

CHEMICAL AND LABORATORY SAFETY

Policies & Procedures

Developed, Revised, and Adopted by
The Chemistry Department Faculty

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CHEMISTRY DEPARTMENT POLICY ON SAFETY GOGGLES

Approved eye protection is required for all people in all locations where a chemical hazard has been identified.**

The chemistry laboratory can be a dangerous place; consequently, professional chemists make safety their highest priority. Federal and state laws mandate that persons working in potentially hazardous environments wear personal protective equipment (PPE).¹⁻⁴ While little that you will be asked to do is intrinsically dangerous, a majority of the materials that you handle are in some way potentially dangerous if they are handled carelessly. Perhaps the greatest potential danger in your laboratory work will be from corrosive substances, such as strong acids and bases, that readily attack human tissues.

One of the most vulnerable parts of your body is your eyes and they must be protected from chemical splashes. Minnesota law requires students to wear eye protective devices.²

Subdivision 1. Requirement to wear eye protective devices. Every person shall wear industrial quality eye protective devices when participating in, observing or performing any function in connection with, any courses or activities taking place in eye protection areas, as defined in subdivision 3, of any school, college, university or other educational institution in the state.

*Subd. 3. Eye protection areas. Eye protection areas shall include, but not to be limited to, vocational or industrial art shops, **science or other school laboratories**, or school or institutional facilities in which activities are taking place and materials are being used involving:*

- (1) hot molten metals;*
- (2) milling, sawing, turning, shaping, cutting, grinding or stamping of any solid materials;*
- (3) heat treatment, tempering or kiln firing of any metal or other materials;*
- (4) gas or electric arc welding;*
- (5) repair or servicing of any vehicle or mechanical equipment;*
- (6) any other activity or operation involving work in any area that is potentially hazardous to the eye.*

Therefore, we **require** that approved safety goggles be worn at all times (covering the eyes) when you are working with chemicals, in the vicinity of others using chemicals, or in rooms where chemicals are available for use.** We will not tolerate exceptions to this rule. You will not be permitted to work in the laboratory if you do not wear them. As shown below Minnesota law suggests penalties available to the instructor and institution for students who fail to appropriately wear approved eye protection; these are incorporated into the Violation Reporting Form and Description found at the end of this document.

Subd. 2. Penalty for failure to wear eye protective devices. Any student failing to comply with such requirements may be temporarily suspended from participation in said course, and the registration of a student for such course may be canceled for willful, flagrant, or repeated failure to observe the above requirements.

If you have a problem with goggles fogging, we recommend that you leave the laboratory to remove the goggles for a short period of time; be sure to put them back on before returning to the lab. Goggles may not be removed in the laboratory unless your instructor has told you to do so and announced that no chemical hazard exists. The chemistry department will work with the St. Olaf Bookstore to make at least one model of goggle available for purchase; all models must provide splash protection and conform to manufacturing standards (ANSI Z87.1-1989). To visually appreciate the importance of splash protection to eye safety examine the poster produced by Science and Safety Consulting Services and available at <http://www.sciencesafetyconsulting.com/pdf/EyeProtectionPoster.pdf>.

Contact lenses

In the past, the chemical profession and others have been concerned about the use of contact lenses in potentially hazardous environments. However, the American Chemical Society and the American Optometric Association, among others, have issued new statements regarding contact lens use. OSHA's preamble for the final rule on PPE in 1994 states: "OSHA believes that contact lenses do not pose additional hazards to the wearer and additional regulation is unnecessary."⁴

The ACS states, "Recent studies and experience have suggested that, in fact, contact lenses do not increase risks but can actually minimize or prevent injury in many situations. Because of the ever-increasing use of contact lenses and the benefits they provide, the American Chemical Society Committee on Chemical Safety, having studied and reviewed the issue, is of the consensus that contact lenses can be worn in most work environments provided the same approved eye protection is worn as required of other workers in the area."⁵

Approved eye protection is required for faculty, staff, students and visitors in locations where a chemical hazard has been identified, regardless of whether or not the person wears contact lenses.

