

Cornerstone University

# Chemical Hygiene Plan

Reference 29 CFR 1910.1450 Occupational Exposure to  
Hazardous Chemicals in Laboratories

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## Forward

On January 31, 1990, the Occupational Safety and Health Administration (OSHA) promulgated a final rule for occupational exposure to hazardous chemicals in laboratories. Included in the standard, which became effective on May 1, 1990, is a requirement for all employers covered by the standard to develop and carry out the provisions of the Chemical Hygiene Plan (CHP).

A CHP is defined as a written program which sets forth procedures, equipment, personal protective equipment and work practices that are capable of protecting employees and research students from the health hazards presented by hazardous chemicals used in that particular workplace. Components of the CHP must include standard operating procedures for safety and health, criteria for the implementation of control measures, measures to ensure proper operation of engineering controls, provisions for training, information dissemination, provisions for medical consultation, designation of responsible personnel, and identification of particularly hazardous substances.

This plan is the Chemical Hygiene Plan developed for Cornerstone University, Grand Rapids, MI 49341. This CHP is maintained and readily available to laboratory employees and research students in the DeWitt Center for Science and Technology, administrative assistant's office (DEWT 201) or online at <https://docs.google.com/document/d/1i6TlEXzpYMUrAi5rJ5hWjw3NmnbrvVKf9u-Rvd-txTE/edit?usp=sharing>. All laboratory personnel must know and follow the procedures outlined in this plan. All operations performed in the laboratory must be planned and executed in accordance with the enclosed procedures. In addition, each person is expected to develop protocols of safe personal chemical hygiene habits aimed at the reduction of chemical exposures to themselves and coworkers.

This document was developed to comply with paragraph e of the referenced OSHA 1910.1450 standard. Cornerstone University will maintain the facilities and procedures employed in the laboratory compatible with current knowledge and regulations in laboratory safety. This CHP will be reviewed, evaluated, and updated at least annually and is readily available to personnel, their representatives and any representatives of the Assistant Secretary of Labor for OSHA.

## POLICY STATEMENT

This Chemical Hygiene Plan (CHP) establishes a written program in accordance with the requirements of the Michigan Occupational Safety and Health Act (MIOSHA) Part 431 Hazardous Work in Laboratories Standard. The CHP is available internally on the Campus Safety page on myCU under Resources/Policy and externally at <https://www.cornerstone.edu/about/consumer-information/>.

The intent of this CHP is to protect Cornerstone University employees and all personnel working in Cornerstone University Laboratories from hazardous chemicals and promote a healthy and safe work environment. The CHP includes information to ensure that all laboratory personnel have working knowledge about the hazardous chemicals they use. The CHP is also intended to provide information on best practices in laboratory health and safety.

## SCOPE

The CHP applies to all laboratories at Cornerstone University covered by the Hazardous Work in Laboratories Standard. The standard applies to all facilities where the "laboratory use of hazardous chemicals" occurs. At Cornerstone University, this includes research and teaching labs in the DeWitt Center for Science and Technology.

It does not include areas under the control of Physical Plant or Dining Services, as any chemical use would be some type of production basis.

"Hazardous chemical" means a chemical for which there is statistically significant evidence, based on at least one study that is conducted in accordance with established scientific principles, that acute or chronic health effects may occur in employees who are exposed to the chemical. These health effects include those that result from exposure to chemicals which are any of the following:

- i) Carcinogens.
- ii) Toxic or highly toxic agents.
- iii) Reproductive toxins.
- iv) Irritants.
- v) Corrosives.
- vi) Sensitizers.
- vii) Hepatotoxins.
- viii) Nephrotoxins.
- ix) Neurotoxins.
- x) Agents that act on the hematopoietic systems.
- xi) Agents that damage the lungs, skin, eyes, or mucous membranes.

This CHP does not address in detail work with biological agents or blood-borne pathogens.

### **1.0 Standard Operating Procedures for Laboratory Chemicals 1.1 Chemical Procurement**

- 1.1.1 The decision to procure a chemical or product containing chemicals (hereafter called chemicals) shall be a commitment to handle and use the chemical properly from initial receipt to ultimate disposal.
- 1.1.2 Chemicals utilized in an area shall be those that are appropriate for the ventilation system.
- 1.1.3 All chemicals should be received and inventoried by a lab director. Other personnel who might receive chemical shipments shall be knowledgeable of the proper procedures for receipt. Chemical containers shall not be accepted without accompanying labels and packaging in accordance with all appropriate regulations. All chemical shipments must be dated when received.

## 1.2 Chemical Storage

Chemical storage is a vital component of achieving overall safety. Because of its importance, several general rules must be followed:

- 1.2.1 Every chemical should have a specific storage place and should be returned to that location after use.
- 1.2.2 Chemicals should be stored in designated areas according to type and compatibility (acids, bases, corrosives, etc.).
- 1.2.3 Storage limits of flammable liquids shall be in accordance with NFPA regulations based on size and type of lab and class of liquid.
- 1.2.4 Chemicals shall be inventoried at least annually. Containers should be checked for proper labeling and container integrity. If a label is loose, missing, or deteriorated, the label should be secured or replaced, or the chemical should be disposed of properly (see chemical waste management).
- 1.2.5 Storage of compressed gas cylinders in use or otherwise is as follows:
  - 1.2.5.1 All cylinders (except lecture bottles) shall be secured by a chain or strap to a non-movable object.
  - 1.2.5.2 While being moved from one location to another or when not in use, cylinders shall have caps on at all times.

## 1.3 Chemical Handling

Each lab and/or teaching assistant, research student, or employee with the training, education and resources provided by supervision, shall develop and implement work habits consistent with this Chemical Hygiene Plan to minimize personal and coworker exposure to the chemicals in the laboratory. Based on the realization that all chemicals inherently present hazards in certain conditions, exposure to all chemicals shall be minimized.

The following precautions should be followed when handling and using chemicals:

- 1.3.1 Skin contact with hazardous chemicals shall be avoided.
- 1.3.2 Storage, handling, and consumption of food or beverages shall not occur in labs unless otherwise designated.
- 1.3.3 Eating or drinking in areas where chemicals are present is prohibited; smoking is prohibited in all areas.
- 1.3.4 Risk determinations shall be conservative in nature when dealing with unknowns, mixtures, or new products.
- 1.3.5 The engineering controls and safety equipment in the laboratory shall be

utilized and inspected.

