

Hazard Communication

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1. Program Description

- 1.1. The federal Occupational Health and Safety Administration (OSHA) Hazard Communication Standard and the Cal/OSHA Hazard Communication Regulation, often called Hazard communication, are regulations designed to ensure that the hazards of workplace chemicals are evaluated, and information on the hazards is provided to employers and employees. Details of these regulations are provided in [29 CFR 1910.1200](#) and [CCR, Title 8, Section 5194](#).
- 1.2. The Standard requires that every affected employer establish a program to inform employees of the potential hazards associated with the materials used in their workplace. The program must include five main components as follows:
 - A Hazard Communication written program
 - An inventory of hazardous chemicals in the workplace
 - Onsite copies of related safety data sheets (SDS)
 - Proper labeling of hazardous chemicals; and,
 - Training for affected employees on the requirements of the Standard/Regulation.
- 1.3. This Hazard Communication Program (Program) applies to all University of California, Riverside (UCR) owned and opera faculty and staff are made aware of and trained in the safe use of hazardous chemicals with which they may come in contact. This will be accomplished by providing appropriate employee training, compiling chemical inventories, maintaining and using Safety Data Sheets (SDS), and ensuring that chemical containers are properly labeled. This Program complies with the [Cal/OSHA Hazard Communication Regulation](#) (Title 8, Chapter 4, Subchapter 7, Group 16, Article 109, Section 5194) and the UCR Environmental Health and Safety Policy.
- 1.4. Additional requirements for laboratories as specified in [Cal/OSHA Occupational Exposure to Hazardous Chemicals in Laboratories Standard](#) (Title 8, Chapter 4, Subchapter 7, Group 16, Article 109, Section 5191) are covered in the [UCR Chemical Hygiene Program](#).

2. Scope

- 2.1 The scope of this Program covers hazardous chemicals used and stored in all UCR workplaces.

3. Definitions

- 3.1 See Appendix A for a complete list of definitions. These definitions include those that may be needed when reviewing Safety Data Sheets (SDS).

4. Responsibilities

- 4.1 **Department Heads** are responsible for:

- 4.1.1 Identifying work units and delegating authority to each of these Units to comply with this program.
- 4.1.2 Departments are responsible for overall compliance with hazard communication requirements.
- 4.1.3 Departments must ensure supervisors have appropriate training to manage this program.

- 4.2 **Supervisors** are responsible for:

- 4.2.1 Training employees regarding the site-specific use of hazardous chemicals and methods required to protect from related hazards,
- 4.2.2 Informing employees of any new products being considered for use in the department,
- 4.2.3 Maintaining an adequate supply of approved personal protective equipment (PPE) for employee and student use,
- 4.2.4 Ensuring that students and employees are trained on the appropriate use of PPE, and
- 4.2.5 Ensuring new employees attend the online [Hazard Communication](#) course on [UC Learning Center](#). The Hazard communication online course will serve as initial Hazard communication training.

4.2.6 Ensuring that all employees under their supervision have received hands on training for all chemicals they are required to use on the job.

4.3 *Employees, Faculty and Staff* are responsible for:

4.3.1 Reading, understanding and following the safety information included on container labels or SDSs,

4.3.2 Attending and participating required safety training,

4.3.3 Labeling secondary containers appropriately,

4.3.4 Developing an understanding of the Program,

4.3.5 Reporting any incidents involving hazardous chemicals to their supervisor.

4.3.6 Wearing appropriate PPE as requested.

4.4 *Environmental Health and Safety (EH&S)* is responsible for:

4.4.1 Preparing and maintaining this written Program.

4.4.2 Assisting with providing required safety training

4.4.3 Assisting Department Heads and Supervisors with the requirements of the Standard.

4.4.4 Assisting in product selection or substitution.

4.4.5 Assisting in the selection of appropriate PPE as requested.

5. Program Components

5.1 **Program Maintenance**

5.1.1 EH&S is responsible for reviewing this program annually and updating as necessary to comply with regulation updates.

5.2 **Program Access**

- 5.2.1 Supervisors are required to train all employees under their supervision in how to access the written program and associated documents.
- 5.2.2 Copies of the Program may be obtained by visiting https://ehs.ucr.edu/safety#hazard_communication or by contacting EH&S at (951) 827-5228.

5.3 **Chemical Inventories**

- 5.3.1 Chemical inventories for many of the University work areas can be found by using the UCR Chemical Inventory system but access is limited.
- 5.3.2 Each department is responsible for maintaining an up-to-date inventory of hazardous chemicals present in their work areas.
- 5.3.3 Supervisors can request chemical inventory assistance by contacting EH&S.
- 5.3.4 Department supervisors are responsible for updating and maintaining the inventory as hazardous chemicals are added or removed from the department.
- 5.3.5 A departmental or area-specific inventory will be made available upon request.
- 5.3.6 Inventories of hazardous chemicals shall be verified annually or as requested by EH&S.