References:

- ** No chemical hazard exists when all chemicals are appropriately stored in closed, designated cabinets, and chemicals are not in use. Chemicals, located on bench tops, carts, or open shelving are readily available for use and, as such, pose a chemical hazard.
- (1) National Research Council (U.S.). Committee on Prudent Practices for Handling Storage and Disposal of Chemicals in Laboratories.; National Research Council (U.S.). Board on Chemical Sciences and Technology. *Prudent practices in the laboratory : handling and disposal of chemicals*; National Academy Press: Washington, D.C., 1995.
 - (2) In *Student Rights, Responsibilities, and Behavior: Eye Protective Devices*, 2001; Minnesota Statute §121A.32.
 - (3) In *Occupational Safety and Health Administration*, 2001; 29 CFR §1910.1450.
 - (4) In *Occupational Safety and Health Administration*, 2001; 29 CFR §1910.132-.138.
 - (5) Committee on Chemical Safety, A. C. S. *Safety in the Academic Chemistry Laboratories*, 7th ed., Vol. 2; American Chemical Society: Washington, D.C., 2003, p. 5.

Laboratory Safety Guidelines

Laboratory safety is a collective responsibility. The collective consists of the person at the laboratory bench and finishes with the chief executive officer of the organization; consequently, laboratory safety requires the full cooperation of everyone in the laboratory and all those in supervisory roles. Everyone is responsible for accident prevention, and the first line of prevention occurs at the laboratory bench with the person executing the laboratory procedures. It is vital to education in chemistry, that you, as the bench scientist become well versed in laboratory safety policies and procedures.

Submission of a Safety Policies and Procedures Signature Sheet, signed by both the student and laboratory instructor, is required before any student can work in a laboratory (p. S-17).

Emergency Procedures

1. **Report to the laboratory instructor immediately if you have an accident, observe another student who has an accident or needs assistance, or observe behavior or procedures that you feel may be hazardous.**
2. If chemicals are spilled:
 - a. If chemicals are spilled on you or if you see chemicals spilled on another student, call for help from your instructor. Portions of your body or clothing that have been in contact with chemicals should be flushed thoroughly with water. Use the safety shower if the spill is extensive. An eyewash is available in the laboratory. Don't wait to see if the chemicals will injure you; rinse spills immediately!
 - b. Work with the instructor to clean up major spills on the bench or floor. Notify students nearby of the presence of broken glassware and/or chemicals, and keep people from walking through the area until cleanup is complete. Don't try to pick up broken glass yourself!
3. In case of fire: try not to panic and immediately call for help from your instructor;
 - a. If clothing is burning, slowly walk to the safety shower and pull the handle (or ask someone nearby to pull the handle). If a shower is not readily available do one of the following: 1) drop and roll on the floor to extinguish the flames; or 2) have others quickly wrap you in a fire blanket and roll you on the floor to extinguish the flames.
 - b. Small fires on the bench top or floor may be put out with an appropriately classified fire extinguisher or smothered by covering the fire with a small vessel. When using a fire extinguisher remember the acronym **PASS**: **P**ull the pin, **A**im nozzle at the base of the fire, **S**queeze the trigger, and **S**weep the extinguishing agent from side to side to cover the area. Fire extinguishers are classified by both the material type and size of fire to be tackled; they are most effective on very small fires or to provide a quick route of escape. A Class D

^e Class	Materials	Examples
x A	ordinary combustible materials	paper, wood, and most plastics
t B	flammable or combustible liquids	gasoline, greases and oils
i C	electrical equipment	appliances, wiring, circuit breakers and outlets
n D	combustible metals	magnesium, titanium, potassium and sodium

 extinguisher can be found in the RNS 341 stockroom. Size I and II (five and ten pound)

Class ABC dry chemical fire extinguishers are found throughout Regents Hall.

4. Wash minor cuts or burns with cold water and get bandages and/or cold packs from the stockroom. Report all such incidents, no matter how minor, to the instructor.