## **1.4 Chemical Transport**

When Transporting chemical bottles in common areas outside of the lab, care must be taken to avoid spills and contaminating common surfaces. When transporting chemicals:

- 1.4.1 Use an unbreakable secondary container such as a plastic or rubber bucket, a sturdy cart with lips for containment, commercial HazMat shipping box (unopened), or other appropriate secondary containment for especially small or oddly shaped materials
- 1.4.2 Maintain an ungloved hand to open doors, push elevator buttons and otherwise touch common surfaces.
- 1.4.3 Use elevators when moving chemicals between floors to prevent stairway spills when appropriate for the chemical. When transporting liquified gases, particular care should be taken when using elevators.

## **1.5 Prior Approval**

- 1.5.1 Some procedures and working with some hazardous materials requires the prior approval of the Executive Vice President and the CHO, including the use of particularly hazardous chemicals (section 1.6).

## **1.6 Particularly Hazardous Chemicals**

Particular caution should be used when working with particularly hazardous substances. Chemicals that fall into this category are “select carcinogens,” reproductive toxins and substances with a high degree of acute toxicity based on information from the SDS for that substance. Use of a particularly hazardous substance requires consideration of the following ahead of time, as appropriate for that particular substance:

- 1.6.1 Establishment of a designated area
  - 1.6.1.1 Use and store these materials only in an area designated for that purpose. This could be a restricted access hood, a glove box or area of the lab set aside for this purpose. The area and the bottles should be labeled appropriately.
- 1.6.2 Use proper containment devices
  - 1.6.2.1 Use a hood or other appropriate containment device for any procedure that may generate vapors or aerosols.
- 1.6.3 Procedures for safe removal of contaminated waste.
  - 1.6.3.1 Follow normal waste disposal procedures and contact the Chemistry Lab Director for transfer of waste to the waste accumulation area. See section 10.0
- 1.6.4 Decontamination procedures

1.6.4.1 Before leaving the designated area, remove PPE and dispose of it in an appropriately labeled waste container. Treat this container as contaminated waste (see Section 1.6.3.1).

1.6.4.2 Wash hands when leaving the designated area

## **1.7 Personal Protective Equipment**

1.7.1 Eye protection is required for all personnel and visitors, and will be worn at all times when in the laboratory and areas where chemicals are stored and/or handled. Safety glasses meeting ANSI Z87.1-2010 are available.

1.7.2 Chemical goggles and/or a face shield shall be worn during handling operations as procedures dictate.

1.7.3 Additional PPE may be used as appropriate.

## **1.8 Labeling**

1.8.1 Primary (commercial) containers

1.8.1.1 Primary containers shall have commercial labels. Primary containers shipped since June 1, 2005 shall have labels that comply with GHS.

1.8.1.2 Primary containers received before June 1, 2005 may retain their original labels. If the original labels become defaced, GHS compliant labels will be added.

1.8.2 Secondary (non commercial) containers

1.8.2.1 Secondary containers shall, at minimum, have the product identifier of the chemical and the general description of the hazards of the chemical. When possible, the label should also contain the date made and the name of the preparer. When non standard abbreviations (not recommended) are used, a key to the abbreviations must be posted in the room.

1.8.2.1.2 When possible, the label of a secondary container will be a simplified GHS label including: product identifier, signal word, hazard pictograms and hazard statements

1.8.3 The Chemical Hygiene Officer, Lab Directors, and/or the Occupational Health and Safety Manager shall periodically inspect the labeling program.

## **2.0 Safety and Emergency Equipment**

**2.1** Telephone numbers of emergency personnel, supervisors and other workers, as deemed appropriate, shall be posted at the entrance of each designated area.

**2.2** All personnel shall be instructed in the location and proper usage of emergency showers and eyewashes. The eyewashes and emergency showers shall be

inspected on a regular basis.

**2.3** Appropriate signage for safety and emergency equipment shall be posted.

**2.4** All personnel shall receive basic safety training appropriate for their work area.

### **3.0 Engineering Controls - HVAC, Hoods, Rooms, Glove Boxes**

The engineering controls installed in laboratories and work areas are intended to minimize unnecessary personnel exposure to chemical and physical hazards in the workplace. The installed controls shall be maintained in proper working order and be inspected in a timely manner.

#### **3.1 Modification**

No modification of engineering controls will occur unless testing indicates that worker protection would continue to be adequate.

#### **3.2 Improper Function**

Improper function of engineering controls must be reported to the Chemical Hygiene Officer or supervisor immediately. The system (and possibly area) shall be taken out of service until proper repairs have been executed.

### **4.0 Personnel Information and Training**

#### **4.1 Hazard Information**

All personnel will be apprised of the hazards presented by the chemicals in use in the laboratory. Each person shall receive training at the time of initial assignment to the laboratory, and prior to assignments involving new exposure situations, and at a regular frequency as determined by the appropriate supervisor.

#### **4.2 Safety Data Sheets**

Safety Data Sheets (SDS) are required to inform the employee of the properties and hazards of chemicals that are found in the workplace. The following will apply in dealings with SDSs.

4.2.1 SDS's are posted to the online [chemical inventory database](#), and are publicly available for all employees and students with or without login. In case of a power and/or internet outage, alphabetized SDS are located in binders in DEWT 202

4.2.2 An SDS shall be maintained for each hazardous chemical in the workplace.

4.2.3 All SDSs shall contain information required by federal regulation.

#### **4.3 Training**

This training shall include methods of detecting the presence of hazardous chemicals, physical characteristics, and health hazards of chemicals in the lab, and measures personnel can take to protect themselves from these hazards. The training shall present the details of the Chemical Hygiene Plan, and shall



include:

4.3.1 the contents of the OSHA laboratory standard, and its appendices;

4.3.2 the location and availability of the Chemical Hygiene Plan;

4.3.3 information regarding Safety Data Sheets;

4.3.4 GHS labels

4.3.5 labeling of secondary containers

4.3.6 the HMIS labeling system (for historical purposes)

The Chemical Hygiene Officer or their designee shall conduct the training. The following materials may be used during training: Audiovisual Programs, Interactive online training, Written Materials, Overhead Projection Materials

4.3.7 The Principle Investigator or Supervisor responsible for specific labs or areas shall conduct further training for laboratory specific procedures.

## **5.0 Medical Consultations and Examinations**

**5.1** An opportunity to receive medical attention is available to all personnel who work with hazardous chemicals in the laboratory. The opportunity for medical attention will be made available to personnel under the following circumstances:

5.1.1 Whenever a worker develops signs or symptoms associated with a hazardous chemical to which they may have been exposed in the laboratory.

5.1.2 Whenever an event takes place in the laboratory such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure the worker will be provided an opportunity for medical consultation for the purpose of determining the need for medical examination.

