					OSHA CFR 1910.133-138	
3.2 A job hazard assessment has been completed to determine the appropriate PPE for each piece of equipment					OSHA CFR 1910.132	
3.3 Laboratory workers are dressed properly					OSHA CFR 1910.1450	
3.4 Personal are aware of location and/or how to access electronic SDS (MSDSonline)					OSHA CFR 1910.1200 Chemical Hygiene Plan Pg. 15	
3.5 Personnel are aware of locations of safety equipment/Eyewash/Safety Showers/Evacuation routes etc.					Chemical Hygiene Plan Pg. 12 OSHA CFR 1910.151	
3.6 Respirators are not in use unless approved by EHS					0SHA CFR 1910.134	
3.7 A copy of SUNY Canton's *Laboratory Chemical Hygiene Plan* is available					OSHA CFR 1910.1450	
4.0 GAS CYLINDERS	**C**	**NC**	**NA**	**S**	**REGULATORY GUIDENCE**	**COMMENTS**
4.1 Gas cylinders are secured to a stationary object					NYS Fire Code 5303.5.3	
4.2 Gas piping appears gas tight					NYS Fire Code 5303.12	

4.3 Gas Cylinders are properly marked					NYS Fire Code 5303.4	
4.4 Cylinders are stored properly (heat, compatible materials, and distance from combustibles)					NYS Fire Code 5303.7	
4.5 Gas lines are labeled with contents and flow direction if not clearly evident from the system characteristics					NYS Fire Code 5303.4.3 ANSI A13.1	
4.6 Gas cylinders valves are closed and safety cap is in place if not in use					NYS Fire Code 5303.6	
4.7 Hoses and regulators are in good working condition					Prudent laboratory practices	
4.8 Fuel cylinders are stored at last 20 feet from O2 cylinders					OSHA 1910.253	
4.9 Rooms or cabinets containing compressed gases are conspicuously labeled COMPRESSED GAS					NYS Fire Code 5003.5.1	
5.0 FUME HOODS	**C**	**NC**	**NA**	**S**	**REGULATORY GUIDENCE**	**COMMENTS**
5.1 Verify annual inspection is current					Chemical Hygiene Plan Pg. 9 OSHA CFR 1910.1450	
5.2 Confirm adequate hood ventilation (flow of 70 - 125 fpm)					Chemical Hygiene Plan Pg. 20 ANSI Z9.5-2012 and ANSI/ASHRAE 110-1995	
5.3 Hood sash is closed or with a 2" opening					Chemical Hygiene Plan Pg. 20 ANSI Z9.5-2003	
5.4 Hood is not crowded or used for long-term storage unless designated SAA					Chemical Hygiene Plan Pg. 16 & 20	
5.5 Bulky equipment is placed on platforms to allow air flow					Chemical Hygiene Plan Pg. 20	
6.0 HAZARDOUS WASTE	**C**	**NC**	**NA**	**S**	**REGULATORY GUIDENCE**	**COMMENTS**
6.1 Containers are clearly marked with the words "Hazardous Waste". Wastes requiring special symbols are labeled appropriately (biological, radiological)					Chemical Hygiene Plan Pg. 30 OSHA CFR 1910.1450 40 CFR Part 26 Marking 49 CFR172-173 6 CRR-NY 372.2	
6.2 Contents are clearly listed in words with proper shipping name not chemical formula					49 CFR 172.301	
6.3 Container is sound and of correct construction for waste inside and around it.					40 CFR 265.171 40 CFR 265.172	
6.4 Containers are closed with properly fitting threaded lid					40 CFR 265.173	
6.5 Container is in lab of origin					40 CFR 265.173	
6.6 Full containers are dated and arrangements for disposal within 180 days have been made					Chemical Hygiene Plan Pg. 12 NYS DEC 6 NYCRR 372	