Safety Goggles and Attire

5. Safety goggles should be worn in the laboratory at all times unless the instructor and department have concluded that no chemical hazard exists. The instructor may dismiss any student from the laboratory not wearing approved goggles. Goggles must be provided by each student and may be purchased in the St. Olaf Bookstore.
6. If you are working on a computer or printer in a lab, you must wear safety goggles when work with chemicals is occurring or when chemicals are available for use.
7. Laboratory attire. Clothing worn in the laboratory offers a first line of protection from splashes, spills and other situations. Each student is responsible for wearing appropriate attire to the laboratory. *Students observed wearing inappropriate attire will be asked to change before being permitted to work in the laboratory.*
 - 7a. **Shoes** with fully closed tops/heels must be worn in chemical laboratories regardless of the work that is occurring. Open-toe shoes or sandals do not provide protection from chemical splashes, spills, falling objects, and materials hidden in the toe space along bench areas. Shoes with tops and sides made of leather, synthetic leather, or other liquid resistant materials are preferred and may be required during certain lab procedures. Cloth/canvas/woven materials may allow liquids to quickly seep through to the foot and should not be worn.
 - 7b. **Clothing** worn to the laboratory offers your body protection. Garments (i.e., pants) that cover the legs must be worn at all times. Shorts and skirts that do not completely cover the leg are inappropriate apparel in the laboratory. Shirts that cover the midriff must be worn. Clothing with loose portions, such as open sweaters, baggy cuffs, and hanging scarves, should be avoided since they may catch on glassware and equipment, may drag through spills, and in some cases may be a fire hazard. If a student desires protection for his/her clothing or simply wants additional protection, a lab coat can be purchased through on-line vendors/retailers.
8. Loose, long hair should be tied back so that it does not become entangled in equipment, exposed to chemicals, or provide an impediment to vision. Similarly, some jewelry can pose problems in the laboratory environment. Please consult with your lab instructor if you have concerns or questions.
9. At times the lab instructor may recommend or require you to wear protective gloves; check to ensure the absence of cracks or small holes in the gloves before each use. To prevent spread of chemical residues, gloves should be removed before leaving the work area and prior to handling such things as telephones, door knobs, writing instruments, computer keyboards, and laboratory notebooks. Department personnel will provide disposable nitrile gloves upon request. 5. These gloves, though disposable, may be reused provided they have not been permeated. Users should verify the compatibility of the glove material with the activity and chemicals.

Laboratory Supervision

10. No unauthorized experiments are permitted. Students may try experiments of their own design only if those experiments have been discussed with a Chemistry department faculty member and

approved.

11. No student may work in the laboratory alone. All laboratory work must be under the supervision of a Chemistry department faculty member or laboratory assistant. At least one other person must be present when work with chemicals is being done. No makeup experiments may be performed without the permission of a student's laboratory instructor.

Behavior in the Laboratory

12. Food and beverages are not permitted in the laboratory.
13. Radios, iPods, MP3 players, and other devices/software applications for playing music have the potential for distracting attention from experimental work and are therefore not permitted in the lab. As in any classroom situation, cellular phones should be turned off or put in "vibrate" mode during lab so as not to cause a disturbance or be a distraction to others. Use of personal electronic devices *as part of the laboratory's activities* is subject to the discretion of the instructor.
14. Any "horseplay" or behavior that is harassing, disruptive, aggressive or in any way presents a hazard to those working in the laboratory is forbidden. Any students or group of students engaging in such behavior may be dismissed by faculty/staff and may receive no credit for the experiment.

Other Procedures

15. If you need to cut glass tubing or insert glass tubing into a rubber stopper, consult your instructor before proceeding. Both procedures present the potential for injury from broken glass and proper precautions are essential.
16. Clean your desktop thoroughly at the end of each laboratory period. This should be done with a damp sponge and not with a towel (If issued a towel, use it is for drying glassware).
17. Except for lab assistants and stockroom student work staff, students are not allowed in the stockroom. If you need something from the stockroom and the stockroom staff is not present, see your instructor or assistant for help.

Safe Handling and Disposal of Chemicals

Some information on the safe use and disposal of chemicals is provided in this laboratory safety document; your laboratory instructor will make additional suggestions. The chemistry department's intent in providing you with guidelines about how to use chemicals and equipment safely are: 1) that no experiment you will do this semester is dangerous if safe procedures are followed throughout; and 2) to be sure that proper precautions are taken to avoid contaminating the environment.