**5.2** These medical consultations and examinations shall be provided without cost to the worker, without loss of pay and at a reasonable time and place.

**5.3** These medical consultations and examinations shall be administered by or under the direct supervision of a licensed physician. Workers seeking the opportunity of medical consultation should inform the supervisor for that area.

5.3.1 In case of emergency, call 911. If a non campus phone was used to call 911, also call campus safety ("0" from a campus phone or 616-949-5300 ) to let them know there is an emergency.

5.3.2 If the situation is not emergent, workers should be seen at the Metro Health Beltline (1310 E Beltline Ave. SE, Grand Rapids, MI 49506).

5.3.3 Students who are injured or exposed in their role as a student (not being paid) should be seen at Health Services in Verna Miller Hall, unless it is an emergency.

## **6.0 Chemical Hygiene Responsibilities**

Responsibility for chemical hygiene rests at many levels, including:

### **6.1 Chief Executive Officer**

The Vice President and Chief Financial Officer has the ultimate responsibility for chemical hygiene throughout the laboratory and, with assistance of all relevant program administrators and faculty, will provide continued support for chemical hygiene. Both the Occupational Health Manager and the Chemical Hygiene Office report directly to the Compliance Coordinator regarding chemical hygiene issues.

### **6.2 Health and Fire Safety Manager**

The Occupational Health Manager shall provide general oversight of compliance with OSHA regulations in the workplace, to include:

6.2.1 Annual review of the Campus Chemical Hygiene Plan (see section 9.0).

6.2.2 Annual inspection of chemical laboratories and safety equipment.

6.2.3 Annual review of accident report forms.

### **6.3 Chemical Hygiene Officer**

6.3.1 Maintain current knowledge concerning the legal requirements of regulated substances in the laboratory

6.3.2 Coordinate with the Occupational Health Manager to review and improve the Chemical Hygiene Plan.

6.3.3 Ensure the appropriate chemical safety training has been provided to all personnel.

6.3.4 Provide general oversight in the workplace in the safe use of chemicals, establishment of safe laboratory practices, and maintenance of a safe environment.

6.3.5 Implement the chemical waste disposal program for the workplace.

6.3.6 Be available for advice on chemical hygiene issues campus wide.

### **6.4 Faculty and Lab Directors**

Faculty are the primary supervisors of students when they are working with chemicals in a lab. Therefore they have overall responsibility for chemical safety with the labs they supervise. The responsibilities include:

6.4.1 Ensuring that laboratory workers and students know and follow the chemical hygiene rules, that Personal Protective Equipment (PPE) is available and used,

and that appropriate training has been provided;

6.4.2 Providing regular chemical safety and housekeeping inspections, including inspection of emergency equipment or requesting that these inspections are done by others;

6.4.3 Ensuring that facilities and equipment for use of any chemical are adequate;

6.4.4 Being familiar with the current legal requirements concerning regulated chemicals under their control;

6.4.5 Determining the requirements for use of protective apparel and equipment;

6.4.6 Initiating and following up on action to eliminate hazards and/or unsafe conditions within their laboratory areas

6.4.7 Report all injuries and incidents to campus security at [campus.safety@cornerstone.edu](mailto:campus.safety@cornerstone.edu).

## **6.5 Lab Workers**

Laboratory Workers, defined as any employee assigned to tasks normally performed in a laboratory or a laboratory storage room, shall be responsible for the following:

6.5.1 Planning and conducting operations in accordance with this Chemical Hygiene Plan;

6.5.2 Developing good personal chemical hygiene habits;

6.5.3 Following all rules, regulations, and instructions pursuant to occupational safety and health standards;

6.5.4 Wearing proper PPE;

6.5.5 Reporting unsafe conditions and practices (including chemical spills) to their supervisor and/or the CHO.

6.5.6 Report all injuries using the form at <https://forms.gle/mUfZti6Yjt9Ns8kv7>.

## **6.6 Students**

Students, defined as individuals who are working in lab for a class, research, or other activity while not being paid by the college, shall be responsible for the following:

6.6.1 Following the safety instructions described by their faculty or staff instructors;

6.6.2 Wearing PPE as directed by their faculty or staff instructors;

- 6.6.3 Reporting unsafe conditions and practices (including chemical spills) to their instructor and/or the CHO;
- 6.6.4 Asking questions when they are unsure of whether a practice is safe. These questions can be directed to the TA, faculty or staff instructor or the CHO; and
- 6.6.5 Report all injuries to their instructor and filling out a “Student Accident Report for Labs” form at <https://forms.gle/AFXd7QWLPK2KqvJn7>.

## **7.0 Recordkeeping**

- 7.1 The immediate supervisor will conduct accident investigations with assistance from other personnel as deemed necessary. See Appendix E Accident/Incident Reports.
- 7.2 Accident reports will be written and retained for five (5) years. The immediate supervisor is responsible for the completion and signing of the report. Forward the report to the Chemical Hygiene Officer.
- 7.3 Exposure records for hazardous chemicals and harmful physical agents will be maintained for 30 years per 29 CFR 1910.20.
- 7.4 Medical records for personnel exposed to hazardous chemicals and harmful physical agents will be maintained for the duration of appointment plus 30 years per 29 CFR 1910.20.
- 7.5 Inventory and usage records for high-risk substances (amounts of substances on-hand, amounts used, and names of workers involved) shall be maintained for 30 years.
- 7.6 Records of personnel training will be maintained for 5 years after the termination of appointment.

## **8.0 Chemical Spills, Releases and Accidents**

In the event of a chemical spill, release or other accident, Cornerstone University will adhere to the procedures outlined in the Emergency Response plan as required by OSHA standard 29 CFR 1910.38 and 1910.20.

## **9.0 Annual Chemical Hygiene Plan Audit**

The Occupation Health Manager will conduct an audit of all phases of the Chemical Hygiene Plan each year. Results will be provided to the Chief Executive Officer, Chemical Hygiene Officer, Department Chairs, and Laboratory Directors. Laboratory Directors, Principle Investigators, and Supervisors are responsible for taking corrective action in their respective areas.

## **10.0 Chemical Waste Management**

Concern for the environment and increasing governmental regulations make it necessary

for a comprehensive, chemical waste management program. The creation and implementation of a program, which protects personnel and the environment rests ultimately with the Chief Executive Officer.

Personnel are responsible for strict adherence to the procedures outlined in the policy.