5.4 **Proposition 65 Chemicals**

- 5.4.1 As a state agency UCR is exempt from Proposition 65 requirements according to CA Health and Safety Code, [Section 25249.11\(b\)](#)
- 5.4.2 An updated list of chemicals known to the state of California to cause cancer or reproductive toxicity is available on the web at: <https://oehha.ca.gov/proposition-65/proposition-65-list>

5.5 **Safety Data Sheets.**

- 5.5.1** The purpose of the Safety Data Sheet (SDS) is to describe the physical and chemical properties, physical and health hazards, routes of exposure, precautions for safe handling and use, emergency and first aid procedures, and control measures related to hazardous chemicals.
- 5.5.2** The University of California uses a SDS search engine that is available to the entire UCR community and can be accessed by going to <https://ehs.ucop.edu/sds/> Pls, Supervisors, Department Heads and others are encouraged to use this system to access SDSs or to obtain the SDS from the manufacturer or supplier websites.
- 5.5.3** Be cautious to make sure you have the correct SDS for the product you have. For example, each color of paint has a different SDS and an SDS for each specific color used must be obtained.
- 5.5.4** Department supervisors are responsible for ensuring SDSs for each hazardous chemical in use by staff and students under their supervision are available in the immediate work area.
- 5.5.5** SDSs can be stored electronically or on paper in a binder at each work location.
- 5.5.6** Employees must be trained on how to access the SDSs and they must be available in a language they can read and understand.
- 5.5.7** If an employee is potentially injured by a chemical it is best to print the SDS and send it with them when seeking medical assistance.

5.6 **Container Labeling**

- 5.6.1** Department supervisors are responsible for ensuring incoming chemical containers are properly labeled. Labels must include the identity of the contents, appropriate hazard warnings, and the name and contact information of the manufacturer.

- 5.6.2** Affixed labels must not be removed from any container until the container has been completely emptied.
- 5.6.3** Receiving personnel should inspect chemicals being delivered for appropriate labeling. If labels are not present the shipment should be refused. The supplier should be contacted and if the labeling cannot be fixed a replacement product should be sourced.
- 5.6.4** Once the chemical has been received, it may be transferred to smaller secondary containers for use in the workplace. Supervisors and employees will be responsible for ensuring all secondary containers are labeled with the identity of the hazardous chemical, appropriate hazard warnings (as defined in the Standard), and the name and address of the chemical manufacturer, importer or other responsible party.
- 5.6.5** UCR employees, faculty and staff should report any unlabeled secondary containers to the supervisor responsible who will either label the container or, if the container contents are unknown, contact EH&S Waste Management for assistance.
- 5.6.6** Pre-printed replacement labels can be obtained from some product manufacturers, you can buy GHS write on labels, or you can make your own printable labels using the Avery GHS & Chemical Label free templates.
<https://www.avery.com/industrial/ghs-and-chemical-labels/>

5.7 **Pipe Labeling**

- 5.7.1** Aboveground pipes transporting hazardous substances (gases, vapors, liquids, semi-liquids, or plastics) shall be identified in accordance with [T8 CCR, Section 3321](#), "Identification of Piping." Other above-ground pipes that do not contain hazardous substances but may have associated hazards if disturbed or cut (e.g., steam lines, oxygen lines) shall be addressed as follows:

Before employees enter the area and initiate work, (persons/position) will inform them of:

- The location of the pipe or piping system or other known safety hazard
- The substance in the pipe
- Potential hazards
- Safety precautions

5.8 **Bringing chemicals from Home**

5.8.1 Employees and volunteers should not bring chemicals to use in the course of work to campus. If there is a compelling reason to do this, prior approval must be obtained from the supervisor and EH&S.

5.8.2 Chemicals brought to campus must be added to the workplace chemical inventory and SDS sheets must be available upon request.

5.9 **Non-Routine Tasks.** Occasionally employees may be asked to perform tasks that are not part of their normal routine. Non-routine tasks may include annual cleaning or a one-time application of a chemical.

5.9.1 Supervisors and/or SRs will provide staff asked to perform non-routine tasks involving the use of hazardous chemicals with information regarding associated hazards prior to starting the non-routine task. This information will also include measures to ensure protection from the hazards, and information regarding engineering and administrative controls or PPE that should be used.

5.9.2 Non-routine tasks should not be undertaken until the employees and/or students involved understand the associated hazards and methods for protection.