Disposal of Chemicals

Each laboratory is designated as a satellite accumulation point (SAP) for chemical wastes. The college provides appropriate containers for disposal of chemical wastes, and a Hazardous Waste Log sheet for each container resides on a clipboard next to every satellite accumulation point. Each chemical user will enter the following information on the appropriate clipboard:

- Proper name of each chemical (or mix of chemicals).

- Quantity of each chemical put into the container (mL or g).
- User initials and laboratory course section.

When a disposal container fills, notify our stockroom staff. They will replace the container and see to it that proper procedures are observed in disposing of these items.

Handling Chemicals

1. Do not taste chemicals.
2. Avoid touching chemicals and always wash your hands thoroughly after using chemicals.
3. Work in a hood when carrying out reactions that give off objectionable gases. If you need to smell a vapor, do not put your nose directly above a flask, beaker, or other vessel containing chemicals. Holding the vessel at least one foot away, use your hand to gently and very cautiously fan the vapors toward your nose.
4. When drawing liquids into a pipet, use the pipet bulbs or pipet pumps provided in the laboratory.
5. Always add acids to water; never add water to acids. Combining acid and water frequently generates heat; adding the acid to the water reduces the amount of heat generated at the point of mixing and provides more water to disperse the heat.
6. Hold reagent bottles and other vessels containing liquids so that any drips will be opposite the label, and hold them so any previous drips on that same side do not get on your hand. Clean off any drips or spills. If necessary, ask for help from your instructor or assistant.
7. Label all flasks, beakers, test tubes, and other vessels according to their chemical contents; ideally labels should be placed on vessels prior to adding the chemical(s). This facilitates both identifying chemicals during an experiment and following proper waste disposal procedures.

Identifying Chemical Hazards

How does one learn about proper handling of chemicals? We have a variety of sources, the most common of which is the Material Safety Data Sheet (MSDS). The MSDS for a given substance provides information relating to health hazards, first aid procedures, procedures for cleaning up spills, and disposal procedures for that specific substance. The first three pages of a Material Safety Data Sheet for acetic acid are shown below. By federal law, companies that sell chemicals must provide one of these forms for each chemical shipped. The department has copies of Material Safety Data Sheets for all chemicals used in the lab. They must be read seriously but with common sense. Indeed, even sand is portrayed as a hazardous material on a first reading.

Material Safety Data Sheet

Acetic Acid, Glacial

Section 1 - Chemical Product and Company Identification

MSDS Name: Acetic Acid, Glacial

Synonyms: Ethanoic acid; Ethylic acid; Glacial acetic acid; Methanecarboxylic acid; Vinegar acid.

Fisher Scientific, Fairlawn, NJ

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
64-19-7	Acetic acid	ca.100	200-580-7

Section 3 - Hazards Identification

Appearance: colorless liquid. **Flash Point:** 39 °C. **Danger! Corrosive. Flammable liquid and vapor.** Causes severe digestive and respiratory tract burns. Causes severe eye and skin burns. May be harmful if absorbed through the skin. Acetic acid forms ice-like solid below 62°F (17°C).

Target Organs: Teeth, eyes, skin, mucous membranes.

Potential Health Effects

Eye: Causes severe eye irritation. Contact with liquid or vapor causes severe burns and possible irreversible eye damage.

Skin: Causes skin burns. May be harmful if absorbed through the skin. Contact with the skin may cause blackening and hyperkeratosis of the skin of the hands.

Ingestion: May cause severe and permanent damage to the digestive tract. Causes severe pain, nausea, vomiting, diarrhea, and shock. May cause polyuria, oliguria and anuria. Rapidly absorbed from the gastrointestinal tract.

Inhalation: Effects may be delayed. Causes chemical burns to the respiratory tract. Exposure may lead to bronchitis, pharyngitis, and dental erosion. May be absorbed through the lungs.

Chronic: Chronic exposure to acetic acid may cause erosion of dental enamel, bronchitis, eye irritation, darkening of the skin, and chronic inflammation of the respiratory tract. Acetic acid can cause occupational asthma. One case of a delayed asthmatic response to glacial acetic acid has been reported in a person with bronchial asthma. Skin sensitization to acetic acid is rare, but has occurred.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.

Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

Ingestion: If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

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

Notes to Physician: Persons with pre-existing skin disorders or impaired respiratory or pulmonary function may be at increased risk to the effects of this substance. Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: Vapors may form an explosive mixture with air. Use water spray to keep fire-exposed containers cool. Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products. Reacts with most metals to form highly flammable hydrogen gas which can form explosive mixtures with air. Flammable liquid and vapor. May be ignited by friction, heat, sparks, or flame. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.

Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. Use water spray to cool fire-exposed containers. For large fires, use water spray, fog or alcohol-resistant foam.

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Use water spray to dilute spill to a non-flammable mixture. Avoid runoff into storm sewers and ditches which lead to waterways. Wash area with soap and water. Use water spray to disperse the gas/vapor. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. Cover with material such as dry soda ash or calcium carbonate and place into a closed container for disposal. A vapor suppressing foam may be used to reduce vapors.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid contact with heat, sparks and flame. Do not get on skin or in eyes. Do not ingest or inhale. Discard contaminated shoes. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage: Keep away from heat, sparks, and flame. Keep from freezing. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Do not store near alkaline substances. Acetic acid should be kept above its freezing point (62°F), since it will expand as it solidifies and may break container.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH American Conference of Governmental Industrial Hygienists	NIOSH National Institute of Occupational Safety and Health	OSHA - Final PELs Occupational Safety and Health Administration
Acetic acid	10 ppm TWA 15 ppm STEL	10 ppm TWA; 25 mg/m ³ TWA; 50 ppm IDLH	10 ppm TWA 25 mg/m ³ TWA

ppm: *parts per million*, which in the context of airborne hazards refers to a volume-to-volume or mole-for-mole ratio. One mole of gas at room temperature is contained in approximately 24.4 L (0.0244 m³). Thus, 1 cubic meter of air contains approximately 41 moles of gas particles, and 1 part per million of a hazardous gas would then involve 41 micromoles or 0.041 millimoles of gas per cubic meter. For acetic acid (MW 60, or 60 mg/mmol), then, "1.0 ppm" would be the same as "2.5 mg/m³," and 10 ppm is approximately 26 mg/m³. Note that ppm in air does not depend upon molar mass, but mg/m³ does.

PEL: *Permissible Exposure Limit* is the maximum amount or concentration that an adult worker may be exposed to without harm for a specific period of time under OSHA regulations.

TWA: *Time Weighted Average* is the average value for exposure over a typical 8 hour work shift.

Ceiling Value: At no time should this exposure limit be exceeded.

STEL: *Short Term Exposure Limit* is the concentration to which workers can be exposed continuously for a short period of time without harm, typically 15 minutes of exposure.

IDLH: level of exposure that is *Immediately Dangerous to Life or Health*

OSHA Vacated PELs: Acetic acid: 10 ppm TWA; 25 mg/m³ TWA

Personal Protective Equipment

Eyes: Wear chemical goggles.

Skin: Wear appropriate gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR §1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid	Flash Point: 39 °C (102.20 °F)
Appearance: colorless liquid	Decomposition Temperature: Not available.
Odor: pungent odor - vinegar odor	NFPA Rating: (estimated) Health: 3; Flammability: 2;
pH: 2.4 (1M), 2.9 (0.1M)	Reactivity: 0
Vapor Pressure: 11.4 mm Hg @ 20 °C	Explosion Limits, Lower: 4.0 vol %
Vapor Density: 2.10 (Air=1)	Upper: 19.9 vol %
Evaporation Rate: 0.97 (n-Butyl acetate=1)	Solubility: Soluble in water; releases heat/vapor.
Viscosity: 1.22 cP	Specific Gravity/Density: 1.05 (Water = 1)
Boiling Point: 117-118 °C	Molecular Formula: C ₂ H ₄ O ₂
Freezing/Melting Point: 16.6 °C	Molecular Weight: 60.04
Autoignition Temperature: 426 °C (798.80 °F)	

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions.

Conditions to Avoid: Incompatible materials, ignition sources, excess heat.