**10.1** All chemical waste transported off site must be handled by a licensed and reputable contractor.

**10.2** Appropriate manifest records of chemical disposal shall be maintained for a minimum of five years.

## 11.0 Revisions to the CHP

Revision	Date Description
0	8/2021 Implementation
1	

**Appendix A: Guide to Reading Safety Data Sheets** The OSHA Brief on Safety Data Sheets (SDS) is available on the OSHA website: <https://www.osha.gov/Publications/OSHA3514.pdf>, accessed 2019-10-21

An SDS contains information about the chemical or chemical mixture supplied by a manufacturer. It is divided up into 16 sections:

Section 1: Identification

Section 2: Hazard(s) Identification

Section 3: Composition/Information on Ingredients

Section 4: First-Aid Measures

Section 5: Fire-Fighting Measures

Section 6: Accidental Release Measures

Section 7: Handling and Storage

Section 8: Exposure Controls/Personal Protection

Section 9: Physical and Chemical Properties

Section 10: Stability and Reactivity

Section 11: Toxicological Information

Section 12: Ecological Information (non-mandatory)

Section 13: Disposal Considerations (non-mandatory)

Section 14: Transportation Information (non-mandatory)

Section 15: Regulatory Information (non-mandatory)

Section 16: Other Information

The following is a list of acronyms, terms and definitions associated with the Safety Data Sheet in the Hazard Communication Program.

## **SDS glossary**

### **-A**

Absorption- The process by which a substance can be readily taken into the body. For example, some chemicals can be absorbed through unbroken skin.

Acid- A compound consisting of hydrogen plus one or more other elements and which, in the presence of some solvents or water, reacts to release hydrogen. Acids have the ability to turn litmus paper red to neutralize bases.

Acute- Severe, usually critical, often dangerous conditions in which relatively rapid changes occur as a result of exposure to high concentrations of material over a short period of time. Acute effects are easier to reverse than are the effects of a chronic exposure. See "chronic."

Alkali- A compound which reacts with an acid to form a salt. Like bases, alkalis turn litmus paper blue. See "base and pH."

Aliphatic- Pertains to an open-chain carbon compound that is usually applied to petroleum products derived from a paraffin base, has a straight or branched chain and has a saturated or unsaturated molecular structure. Examples: hexane, naphtha, and mineral spirits.

Alopecia- Loss of hair.

Analgesia- Loss of sensitivity to pain.

Anaphylaxis- Hypersensitivity resulting from sensitization following prior contact with a chemical or protein.

Anesthesia- Loss of sensation or feeling.

Anhydride- An oxide or compound which when combined with water produces an acid or base.

Anhydrous- Does not contain water.

Anosmia- Loss of the sense of smell.

Anoxia- A lack of oxygen from inspired air- literally without oxygen. Also see "hypoxia."

Anorexia- Loss of appetite.

Aqueous- A water-based solution.

Argyria- Local or generalized impregnation (grey-blue color) of the body tissues with silver.

Aromatic- Fragrant or of marked odor which is applied to a group of hydrocarbons and their derivatives characterized by the presence of one or more six-carbon rings. Examples are benzene, toluene and xylene.

Asphyxia- Unconsciousness due to interference with the oxygen of the blood.

Asphyxiation- A condition that causes asphyxia, suffocation.

Ataxia- A loss of power of muscular coordination.

Atrophy- A wasting or diminution in the size of a part of the body.

Auto-Ignition Temperature- The lowest temperature at which a flammable gas or vapor-air mixture will ignite from its own heat source or a contacted heated surface without the presence of a spark or flame.

## **-B**

Barrier Cream- A cream used on human skin to protect against injury from contact with specific types of harmful agents.

Base- A compound which reacts with an acid to form a salt. It turns litmus paper blue. Base is another term for "Alkali."

Biohazard- This is a combination of the words "biological hazard" and is used to describe infectious agents presenting a risk or potential risk to the well-being of man or animals either directly through infection, or indirectly through disruption of the environment.

Biological Half-Life- The time required for a given species, organ, or tissue to eliminate half of a substance which it takes in.

Boiling Point- The temperature at which a substance will boil. This is the point at which the vapor pressure of a liquid is equal to the atmospheric pressure.

Bradycardia- A slow heartbeat in which the pulse rate falls below 60. Also see "tachycardia."

Breathing Zone- The area of the ambient environment in which a person breathes.

Bronchitis- Inflammation of the bronchial tubes in the lungs.

Buffer- Substance that reduces the change in hydrogen ion concentration, which otherwise would result from adding acids or bases.

## **-C**

Carcinogen- Any substance which under certain qualified exposures produces cancer in animals or humans. A chemical is considered to be a carcinogen if:

- it has been evaluated by the International Research Agency of Cancer (IRAC) and found to be a carcinogen or potential carcinogen; or
- it is listed as a carcinogen or potential carcinogen in the annual report on

- carcinogens published by the National Toxicology Program (NTP); or
- it is regulated by OSHA as a carcinogen.

Ceiling Limit- A concentration that is not to be exceeded.

Carcinogenic- Cancer-producing.

Carcinoma- A malignant tumor or cancer; new growth made up of epithelial cells, tending to infiltrate and give rise to metastasis.

Catalyst- A substance which, without changing itself, causes a chemical reaction to proceed faster.

Cataract- A loss of transparency of the crystalline lens of the eye or of its capsule.

Caustic- Something which strongly irritates, burns or destroys living tissue.

Ceiling Value (C)- A maximum established level which no human exposure should ever exceed.

Chemical- Any element, chemical compound or mixture of elements and/or compounds.

Chemical Change (Reaction)- Change of composition in properties due to rearrangement of elements, atoms, or molecules.

Chemical Name- The scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name which will clearly identify the chemical for the purpose of conducting a hazard evaluation.

Chemical Compound- A substance composed of definite proportions by weight of two or more elements and whose properties differ from those of its elements. Also see "mixture".

Chemical Family- A group of individual elements or compounds with a common general name Example: acetone, methyl ethyl ketone (MEK), etc.

Chloracne- An acne-like eruption from contact with chlorinated naphthalene and polyphenyls acting on sweat glands.

Chronic- Persistent, prolonged, and/or repeated effects that are the result of repeated exposure to low concentrations of a chemical substance over a long period of time. See "acute."

Chronic Effect- An adverse effect on a human or animal with symptoms that develop slowly over an extended period of time or that recur frequently.

Chronic Toxicity- An adverse effect resulting from repeated doses of exposure to a substance over a relatively prolonged period of time. The term is usually used to denote effects in experimental animals.



Combustible Liquid- Any liquid with a flashpoint above 140 degrees °F.