5.10 **Contractors.**

- 5.10.1** Contractors working on UCR property are responsible for compliance with the Standard under their own written Hazard Communication Program.
- 5.10.2** In addition, contractors must notify the appropriate UCR project manager of any hazardous chemicals they will use on property owned or occupied by UCR, provide a copy of their written hazard communication program upon request, have onsite copies of SDSs for any hazardous chemicals they use on UCR property, and immediately provide SDSs for these products upon request. In addition, all hazardous chemicals used on UCR property shall be properly labeled per Section 5.4 of this Program.

5.11 **Training.**

- 5.11.1** Hazard communication training is provided to UCR employees working with hazardous chemicals.
- 5.11.2** A brief overview of this Program is provided during Safety Orientation training.
- 5.11.3** Supervisors provide work unit-specific training for employees prior to their initial assignment or whenever employees will be using a new hazardous chemical. During this work-unit specific training, employees will be informed of the hazards associated with the new material and the precautions necessary to protect them from these hazards.
- 5.11.4** Competency will be determined by the successful completion of required training and work observations made by the employee's supervisors or EH&S representatives.
- 5.11.5** Training refreshers will be mandatory every three years or when the program is updated.

6. Information and External References

- [Cal/OSHA Hazard Communication Regulation \(CCR Title 8, Section 5194\)](#)
- [OSHA Hazard Communication Guidance](#)
- [OSHA Hazard Communication Standard \(29 CFR 1910.1200\)SHA “Laboratory Standard” \(29 CFR 1910.1450\)](#)
- [Proposition 65 Chemicals List](#)
- [UCR Lab Chemical Safety](#)
- [UCR Chemical Hygiene Plan](#)
- [UCR Asbestos Management Program](#)
- [UCR Respiratory Protection Program](#)
- [UCR Hazardous Waste Management Program](#)
- [OSHA “What is Hazard Communication?”](#)
- [Hazardous Waste Satellite Accumulation Area \(SAA\) Guidance](#)
- [Guide to the California Hazard Communication Regulation](#)
- [U.S. Department of Health and Human Services National Toxicology Program: Report on Carcinogens](#)
- [NIOSH Pocket Guide to Chemical Hazards](#)
- [UC Chemicals – Chemical Inventory Application](#)
- [UC SDS Search](#)

APPENDIX A: Definitions

Acid - Any chemical with a pH between 0 and 6. Acids are corrosive and cause severe burns.

Acute Effect - An effect on the human body that takes place soon after exposure. Example: Ethyl Alcohol ingestion may result in acute intoxication.

ACGIH - American Conference of Governmental Industrial Hygienists – A consensus organization comprised of professional industrial hygienists. ACGIH studies chemical exposures and publishes recommended occupational exposure limits for hundreds of chemicals and physical agents.

Aerosol - A fine aerial suspension of particles sufficiently small in size to confer some degree of stability from sedimentation. *Example: smoke or fog.*

Alkali - (or bases) Alkalis turn litmus paper blue and have pH values from 8 to 14. Any chemical substance which forms soluble soaps with fatty acids. They may cause severe burns to the skin.

ANSI - American National Standards Institute; a privately funded, voluntary membership organization that identifies industrial and public needs for national consensus standards and coordinates development of such standards. Many ANSI standards relate to safe design/performance of equipment, such as safety shoes, eyeglasses, smoke detectors, fire pumps and household appliances; and safe practices or procedures, such as noise measurement, testing of fire extinguishers, and flame arresters, industrial lighting practices, and the use of abrasive wheels.

Antidote - A remedy to relieve, prevent, or counteract the effects of a poison.

Asphyxiate - A vapor or gas, which can cause unconsciousness or death by suffocation (lack of oxygen). Most simple asphyxiates are harmful to the body only when they become so concentrated that they reduce oxygen in the air (normally about 21%) to dangerous levels (16% or lower). Some chemicals like carbon monoxide function as chemical asphyxiates by reducing the blood's ability to carry oxygen.

Auto-Ignition Temperature - The temperature at which a closed or nearly closed container must be heated in order for the flammable liquid, when introduced into the container, will ignite spontaneously or burn.

Boiling Point - The temperature at which a liquid moves to a vapor state, at a given pressure, usually expressed in degrees Fahrenheit at sea level pressure. Flammable materials with low boiling points generally present special fire hazards.

Cal/OSHA – The California Department of Industrial Relations, Division of Occupational Safety and Health. A State office that promulgates regulations that are designed to protect employees from workplace hazards.

Carcinogen - A substance or agent that can cause a growth of abnormal tissue or tumors in humans or animals. A material identified as an animal carcinogen does not necessarily cause cancer in humans. *Examples: Coal tar, which can cause skin cancer, and vinyl chloride, which can cause liver cancer.*

CHEMTREC – The Chemical Transportation Emergency Center is a national center established by the Chemical Manufacturers Association (CMA) in Washington DC to relay pertinent emergency information concerning specific chemicals on request. (CHEMTREC's 24-hour toll free phone number is 800-424-

9300). This number should only be used by those who respond to chemical transportation emergencies.