Incompatibilities with Other Materials: Metals, acetic anhydride, alcohols, amines, ammonium nitrate, chlorine trifluoride, nitric acid, permanganates, peroxides, sodium hydroxide, sodium peroxide, hydrogen peroxides, acetaldehyde, caustics (e.g. ammonia, ammonium hydroxide, calcium hydroxide, potassium hydroxide, sodium hydroxide), acid anhydrides, chlorosulfonic acid, oleum, chromium trioxide, potassium hydroxide, carbonates, bromine pentafluoride, perchloric acid, chromic anhydride, potassium-tert-butoxide, calcium salts, ethyleneimine, Attacks some forms of plastics, rubbers, and coatings., 2-aminoethanol, ethylene diamine, phosphorus trichloride, chromic acid anhydride, phosphorus isocyanate, diallyl methyl carbinol + ozone, nitric acid + acetone, xylene, sodium salts.

Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.

Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:

CAS# 64-19-7: AF1225000

LD50/LC50:

CAS# 64-19-7:

Draize test, rabbit, skin: 50 mg/24H Mild;

Inhalation, mouse: LC50 = 5620 ppm/1H;

Oral, rat: LD50 = 3310 mg/kg;

Skin, rabbit: LD50 = 1060 uL/kg;

Carcinogenicity:

CAS# 64-19-7: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.

Epidemiology: No information available.

Teratogenicity: No teratogenic effects were observed among the offspring of mice, rats, or rabbits that had been given very large doses of apple cider vinegar (containing acetic acid) during pregnancy.

Reproductive Effects: Intratesticular, rat: TDLo = 400 mg/kg (male 1 day(s) pre-mating) Fertility - male fertility index (e.g. # males impregnating females per # males exposed to fertile nonpregnant females).

Neurotoxicity: No information available.

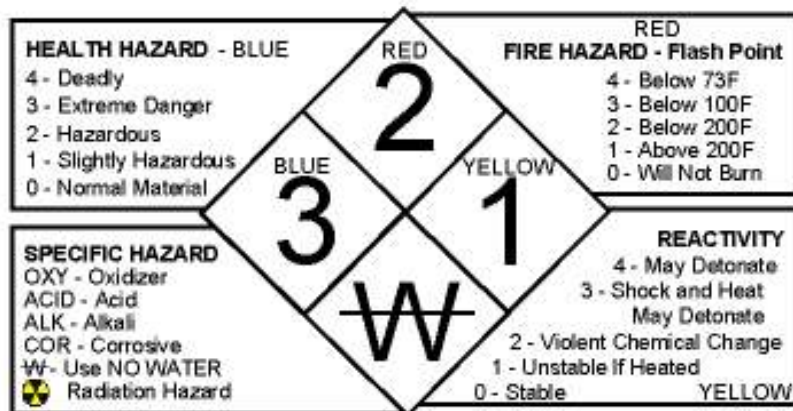
Mutagenicity: Sister Chromatid Exchange: Human, Lymphocyte = 5 mmol/L.; Unscheduled DNA Synthesis:

Administration onto the skin, mouse = 79279 ug/kg.; Cytogenetic Analysis: Hamster, Ovary = 10 mmol/L.

Other Studies: See actual entry in RTECS for complete information.