Compressed Gas- A gas under pressure of at least 40 pounds per square inch and some liquids with a very high vapor pressure, i.e., pressure that exceeds 40 pounds per square inch. Examples are argon, helium, and nitrogen.

Concentration- The amount of a substance in a given amount of air.

Conjunctivitis- Inflammation of the conjunctiva, the delicate membrane that lines the eyelids and covers the eyeballs.

Contact Dermatitis- Caused by contact with a primary irritant, a skin irritation at the area of skin contact.

Cornea- Transparent structure of the external layer of the eyeball.

Corrosive- Any material, liquid or solid, that causes visible destruction of or irreversible alternations in human skin tissues at the site of contact (burns). Examples of corrosive caustics are sodium hydroxide or ammonia solutions.

Cutaneous Hazards- Chemicals which irritate the skin.

Cyanosis- Blueness of the skin, generally caused by the lack of oxygen. **-D**

Dermal- Used on or applied to the skin.

Dermal Toxicity- Adverse effects resulting from exposure of the skin to a substance; ordinarily used to denote effects in experimental animals.

Dermatitis- Inflammation of the skin. There are two types of skin reactions: primary irritation dermatitis and sensitization dermatitis. Also see: irritant, sensitizer, and contact dermatitis.

Dose- The term used to express the amount of energy or substance absorbed in a unit volume of an organ or individual. Dose rate is the dosage delivered per unit of time.

Dysfunction- Any abnormality or impairment of an organ.

Dyspnea- Labored or difficult breathing; shortness of breath.

**-E**

Eczema- A skin disease or disorder; one specific type of dermatitis. Edema- An abnormal accumulation of clear, watery fluid in the tissues; swelling.

Element- A substance composed entirely of one kind of atom. Elements are designated by chemical symbols.

Emphysema- A lung disease which the presence of air in the connective tissues of the lungs causes swelling or inflammation.

Epistaxis- Nosebleed; hemorrhage from the nose.

Evaporation Rate- The time it takes for a given amount of material to completely vaporize (evaporate) when compared to an equal amount of reference material, such as water.

**-F**

Flammable- Any substance that is easily ignited, burns intensely, or has a rapid rate of flame spread.

Types of Flammable substances:

Flammable Aerosol- An aerosol that yields a flame projection longer than 18 inches of full valve opening of a flashback (a flame extending back to the valve) at any valve opening.

Flammable Gas- A gas that will burn or explode if combined with air over a wide concentration range. Examples are acetylene, hydrogen, and propane.

Flammable Liquid- A liquid that has a flashpoint below 100 degrees F and can be ignited by a spark without any preheating. Examples are acetone, toluene, and methanol.

Flammable Solid- A solid, other than a blasting agent or explosive that is easily ignited and burns intensely without other fuel being needed. Ignition can occur through friction, absorption of moisture, spontaneous chemical change, or retained from manufacturing or processing. Examples are aluminum metal powder, magnesium metal strips or powder, and zirconium metal.

Flammable (Explosive) Limits- LEL & UEL- Indicates the explosive or flammable range of a vapor or gas. Are those concentrations of a vapor or gas in air below or above which flame does not occur on contact with a source of ignition. The lower explosive limit (LEL) is the minimum concentration below which the vapor-air mixture is too "lean" to burn or explode. The upper explosive limit (UEL) is the maximum concentration above which the vapor-air mixture is too "rich" to burn or explode.

LEL and UEL are given in terms of percentage by volume of gas or vapor in air.

Flash point- The lowest temperature at which a liquid produces enough vapor to form an ignitable mixture with the air.

Fume Fever- An acute condition caused by a brief high exposure to the freshly generated fumes of metals, such as lead or magnesium or their oxides.

## **-G**

Gangrene- Death of tissue combined with putrefaction.

Gastroenteritis- Inflammation of the stomach and intestines.

## **-H**

Hazardous Material- A material that is characterized by one or more of the following: (1) has a flashpoint below 140 degrees F, closed cup, or subject to spontaneous heating; (2) has a threshold limit value below 500 ppm for gases' vapors, below 500 mg/m<sup>3</sup> for fumes, and below 25 mppcf for dusts; (3) single oral dose LD<sub>50</sub> or below 500 mg/kg of body weight; (4) is subject to polymerization which results in the release of large amounts of energy; (5) is a strong oxidizing or reducing agent; (6) causes first degree burns to skin in short time exposure, or is systematically toxic on contact with the skin; and/or (7) in the course of normal operations may produce dusts, gases, fumes, vapors, mists, or smoke which has one or more of the above characteristics.

Health Hazard- Anything (including certain chemicals) that, according to at least one significant scientific study, may be harmful to the health. Chemicals classified as health hazards include those that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants; corrosives, sensitizers, hepatotoxins, neurotoxins, agents that act on the hematopoietic system, or agents which damage the lungs, skin, eyes, or mucous membranes.

Hematologic Disturbances- Blood disturbances.

Hematopoietic System- The system of the body that manufactures blood.

Hematuria- The presence of blood in the urine.

Hepatotoxin- Chemicals which produce liver damage.

Hydrocarbons- Composed solely of carbon and hydrogen atoms, which are the basic building blocks of all organic chemicals.

Hygroscopic- Readily absorbs moisture from the air.

Hypoxia- Insufficient oxygen especially as applied to body cells.

## **-I**

Immiscible- Liquids that do not mix well with each other will form two separate layers or will result in cloudiness or turbidity.

Incompatible- Materials that could cause dangerous reactions from direct contact with one another.

Inflammation- A morbid series of reactions produced in the tissues by an irritant; it is marked by an afflux of blood with exudation of plasma and leukocytes.

Ingestion- The taking in of a substance through the mouth; eating it. The failure to wash hands before eating, drinking, and smoking can result in the ingestion of chemicals.

Inhalation- The act of breathing in. This is the most common route of entry to the body for chemicals.

Inhibitor- An agent which arrests or slows chemical action, or a material used to prevent or retard rust or corrosion.

Injection- The entry of chemicals into the body by means of broken skin from sores, cuts, burns and scratches.

Inorganic- A term used to designate compounds that generally do not contain carbon. That may contain sources of matter other than vegetable or animal. Examples are sulfuric acid and salt.

Insoluble- A substance which is incapable of being dissolved.

Iridocyclitis- Inflammation of both the iris and ciliary body of the eye.

Irritant- A chemical that is not corrosive, but is a substance that causes a reversible inflammatory effect on living tissue by chemical reaction at the site of contact. Also see dermatitis and sensitizer.

Ischemia- Local and temporary anemia due to the obstruction of the circulation to a part of the body.