6.7 Less than 55 gals of waste in lab (less than 2 pounds acute)					6 CRR-NY 372.2 40 CFR 265.173	
6.8 Incompatible wastes are stored and segregated properly					264.17 30 CFR 56.16012	
6.9 Waste is located away from floor drains and sinks					40 CFR 265.173	
7.0 SAFETY EQUIPMENT	**C**	**NC**	**NA**	**S**	**REGULATORY GUIDENCE**	**COMMENTS**
7.1 Eye washes and safety showers are within 10 seconds walking time of laboratory and unobstructed.					ANSI Z358.1	
7.2 Proper fire extinguishers are within 50 feet of laboratory.					OSHA 1910.157 OSHA 3404-11R 2011	
7.3 All safety equipment is properly maintained with proper inspections (EH&S)					ANSI Z358.1	
8.0 ELECTRICAL SAFETY	**C**	**NC**	**NA**	**S**	**REGULATORY GUIDENCE**	**COMMENTS**
8.1 Electrical equipment is in good condition					NYS Fire Code 605.1	
8.2 Electrical cords are not frayed					NYS Fire Code 605.1	
8.3 All electrical equipment is properly grounded					NYS Fire Code 605.1 NYS Fire Code 605.5.4	
8.4 Electrical appliance must be tested and listed by an approved agency					NYS Fire Code 605.7	
8.5 Circuit breaker panels are unobstructed and closed					NY State Fire Code 605.3	
8.6 Extension cords are used only in temporary applications					NY State Fire Code 605.5	
8.7 Cords in the work area do not represent trip hazards					46 CFR 140.510	
8.8 Multi Plug adapters are not in use					NYS Fire Code 605.4	
8.9 Electrical connections are made in approved junction boxes. All wiring utilizes appropriate materials and adequate workmanship					NY State Fire Code 605	
8.10 Power strips are not plugged into extension cord					NY State Fire Code 606.4.2	
8.11 Electrical outlets within 6 feet of a sink or other water source has a GFCI					National Elec. Code 5.2.4.3	
9.0 HAZARD COMMUNICATION	**C**	**NC**	**NA**	**S**	**REGULATORY GUIDENCE**	**COMMENTS**
9.1 Laboratory is locked when unoccupied					Chemical Hygiene Plan Pg. 12	
9.2 SDS are readily available					NY State Fire code 407.2 OSHA 3695-03 2014	

9.3 No signs of eating in laboratory. Chances of contamination through ingestion are kept to a minimum.					Chemical Hygiene Plan Pg. 65 OSHA 1910.1450	
9.4 Special hazards are identified					NY State Fire Code 5003.5	
10.0 BIOHAZARD SAFETY	**C**	**NC**	**NA**	**S**	**REGULATORY GUIDENCE**	**COMMENTS**
10.1 Biohazard areas are labeled as such					OSHA 1910.1030	
10.2 Proper PPE is available and is in use					OSHA 1910.133-138	
10.3 Work surfaces are properly decontaminated after use					OSHA 29 CFR 1910.1030	
10.4 Hypodermic needles are promptly disposed of in puncture-resistant container					OSHA 29 CFR 1910.1030	
10.5 Biohazard waste is stored in a biohazard bag					OSHA 29 CFR 1910.1030	
10.6 Lab coats are in use					OSHA 29 CFR 1910.1030	
10.7 Biological Safety Cabinets have been certified					OSHA 29 CFR 1910.1030	
11.0 RADIATION SAFETY	**C**	**NC**	**NA**	**S**	**REGULATORY GUIDENCE**	**COMMENTS**
11.1 Labs utilizing x-ray equipment are labeled as such					Radiation Safety Man. Sec. II NY State Fire Code 5003.5	
11.2 While radiograph is in use all individuals will remain behind the leaded glass viewing wall					Radiation Safety Man. Sec VII	
11.3 Survey equipment is available and in use (dosimetry badges)					Radiation Safety Man. Sec. IV NRC Part 34	
12.0 HYPODERMIC SYRINGES & NEELDE USE	**C**	**NC**	**NA**	**S**	**REGULATORY GUIDENCE**	**COMMENTS**
12.1 Syringes & needles shall be stored in a locked secure place, no use of spring or combination dial locks					NYCRR Title Section 80.133(g)(1)	
12.2 Reserve or main stock kept in locked room with locked cabinets					NYCRR Title Section 80.133 (g)(2)	
13.0 DOCUMENTATION, TRAINING, AND PLANS	**C**	**NC**	**NA**	**S**	**REGULATORY GUIDENCE**	**COMMENTS**
13.1 Laboratory employees have completed General Laboratory Safety Training and training has been documented					Chemical Hygiene Plan pg. 35 OSHA 29 CFR 1910.1450	
13.2 Chemical Hygiene Plan is readily available and up-to-date					Chemical Hygiene Plan Pg. 48 OSHA 1910.1450	
13.3 An up-to-date chemical inventory list is up-to-date and readily available					Chemical Hygiene Plan Pg. 16 OSHA 29 CFR 1910.1450 OSHA 1910.1200(E)(1)(i)	