Chemical Labeling

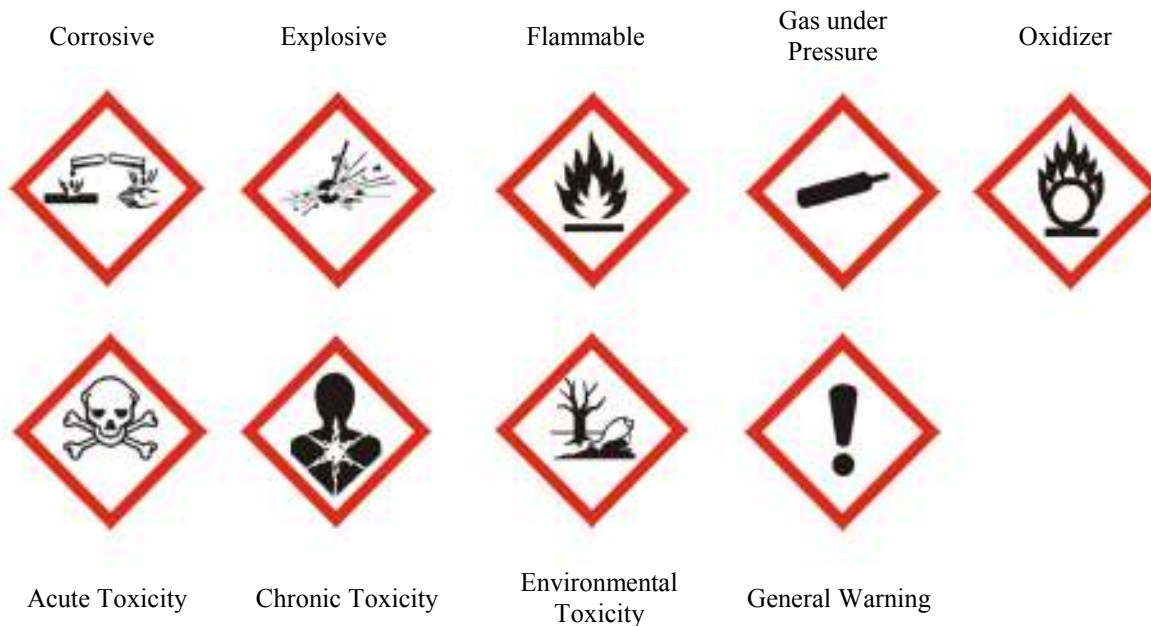
In the laboratory you will notice that all containers are labeled. In addition to the name, chemical formula, and physical properties of the substance, a few other labeling systems will be apparent.



NFPA (National Fire Protection Association): A colored diamond inscribed with numbers represents NFPA codes. The colors correspond to a chemical's fire, reactivity, health, or other hazard, and the number within a particular color indicates the hazard level associated with that category. Higher numbers indicate greater potential hazards. The specific codes are indicated in the figure to the left.

Globally Harmonized System of Classification and Labeling of Chemicals (GHS): The GHS addresses classification of chemicals by types of hazard and proposes hazard communication elements, including labels and safety data sheets. It aims at ensuring that information on physical hazards and toxicity from chemicals is available in order to enhance the protection of human health and the environment during the handling, transport and use of these chemicals at national, regional and worldwide levels, an important factor for trade facilitation. The system is comprised of a pictogram, signal words and a hazard statement. Numbers shown on the pictogram indicate the division level within the hazard category. For more information, see http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html.

GHS Pictograms



Description of PPE Violation Process

It is your responsibility to understand and abide by all safety policies while in the chemistry laboratories. It is the responsibility of all Chemistry department faculty and staff to report violations of the policies. This includes your instructor as well as any other faculty or staff who might be passing through the laboratory at any time. The following describes how the Chemistry department will manage its personal protective equipment policies.

0. Grace Period

During the first laboratory period of the term where goggles are required, the instructor and other staff members will warn students, if necessary, to wear personal protective equipment. This verbal warning does not result in a written violation, but serves to reinforce good laboratory practices used in the chemical profession. Recording of violations will begin the next lab period; in the case where a student fails to appropriately respond to warnings given by faculty/staff, the violations begin immediately.

1. First Violation

The student will be immediately dismissed from the laboratory for the remainder of the period and will lose all points associated with the day's work. Faculty/staff will have the student sign under **Violation 1** on the Violation Reporting Form included in the lab manual. Faculty/staff will return the form to the department office for the lab and/or course instructor's signature and for record keeping. The lab instructor will send a CRS form to the Dean of Students office noting the student's violation of chemistry department safety policies.

2. Second Violation

The student will be immediately dismissed from the laboratory for the remainder of the period and will lose all points associated with the day's work. Faculty/staff will have the student obtain the previously filed Violation Reporting Form from the department office. Both the faculty/staff and student will sign under **Violation 2**. Faculty/staff will return the form to the department office for signatures (lab/course instructor, department chair) and the form filed for record keeping. The lab instructor will send a second CRS form to the Dean of Students office noting the repeated violation of chemistry department safety policies by the student and the potential for dismissal from the course with the next violation.

The student will arrange a meeting with the chemistry department chair and chemical hygiene officer to discuss the situation and importance of following safety policies. To be readmitted to the laboratory, the student must obtain the signatures of the chair and chemical hygiene officer verifying that a meeting occurred.