## **-K**

Ketosis- The condition marked by excessive production of ketone bodies in the body.

## **-L**

Lacrimation- Secretion and discharge of tears.

Latent Period- The period of time between exposure and the first manifestation of damage.

Lavage- A washing of a hollow organ, such as the stomach.

Lead Intoxication- Lead absorption resulting from inhalation of lead dust or fumes, or from swallowing lead dust.

LEL- Lower exposure limit. See “flammable (explosive) limits.”

Lesion- Injury, damage, or abnormal change to body tissue or organs.

Lethal Concentration- LC- a concentration of a substance that is sufficient to kill a test animal.

Lethal Concentration 50- LC50- Also see toxic inhalation LC50.

Lethal Dose- LD- An amount of a substance that is sufficient to kill a test animal.

Lethal Dose 50- LD<sub>50</sub>- See toxic, inhalation LD<sub>50</sub>.

LEL- Lower explosive limit. See flammable (explosive) limits.

Leukemia- A disease of the blood marked by persistent leukocytosis, associated with changes in the spleen, the bone marrow, or the lymphatic nodes.

## **-M**

Malaise- A feeling of general discomfort, distress or uneasiness; an out-of-sort feeling.

Metastasis- Transfer of a disease-producing agency from the site of disease to another part of the body; a secondary metastatic growth or a malignant tumor.

Metabolism- The chemical changes whereby the body functions.

Mixture- A combination of two or more substances which may be separated by mechanical means.

Mutagen- A chemical that causes a defect in sperm or egg cells prior to conception.

## **-N**

Narcosis- Stupor or unconsciousness produced by some narcotic drug. Nausea- Tendency to vomit, feeling of sickness of the stomach.

Necrosis- Local death of tissue.

Nephrotoxins- Chemicals that produce kidney damage.

Neurotoxins- Chemicals that affect the nervous system primarily.

## **-P**

Pyrophoric- A chemical that will ignite spontaneously and burn when exposed to air temperatures below 130 degrees F.

**-R**

Reactivity- The ability of a material to undergo chemical reactions with the release of energy or heat.

Reducing Agent- A material which accepts oxygen in a reaction.

Reproductive Toxins- Chemicals which have a negative effect on the reproductive capabilities, including chromosomal damage (mutations) and birth defects to the fetus (teratogenesis).

Respirator- A device designed to protect the wearer from the inhalation of contaminated air.

Respiratory Disease- Any disease which affects the lungs or the respiratory tract.

Respiratory Irritants- Any chemical that produces a reversible inflammatory effect on the respiratory system.

**-S**

Safety Can- An OSHA-approved closed container which has the following characteristics: (1) a capacity of not more than 5 gallons (19 liters); (2) a spring-closed lid and spout cover; (3) flash- arresting screen; and (4) designed to safely relieve internal pressure if exposed to fire.

Saturation- The maximum concentration of matter that can be dissolved in a solution at a given temperature.

Sensitization- An allergic response reaction that increases in severity with subsequent exposures. A person previously exposed to a certain material is more sensitive when further contact with this material is encounter.

Sensitizer- Chemicals that may cause an allergic reaction after one or more exposures. Once an individual becomes sensitized, a small dose of the material may cause a big effect. See "dermatitis" and "irritant."

Skin Notation- A chemical that can penetrate unbroken skin.

Soluble- Capable of being dissolved.

Solubility- The ability of a material to dissolve in water or other solvent.

Solubility in Water- The percentage of a material (by weight) that will dissolve in water at ambient temperature. Terms used to express solubility are:

Negligible-----less than 0.1%  
Slight-----0.1% to 1.0%  
Moderate-----1 to 10 %  
Appreciable-----more than 10%  
Complete-----soluble in all proportions

Spasm- An involuntary, convulsive, muscular contraction.

Specific Gravity- A measurement used to quantify the weight of a substance by comparing the weight of a given volume of material to the same volume of water. Material with a specific gravity of more than one is heavier than water and will sink if it does not dissolve. Material with a specific gravity of less than one will float on the water if it does not dissolve. See "solubility in water."

Spontaneous Combustion- Combustion resulting from a chemical reaction with the slow generation of heat from oxidation of organic compounds until the ignition temperature of the material (fuel) is reached. This condition is reached only where there is sufficient air for oxidation but not enough ventilation to carry away the heat as fast as it is generated.

Stability- The tendency of material to resist undesirable chemical changes during storage or transportation.

Stupor- Partial or nearly complete unconsciousness.

Synergistic- Pertaining to the action of two or more substances, organs or organisms to achieve an effect of which each is individually incapable.

Systemic- Spread throughout the body and affecting all body systems and organs; not localized in one spot or area.

-T

Tachycardia- Excessively rapid heartbeat.

Target Organ- Primary organ in the body attacked by a chemical.

Teratogens- Chemicals that cause birth defects in a developing fetus.

Thermal Decomposition- The breakdown of a material when heated.

Threshold Limit Value- TLV and PEL

The Threshold Limit Value (TLV)- is a safe exposure level by the American Conference of Governmental Industrial Hygienists (ACGIH). A Permissible Exposure Limit (PEL) is a similar lever set by OSHA. Both refer to airborne concentrations of substances and represent an exposure level under which most people can work constantly for eight hours a day, day after day, with no harmful effects.

Three categories of TLV's are specified:

- a. Time Weighted Average (TLV-TWA)- This is the time-weighted average concentration for a normal eight-hour workday or forty-hour work week, to which all workers may normally be exposed day after day, without adverse effects.
- b. Short-term Exposure Limit (TLV-STEL)- This is the maximum concentration to which workers can be exposed for a period up to fifteen minutes continuously without suffering from irritation; (2) chronic or irreversible tissue change; or (3) narcosis of sufficient degree to impair self-rescue or reduce work efficiency. No more than four 15-minute exposure periods per day are permitted with at least 60 minutes between those exposure periods.
- c. Ceiling (TLV-C)- The concentration that should not be exceeded even instantaneously.

Tinnitus- A ringing or singing sound in the ears.

Toxemia- Poisoning by way of the blood stream.