13.4 Laboratories using x-ray equipment maintain a complete logbook					Radiation Safety Man. Sec. 6	
13.5 Laboratories utilizing x-ray equipment have received a current DYSDOH Registration						
13.6 Laboratories utilizing hypodermic syringes and needles have a NYSDOH Certificate of Need					NYCRR Title Section 80.133	
13.7 Laboratories utilizing hypodermic syringes and needles have complete records, record of purchases, annual inventory, record of all syringes and needles destroyed					NYCRR Title Section 80.133 (h)(4)	

Additional Notes/Comments:

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Explanation of Ratings

- C: Compliant ● NC: Noncompliant/Not acceptable ● N/A: Not applicable
- S: Serious finding that must be corrected

APPENDIX C

Information on Hazardous Chemicals, by Class

INFORMATION ON HAZARDOUS CHEMICALS BY CLASS

INTRODUCTION

This section contains a description of the physical and/or toxic hazards commonly encountered in laboratory chemicals. For each class some examples are provided. The examples provided are not a complete listing of chemicals that fall within that hazard class.

To use this section, obtain information on specific chemicals of interest (using SDS's, compendia of information, etc.) to determine which hazard classes apply; then refer to this section for a description of that hazard class.

FLAMMABILITY

Certain physical characteristics are used to describe the flammability characteristics of chemicals. The flash point is the temperature at which there is enough vapor above the liquid to ignite in the presence of a spark, and the auto ignition temperature is the temperature which the material will ignite without a spark source. The boiling point is the temperature at which the vapor pressure above liquid is equal to atmospheric pressure and the vapor pressure is the partial pressure of chemical vapor at a stated temperature, often 25 C. The lower the flash point, lower the autoignition temperature, lower the boiling point, and higher the vapor pressure, the greater the flammability hazard.

Lower and upper explosion or flammability limits are also used to characterize the flammability of chemicals. The LEL (or LFL), lower explosive (flammable) limit, and UEL (or UFL), upper explosive (flammable) limit defines the lower and upper ends of the explosive or flammable range. Air and solvent mixtures (expressed as percent solvent vapor) within the flammable range will burn; below the LEL or above the UEL the mixture is too lean (not enough fuel) or too rich (too much fuel), respectively, to burn.

A list of highly flammable materials follows:

- acetic anhydride
- acetone
- iso-amyl alcohol
- n-amyl alcohol
- n-butyl alcohol
- isobutyl alcohol
- butyraldehyde
- 1-chlorobutane
- 2-chloro-2-methylpropane
- cyclopentanone
- cyclohexane
- diethyl ether
- ethyl acetate
- ethyl alcohol
- n-heptane
- n-hexane
- kerosene
- methyl acetate
- methyl alcohol
- methyl ethyl ketone
- naphthalene
- Pentane
- 2-propanol
- n-propyl alcohol
- toluene
- o-xylene

PYROPHORIC MATERIALS

Pyrophoric materials react with air, or with moisture in air. Typical reactions which occur are oxidation and hydrolysis, and the heat generated by the reactions may ignite the chemical. In some cases, these reactions liberate flammable gases which makes ignition a certainty and explosion a real possibility. Examples of pyrophoric chemicals are:

- Potassium
- Sodium
- Lithium

ODOR THRESHOLD AND WARNING PROPERTIES

(TOXICOLOGY BACKGROUND INFORMATION)

Warning properties include odor, irritation, and color--chemical properties that warn you the chemical is in the area. Chemicals with good warning properties don't sneak up on you; you can smell, see, or feel them, so you know to look for the source or leave the area. Chemicals with poor warning properties don't warn you of their presence, so are potentially more dangerous. People often link "strong smell" with "dangerous" and ignore the fact that some dangerous chemicals lack odor (carbon monoxide).

Chemicals with good warning properties can be smelled, felt, or seen at safe exposure levels; this table compares a selection of "odor thresholds" with safe 8-hour exposure levels, TLVs. TLV's are developed by the American Committee of Governmental Industrial Hygienists (ACGIH), a standard setting organization.