3. Third Violation

The student will be immediately dismissed from the laboratory for the remainder of the period and will lose all points associated with the day's work. Faculty/staff will have the student obtain the previously filed Violation Reporting Form from the department office. Both the faculty/staff and student will sign under **Violation 3**, and the faculty/staff member will return the form to the department office for signatures (lab/course instructor, department chair). The department chair will forward a copy of the Violation Reporting Form to the Dean of the College (or his/her designee) with the recommendation that the student be dropped from the course. The Dean of the College's office will reply to both the department chair and student regarding the action to be taken. Unless notified by the Dean's office indicating otherwise, the student will not be permitted to return to the laboratory for the remainder of the term.

4. Additional Violations

Any additional violations will follow the process outlined in the section titled **Third Violation**.

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Personal Protective Equipment (PPE) Violation Reporting Form

 Print Student Name

 Course I.D./Section/Lab Section

 Term

The student, named above, did not wear approved personal protective equipment during laboratory work associated with the above course. Failure to follow safety guidelines puts people at increased risk of injury. By signing below, the student acknowledges this violation of chemistry department safety policies. Three recorded violations of the same type may result in cancellation of the student's registration in the course.

Violation 1

<hr/> Student Signature	<hr/> Date	PPE Violation Type (check box) <input type="checkbox"/> goggles <input type="checkbox"/> footwear <input type="checkbox"/> other _____
<hr/> Faculty/Staff Signature	<hr/> Date	
<hr/> Lab Instructor Signature	<hr/> Date	
<hr/> Course Instructor Signature	<hr/> Date	

Violation 2

<hr/> Student Signature	<hr/> Date	PPE Violation Type (check box) <input type="checkbox"/> goggles <input type="checkbox"/> footwear <input type="checkbox"/> other _____
<hr/> Faculty/Staff Signature	<hr/> Date	
<hr/> Lab Instructor Signature	<hr/> Date	
<hr/> Course Instructor Signature	<hr/> Date	
<hr/> Department Chair Signature	<hr/> Date	

Violation 3

<hr/> Student Signature	<hr/> Date	PPE Violation Type (check box) <input type="checkbox"/> goggles <input type="checkbox"/> footwear <input type="checkbox"/> other _____
<hr/> Faculty/Staff Signature	<hr/> Date	
<hr/> Lab Instructor Signature	<hr/> Date	<i>Registrar's Office Action</i> _____
<hr/> Course Instructor Signature	<hr/> Date	_____
<hr/> Department Chair Signature	<hr/> Date	_____ Date

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Safety Policies and Procedures Signature Sheet

I have read all the materials in *Chemical and Laboratory Safety: Policies & Procedures* and any additional safety information provided by the laboratory instructor for use in the course in which I am enrolled. I understand this material and how it applies to the laboratory in which I will be working. Furthermore, I have familiarized myself with the location of safety equipment contained in the laboratory, and I have asked for clarification of those points I did not understand.

Signed: _____ Date: _____

Name: _____
please print

Lab Instructor: _____
please print

Course Instructor: _____
please print

Course Number (check box below)

<input type="checkbox"/> 107	<input type="checkbox"/> 111	<input type="checkbox"/> 121
<input type="checkbox"/> 124	<input type="checkbox"/> 125	<input type="checkbox"/> 126
<input type="checkbox"/> 253	<input type="checkbox"/> 254	<input type="checkbox"/> 256
<input type="checkbox"/> 357	<input type="checkbox"/> 373	<input type="checkbox"/> 374
<input type="checkbox"/> 376	<input type="checkbox"/> 378	<input type="checkbox"/> 391

Laboratory Section (check box below)

<input type="checkbox"/> A	<input type="checkbox"/> B
<input type="checkbox"/> C	<input type="checkbox"/> D
<input type="checkbox"/> E	<input type="checkbox"/> F
<input type="checkbox"/> G	<input type="checkbox"/> H
<input type="checkbox"/> I	<input type="checkbox"/> J

ChBi Course Number (check box below)

<input type="checkbox"/> 125	<input type="checkbox"/> 126	<input type="checkbox"/> 127
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