Toxic- The toxicity of a chemical can be measured using a variety of animal studies. OSHA uses three categories for this:

- a. Oral LD<sub>50</sub>- Lethal dose 50% test; the medium lethal dose (LD<sub>50</sub>) that kills 50% of the albino white rats that received it. Oral LD<sub>50</sub> is expressed as milligrams of chemical per kilogram of test animal body weight. A dose of one milligram per kilogram (mg/kg) is equal to 1 one millionth of the test animal's body weight. OSHA considers a chemical to be toxic if the oral LD<sub>50</sub> is above 50 mg/kg.
- b. Skin LD<sub>50</sub>- a dose that kills 50% of the albino white rabbits that had the chemical applied directly to the bare skin for 24 hours. Skin LD<sub>50</sub> is also expressed in mg/kg. OSHA considers a chemical to be toxic if the oral LD<sub>50</sub> is between 200 mg/kg and 1000 mg/kg.
- c. Inhalation of LC<sub>50</sub>- Lethal concentration 50% is the concentration of a chemical in the air needed to kill 50% of the albino white rats that breathed it. LC<sub>50</sub> is expressed as parts-per- million (ppm) for bases and vapors. LC<sub>50</sub> is also expressed as milligrams per liter (mg/L) for mists, fumes, and dusts. See "highly toxic."

Toxicity- The degree of injury or illness caused by a toxic material.

**-U**

Unstable (Reactive)- A chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shock, pressure, or temperature.

UEL- Upper Explosive Limit- See "flammable explosive limits."



Urticaria- Nettle-rash, hives, elevated itching, white patches.

**-V**

Vapor Density- A measure of how heavy a vapor is compared to air, which has a vapor density of one. Vapors more dense than air accumulate close to the floor and in low spaces.

Vapor Pressure- A measure of how readily a material will evaporate and indicates how volatile a liquid is. The lower the vapor pressure, the slower it evaporates and the longer it takes to build up toxic or explosive concentrations.

Vertigo- Is a feeling of revolving in space; dizziness, giddiness.

Viscosity- Resistance to flow exhibited by a fluid.

Volatility- The tendency or ability of a liquid to vaporize.

Volatile Organic Compound- (VOC)- An organic compound that evaporates.

Volatile Percent- Is the fraction by weight or volume of a chemical that evaporates in a mixture.

Water Reactive- A chemical that reacts with water.

## **ABBREVIATIONS AND SYMBOLS FOUND IN SDS**

**ABIH** American Board of Industrial Hygiene

**ACGIH** American Conference of Governmental Industrial Hygienists

**ACS** American Chemical Society

**AIHA** American Industrial Hygiene Association

**AMA** American Medical Association

**ANSI** American National Standards Institute

**AQTX** Aquatic Toxicity

**ASTM** American Society for Testing and Materials

**atm** Atmosphere

**BLS** Bureau of Labor Statistics

**ca** (circa) about

**CAR** Carcinogenic effects

**CAS** Chemical Abstract Service

**cc** cubic centimeter

**CC** Closed Cup

**(C)** Ceiling concentration

**CFM** Cubic feet per minute

**CFR** Code of Federal Regulations

**CNS** Central Nervous System

**COC** Cleveland Open Cup

**conc** Concentration

**cum or m<sup>3</sup>** Cubic meter

**decomp** Decompose or Decomposition

**DHHS** U.S Department of Health and Human Services

**DOL** U.S Department of Labor of which the Occupational Safety and Health Administration (OSHA) is a part.

**DOT** Department of Transportation

**EPA** Environmental Protection Agency

**F** degree Fahrenheit

**FR** Federal Register

**G.I or GI** Gastrointestinal

**G or gm** Gram

**IARC** International Agency for Research on Cancer

**inhl** inhalation

**insol** insoluble

**IRDS** Primary irritation dose

**IRR** Irritant effects (Systemic)

**kg** Kilogram (one thousand grams)

**L** Liter

**LC<sub>50</sub>** Lethal concentration to 50% of those tested (mean lethal concentration)

**LDLO** Lowest possible lethal dose

**LEL** Lower explosive limit

**LFM** Linear feet per minute

**m<sup>3</sup>** Cubic meter

**mg** Milligram (1/1000, 10<sup>-3</sup>, of a gram)

**mg/mg<sup>3</sup>** Milligrams of substance per cubic meter of air

**mL** milliliter

**mm Hg** Milliliters of Mercury

**MLD** Mild

**mppcf** Millions of particles per cubic foot of air

**MSDS** Material Safety Data Sheets

**MW** Molecular weight

**n** Normal

**NBS** National Bureau of Standards

**NCI** Neoplastic effects

**NFPA** National Fire Protection Association

**NIOSH** National Institute of Occupational Safety and Health

**NOX** Oxides of Nitrogen

**NTIS** National Technical Information Services

**ng** Nanogram (One billionth,  $10^{-9}$ , of a gram)

**OSHA** Occupational Safety and Health Administration

**PEL** Permissible Exposure Limit (by OSHA)

**pH** Negative Logarithm of the hydrogen ion concentration

**PMCC** Pensky-Martens Closed Cup

**ppb** Parts per billion

**PPE** Personal Protective Equipment

**ppm** Parts per million parts of air

**ppt** Parts per trillion

**PUL** Pulmonary

**SCBAF** Self-contained breathing apparatus with full face piece  
**SCC** Setaflash Closed Cup

**SCFM** Standard cubic feet per minute

**SCI** Specific Chemical Identity- means the chemical name Chemical Abstract Services (CAS) registry number, or any other information that reveals the precise chemical designator of the substance.

**SKN** Skin effects

**soln** Solution

**SO<sub>x</sub>** Oxides of Sulfur

**STEL** Short-term exposure limit. Also see "threshold limit value".

**STP** Standard temperature and pressure

**SYS** Systemic effects

**TCC** Tag Closed Cup

**TCLo** Lowest Published toxic dose

**temp** Temperature

**TER** Teratogenic effects

**TFX** Toxic effects

**TLm** Median tolerance limit

**TLV** Threshold limit value

**TOC** Tag Open Cup

**torr** mm Hg pressure

**TWA** Time weighted average

**UEL** Upper Explosive Limit

**ug** Microgram (one millionth,  $10^{-6}$ , of a gram)

**VOC** Volatile Organic Compounds

> Greater than

< Less than

## Appendix B: Explanation of HMIS Ratings

### HMIS® III - HEALTH HAZARD RATINGS

\* **Chronic Hazard** Chronic (long-term) health effects may result from repeated overexposure

**0 Minimal Hazard.** No significant risk to health

**1 Slight Hazard.** Irritation or minor reversible injury possible

**2 Moderate Hazard.** Temporary or minor injury may occur

**3 Serious Hazard.** Major injury likely unless prompt action is taken and medical treatment is given

**4 Severe Hazard.** Life-threatening, major or permanent damage may result from single or repeated overexposures

### HMIS® III - FLAMMABILITY RATINGS

**0 Minimal Hazard.** Materials that will not burn

**1 Slight Hazard.** Materials that must be preheated before ignition will occur. Includes liquids, solids and semi solids having a flash point above 200 °F. (Class IIIB) **2**

**Moderate Hazard.** Materials which must be moderately heated or exposed to high ambient temperatures before ignition will occur. Includes liquids having a flash point at or above 100 °F but below 200 °F. (Classes II & IIIA)

**3 Serious Hazard.** Materials capable of ignition under almost all normal temperature conditions. Includes flammable liquids with flash points below 73 °F and boiling points above 100 °F. as well as liquids with flash points between 73 °F and 100 °F. (Classes IB & IC)

**4 Severe Hazard.** Flammable gases, or very volatile flammable liquids with flash points below 73 °F, and boiling points below 100 °F. Materials may ignite spontaneously with air. (Class IA)

#### **HMIS® III - PHYSICAL HAZARD RATINGS**

**0 Minimal Hazard.** Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react.

Non-Explosives.