IRRITATING OR CORROSIVE GASES AND VAPORS

Lung Irritation and Damage: intense exposure (prolonged exposure to irritants or brief exposure to corrosives) causes lung tissue to swell and seep fluid, a condition called chemical pneumonitis; lungs may be damaged enough to cause death. Methyl isocyanate caused chemical pneumonitis in the Bhopal India tragedy. Chemical pneumonitis survivors may have permanent lung damage with symptoms similar to emphysema and a form of asthma in which airways constrict when exposed to quite low levels of irritating chemicals.

Eye Irritation and Damage: irritating and corrosive gases may cause intense pain and temporary eye damage which can take several weeks to heal. During exposure the eyes are usually tightly shut--which opens the victim up to the hazards of temporary blindness.

Direct eye contact with irritants and corrosive liquids or powders can cause (at best) short term irritation and swelling to (worst case) permanent blindness. Quick and correct actions can reduce symptoms and prevent blindness.

Prevention is the best approach to prevent eye damage; wear goggles and face shield when handling corrosive materials. However, if contact does occur, wash chemical out of eyes immediately and continue rinsing with a gentle stream of water for 15 minutes. If eye irritation persists or if the chemical is particularly toxic or corrosive, the victim should seek medical attention.

Skin Irritation and Damage: Corrosive chemicals cause severe burns which will form scars unless treated properly. Wash contaminated skin with soap and water (or special solvent in several notable cases--bromine, phenol, hydrogen fluoride) immediately.

Irritating chemicals cause a wide range of skin effects including burns, blisters, redness, itching, dryness, cracks (e.g., between fingers), roughness and a variety of skin problems termed dermatitis (skin inflammation). In general, irritant effects are not severe, but are at least, annoying; and at worst, temporarily or permanently debilitating (e.g., when an irritant effect turns into an allergy).

EXAMPLES OF IRRITATING AND CORROSIVE CHEMICALS:

Gases such as ammonia, chlorine, bromine, nitrogen oxides, sulfur oxides, hydrogen chloride, formaldehyde.

Liquids and solids such as strong acids, bases, chlorinated solvents (methylene chloride), organic bases, organic solvents, detergents, metal salts. See list below.

- Potassium Dichromate
- Potassium Hydroxide
- Sodium Hydroxide
- Succinic Anhydride
- p-Dichlorobenzene
- Sodium Dichromate
- Chlorosulfonic acid

SENSITIZERS (ALLERGENS)

Some chemicals cause allergies; an allergy (or sensitivity) is an abnormal response to low exposure levels of chemicals which don't elicit a similar response in the majority of people. The allergic response can be quite serious.

Once an allergy develops it usually does not go away. If the symptoms are serious, the person must not be allowed to work where the chemical is used or generated.

Allergic responses vary from life threatening (anaphylactic "bee sting" type reactions which can cause death by asphyxiation within minutes of exposure); to moderate (dermatitis, severe headache, head or chest cold or flu symptoms); to slight (rash, dry skin, itching nose or eyes).

Chemicals that cause skin sensitivities (by class and several examples of each):

- coal tar and its derivatives
- benzidine compounds
- explosives
- insecticides
- cutting, linseed
- hydroquinone, bichromates, pyrogallol
- stearic acid
- proteolytic enzymes, B. subtilis
- cresol, pyridine, acridine
- naphthalene and compounds
- sodium nitrate
- natural oils
- photographic developers
- plasticizers
- enzymes

ASPHYXIANTS

Animals require a constant supply of oxygen to survive, and asphyxiants reduce or eliminate this supply. Low levels of exposure to asphyxiants (or chronic exposure to less powerful ones) generally cause headaches, fatigue, and confusion. High levels (or low levels of very toxic ones) will cause coma and, if the victim is not rescued, death.

Asphyxiants can act quickly. One breath of pure nitrogen causes immediate collapse and unconsciousness--leaving no time to recognize and respond to the danger.

TYPES OF ASPHYXIANTS

CHEMICAL ASPHYXIANTS cause asphyxiation by reacting inside the body; generally small amounts can cause illness or death. For example, hydrogen sulfide interferes with nerve cell function, putting certain nerves to sleep, including olfactory (smell) nerves and

the ones necessary for breathing. Moderate exposure levels eliminate our ability to smell--so right at the beginning of exposure we smell the characteristic rotten egg odor--and then it appears to go away. The odor is not gone; the ability to perceive it is gone. At higher concentrations or after prolonged breathing this chemical causes loss of consciousness and loss of the breathing mechanism. Several minutes in this state result in death.

Certain amines, nitrites and carbon monoxide produce asphyxia by reacting with blood hemoglobin, reducing its capacity to carry oxygen.

Chemical asphyxiants include carbon monoxide, hydrogen cyanide, hydrogen sulfide, arsine, nitrites, amines, nitrobenzene.

SIMPLE ASPHYXIANTS are not toxic but can cause serious problems in confined spaces. Simple asphyxiants reduce oxygen levels from the usual 21% to lower levels by simple displacement. For example, methane may seep into an underground electrical vault and displace most of the air dropping the oxygen concentration to 5%, not enough to survive in.

Asphyxiating conditions can be set up in confined spaces when vessels or pipes are flushed with nitrogen; when CO2 fire extinguishers are used in confined areas; due to generation or leakage of gas from cryogenic or welding processes; due to the formation of rust in closed (or very large) pipes or vessels; and in tanks, in the presence of high levels of microorganisms which use oxygen in metabolic reactions.

Simple Asphyxiants include methane, helium, nitrogen, carbon dioxide.

CORROSIVE CHEMICAL ASPHYXIATION: breathing certain chemicals can cause severe lung burns resulting in lung damage, swelling and loss of function--thereby affecting the amount of oxygen available to the body (thus meeting the definition of asphyxiation). However, this type of "asphyxia" is generally viewed as a corrosive effect rather than true asphyxia.

CENTRAL NERVOUS SYSTEM (CNS) DEPRESSANTS

ANESTHETIC AND NARCOTIC GASES, VAPORS AND LIQUIDS

(MOSTLY SOLVENTS)

Anesthetic or narcotic materials depress the central nervous system (CNS, the brain and spinal cord) causing sleepiness, dizziness, drunk behavior, headache and often nausea and vomiting. Many organic solvents, alcohols, ethers, ketones, esters, etc. are CNS depressants.

CNS effects generally occur within a few minutes of overexposure and may last quite a while, until the chemical has been detoxified by the liver.

Chlorinated hydrocarbon solvents (methylene chloride, methyl chloroform, carbon tetrachloride, etc.) have a peculiar and dangerous effect at high exposure levels (inhalation or direct skin contact): they cause changes in heart function (like a heart attack) which can cause death in minutes. The exposure situation is usually use of these materials in a confined area, where extremely high exposure levels can rapidly develop. Deaths in "glue sniffing" may also be due to this type of heart effect.

One of the most dangerous symptoms of overexposure to CNS depressants is inebriation (drunk behavior) because victims are more likely to make mistakes, to fall or trip, and are less likely to follow or hear instructions or see imminent danger. They are dangerous to themselves and others. Watch for signs of inebriation due to overexposure to chemicals, both in your co-workers and yourself.

Many chemicals (especially solvents) can enter the body through the skin, and entry by this route is often more toxic than by oral or inhalation routes. (Propylamine is ten times as toxic via skin than via mouth). Some areas of skin are more easily penetrated by chemicals than others: the scrotum is very easily penetrated (which makes contaminated slacks particularly hazardous); the scalp and forehead are quite easily penetrated, and the palm of the hand is the least easily penetrated.

POISONS

Certain chemicals are acutely toxic at very low levels and can cause serious, life-threatening damage in amounts readily ingested, inhaled, or absorbed through the skin.

Examples of poisons are:

- acetic anhydride
- arsenical compounds
- barium salts
- calcium fluoride
- chloroform
- cyanide salts other than ferro- or ferricyanide
- iodine
- lead compounds
- mercury compounds
- methanol
- nitrobenzene
- oxalic acid
- potassium hydroxide
- potassium iodine
- sodium bisulfate
- sodium nitrate
- silver nitrate
- zinc sulfate

SYSTEMIC TOXINS

Systemic toxins damage tissues at sites other than the point of contact. They enter the body through the skin, mouth, or lungs, spread via blood, and damage one or more internal organs such as the liver, kidneys, blood forming tissue, reproductive system, brain or nerves.

Systemic damage is usually caused by long term exposure (years) to relatively low levels of chemicals, an exposure pattern often found in industry. Short term exposure to high levels of chemicals (acute exposure) is less likely to cause systemic toxic effects.