**1 Slight Hazard.** Materials that are normally stable but can become unstable (self-react) at high temperatures and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.

**2 Moderate Hazard.** Materials that are unstable and may undergo violent chemical changes at normal temperature and pressure with low risk for explosion. Materials may react violently with water or form peroxides upon exposure to air.

**3 Serious Hazard.** Materials that may form explosive mixtures with water and are capable of detonation or explosive reaction in the presence of a strong initiating source. Materials may polymerize, decompose, self-react, or undergo other chemical change at normal temperature and pressure with moderate risk of explosion

**4 Severe Hazard.** Materials that are readily capable of explosive water reaction, detonation or explosive decomposition, polymerization, or self-reaction at normal temperature and pressure.

#### **HMIS® (SECOND EDITION) – REACTIVITY RATINGS**

**0 Minimal Hazard.** Materials which are normally stable even under fire conditions, and which will not react with water.

**1 Slight Hazard.** Materials which are normally stable, but can become unstable at high temperatures and pressures.

**2 Moderate Hazard.** Materials that undergo violent chemical change at elevated temperatures and pressures. These materials may also react violently with water. **3**

**Serious Hazard.** Materials that are capable of detonation or explosive reaction, but require a strong initiating source, or must be heated under confinement before initiation. Materials which react explosively with water.

**4 Severe Hazard.** Materials that are readily capable of detonation or explosive decomposition at normal temperatures and pressures.

NOTE: See the appropriate HMIS® Implementation Manual for complete descriptions of the rating criteria for each of the various categories.

NOTE: This section is included because there are still HMIS labels on many bottles. New bottles rely on the already included GHS labels instead. See Appendix C.

## **Appendix C: Explanation of the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)**

- a. GHS is a work product of the United Nations which has been implemented in the United States through OSHA's Hazard Communication Standard (HCS), otherwise known as the "Right to understand" (29 CFR 1910). Please see OSHA's website for the details, especially a very detailed guide to GHS found at

<https://www.osha.gov/dsg/hazcom/ghsguideoct05.pdf>. OSHA's landing page regarding the HCS including GHS is

<https://www.osha.gov/dsg/hazcom/index.html>

- b. GHS is a system for standardizing the classification and harmonizing the labeling of chemicals across countries. It standardizes the definitions and classification of the different kinds and degree of hazards chemicals pose as well as how that information is communicated on labels and within Safety Data Sheets (SDS).
- c. Details on the hazard classes (type of hazard) and categories (severity) can be found in the first link in a. above.
- d. GHS organizes chemical hazards visually into 9 different pictograms each describing a different kind of chemical hazard. These pictograms appear on a chemical label when the severity of that particular hazard posed by a chemical in that container reaches a specific threshold (For details see [http://www.unece.org/fileadmin/DAM/trans/danger/publi/ghs/ghs\\_rev00/English/GHS-ANNEX-1.pdf](http://www.unece.org/fileadmin/DAM/trans/danger/publi/ghs/ghs_rev00/English/GHS-ANNEX-1.pdf)). The hazards indicated by the individual pictograms are below.



- i. Flammable; emits flammable gas; pyrophoric; self reactives; self-heating; organic peroxides



- ii. Oxidizer



- iii. Corrosive



- iv. Gas under pressure



- v. Explosive; self reactives; organic peroxides



- vi. Irritant; dermal sensitizer; acute toxicity (harmful); narcotic effects; respiratory tract irritation



- vii. Carcinogen; respiratory sensitizer; reproductive toxin; specific organ toxicity; mutagenicity; aspiration toxicity



viii. Acute toxicity (severe)



ix. Environmental hazard; acute aquatic toxicity

- e. The Elements of a GHS label (which should be on all new commercial or “primary” chemical bottles):
- i. Product Identifier: This identifies the product, in English, not a chemical formula
  - ii. Signal word: “Danger”, “Warning” , or no signal word will appear giving a one word summary of how hazardous the product is. Danger describes the most severe hazards, warning is a level less severe, and non hazardous materials do not have a signal word.
  - iii. Pictograms: symbols from d. that convey the hazards that meet the threshold to require a pictogram.
  - iv. Hazard Statements: Standardized statements describing the hazards of the product.
  - v. Precautionary Statements: Standardized statements describing measures to minimize or prevent adverse effects resulting from exposure. Also describes appropriate PPE, and types of exposure to avoid.
  - vi. Supplier information: Name, address and telephone number of the manufacturer or supplier

## Appendix D: Glove Compatibility Charts

- a. Different gloves protect against different hazards, so it is important to use the proper glove for the expected hazards. There are different types of gloves for heat and cold that may not be interchangeable. Below is a non exhaustive list of types of gloves used at Hope and links to the manufacturer’s websites, where compatibility charts may be available:
- i. Autoclave gloves (<450 °C)
    1. [https://www.rpicorp.com/products/laboratory-equipment/gloves/clarivies-gloves-13-long.html?search\\_query=autoclave%20glove&ga\\_list\\_name=Search%20%28Grid%20View%29](https://www.rpicorp.com/products/laboratory-equipment/gloves/clarivies-gloves-13-long.html?search_query=autoclave%20glove&ga_list_name=Search%20%28Grid%20View%29)
  - ii. more protective heat resistant gloves (<1000°C)
    1. <http://www.blackstallion.com/>
  - iii. Cryogen Gloves
    1. <https://tempshield.com/pages/frequently-asked-questions>
  - iv. Disposable nitrile gloves
    1. [https://www.showagroup.com/us/en/search\\_product](https://www.showagroup.com/us/en/search_product)
  - v. Rubber chemical resistant gloves