We learn about systemic toxicity from human experience (e.g., occupational overexposure) and animal research. Some chemicals have many target organs, some just one. The target organ depends on the material and route and pattern of exposure. It is best to treat systemic toxins as possibly harmful to all organs, since the complete toxicity profile is usually not known.

Examples:

CHEMICALS THAT AFFECT SEVERAL ORGANS: halogenated hydrocarbons (many); phenols (brain and bone marrow/blood forming tissue); ionizing radiation (skin, gut, bone marrow, reproductive organs); methanol, n-hexane, methyl n-butyl ketone (nerves, brain); lead (bone marrow, brain, conceptus); manganese (lungs); cadmium (lungs, testes); mercury (kidneys, brain); arsenic (many organs including blood); phosphorous (bones); selenium (liver); dichloromethane (kidney, liver, brain).

CHEMICALS THAT PRIMARILY AFFECT THE BLOOD: acetonitrile, antimony, arsenic, lead, manganese, mercury, methyl chloride, nitrobenzene, nitrophenol, toluene, xylene.

CHEMICALS THAT PRIMARILY AFFECT THE LIVER: antimony, arsenic, cadmium, carbon disulfide, chloroform, cobalt, ethanol, methyl chloride, phenol, phosphorous, thioacetamide.

CARCINOGENS (CANCER CAUSING MATERIALS)

Several chemicals are known or suspected as causing or helping to cause cancer. A few chemicals are known human carcinogens (such as asbestos and cigarette smoke). Most are known or suspected animal carcinogens. Chemicals known to cause cancer in animals are considered potential human carcinogens.

Current evidence (e.g., for cigarette smoke and asbestos) indicates a 10-to-20-year delay between onset of exposure and onset of cancer; and, for most known human carcinogens, there was a high-level, long-term exposure pattern. Can long or short-term exposure to low levels of asbestos or side stream smoke (or other carcinogens) cause cancer? No one knows. However, for regulatory purposes human carcinogens are considered

carcinogenic whatever the exposure amount or pattern--thus exposure must by law be kept to a minimum.

Mutagens are chemicals which damage DNA, and DNA damage is believed to play an important role in initiating cancer. Thus, mutagens are viewed as "potential suspected animal carcinogens" even in the light of evidence to the contrary.

Examples of known human carcinogens:

- Arsenic
- Asbestos

Probable human carcinogens (good animal and equivocal human data).

- aflatoxin
- formaldehyde
- lead and lead compounds
- methylene chloride
- nickel and certain nickel compounds

REPRODUCTIVE TOXINS AND TERATOGENS

Some chemicals are associated with reproductive damage to mature female or male reproductive system causing reduced fertility or stimulating natural abortions. There are many forms of reproductive damage, including:

abnormal sperm and/or low sperm count

infertility

reduced libido and/or impotence

altered menstrual cycles or no ovulation

spontaneous abortions

damaged eggs

DNA changes in egg or sperm (mutations)

Examples of reproductive system toxins (effects not specified) are:

Anesthetic gases, aniline, arsenic, carbon monoxide, boron, cadmium, formaldehyde, manganese, toluene.

Chemical damage of the conceptus (the developing embryo or fetus) is called TERATOGENESIS, and chemicals causing teratogenic effects are called teratogens.

Examples of teratogens:

- ethanol
- arsenic
- some antibiotics
- anticoagulants (e.g., coumarin, wafarin)
- chloroform
- lead
- mercury
- methyl ethyl ketone
- methylene chloride
- selenium
- xylene

CHEMICALS THAT DAMAGE THE LUNGS

The damaging effects of inhaled corrosive materials have already been presented and are not included in this section.

There are other chemicals, not considered corrosive, but still irritating and damaging to delicate lung tissues. In general lung damage is caused by the long-term moderate exposure level pattern found in the workplace, though short-term high exposure levels have caused severe, permanent damage. Again, in the usual case, the damage occurs over an extended period and is not discovered until the victim is debilitated by the damage.

Some examples of lung damaging chemicals are listed below; add to this list materials which are obviously corrosive, such as strong acids and bases.

- asbestos
- aluminum dust and fume
- ammonia
- arsenic
- chlorine
- iron oxide dust and fume
- manganese
- oxides of nitrogen
- silica
- sulfur dioxide
- talc
- tin or tin dust
- xylene