Chronic Effect - An adverse effect on a human body that can take months or years to develop after exposure. *Examples: Cancer*

Combustible - Capable of burning.

Combustible Liquid - Any liquid having a flashpoint at or above 100°F, but below 200°F.

Concentration - The relative amount of a substance when combined or mixed with other substances. *Example: 2 PPM hydrogen sulfide in air or a 50% caustic solution.*

Corrosive - A liquid or solid that causes visible destruction or irreversible alterations in human skin tissue at the site of contact or, in the case of leakage from its packaging, a liquid that has a severe corrosion rate on steel. *Example: Sulfuric acid.*

CPSC - Consumer Products Safety Commission; Federal agency responsible for regulating hazardous materials when they appear in consumer goods.

Dermal Toxicity - Adverse effects resulting from skin exposure to a substance.

Dilution Ventilation - Air flow designed to dilute contaminants to acceptable levels.

Evaporation Rate - The rate at which a particular material will vaporize (evaporate) when compared to the rate of vaporization of a known material. The evaporation rate can be used in evaluating the health and fire hazards of a material and may be classified as Fast, Medium, or Slow.

Exposure - Any situation arising from work operations where an employee may ingest, inhale, absorb through the skin or eyes, or otherwise come into contact with a hazardous substance.

Flammability Limits - The range of gas or vapor concentration in the air that may ignite or explode if an ignition source is present.

Flammable Aerosol - An aerosol that when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening or a flashback (a flame extending back to the valve) at any degree of valve opening.

Flammable Gas - A gas that at ambient temperature and pressure, (1) forms a flammable mixture with air at a concentration of thirteen percent (13%) by volume or less; (2) forms a range of flammable mixtures with air, wider than twelve percent (12%) by volume, regardless of the lower limit.

Flammable Liquid - Any liquid having a flash point below 100°F, except any mixture having components with flash points of 100°F or higher, the total of which make up 99% or more of the total volume of the mixture.

Flammable Solid - A solid, other than a blasting agent or explosive, as defined in 29 CFR 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing processing or which can be ignited readily and when ignited, burns so vigorously and persistently as to create a serious hazard.

Flash Point - The temperature at which a liquid will give off enough flammable vapors to ignite if an ignition source is present.

Hazardous Chemical - Any chemical which presents either a health hazard or physical hazard.

Health Hazard - A chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. This may include chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, or agents which act on the hematopoietic system and agents which damage the lungs, skin, eyes or mucous membranes.

Insoluble - Incapable of being dissolved in a liquid.

Irritant - A substance which, by contact in sufficient concentration for a sufficient period of time, will cause an inflammatory response or reaction of the eye, skin, or respiratory system. The contact may be a single exposure or multiple exposures. *Some primary irritants: chronic acid, nitric acid, sodium hydroxide, calcium chloride, amines, metallic salts, chlorinated hydrocarbons, ketones and alcohols.*

LC - Lethal concentration; a concentration of a substance being tested which will kill a test animal.

LC50 - The concentration of a material in air which, on the basis of laboratory testing, is expected to kill 50% of a group of test animals when administered as a single exposure. Generally, more toxic materials have lower LC50s.

LD - Lethal dose; a concentration of a substance (dose) being tested which will kill a test animal.

LD50 - Lethal dose 50%; a single dose of a material which on the basis of laboratory tests, is expected to kill 50% of a group of test animals. The LD50 dose is usually expressed in milligrams or grams of material per kilogram of animal body weight. Generally, more toxic materials have lower LD50s.

LEL - Lower Explosive Limit - The lowest concentration (lowest percentage of the substance in air) that will produce a flash of fire when an ignition source (heat, arc, or flame) is present. At concentration lower than the LEL, there is not enough fuel to sustain combustion.

Mist - Suspended liquid droplets generated by condensation from the gaseous to the liquid state, or by breaking up a liquid into a dispersed state, such as splashing, foaming or atomizing. Mist is formed when a finely divided liquid is suspended in air.

NFPA - National Fire Protection Association; an international voluntary membership organization to promote/improve fire protection and prevention and establish safeguards against loss of life and property by fire. Best known for the National Fire Codes and familiar diamond-shaped label for hazards. See Section 8.0.

NIOSH - National Institute for Occupational Safety and Health (of the Public Health Service, U.S. Dept. of Health and Human Services (DHHS)); federal agency which recommends occupational exposure limits for various substances and assists OSHA with occupational safety and health investigations and research.

OSHA - The Occupational Safety and Health Administration - A subdivision of the U.S. Department of

Labor that promulgates regulations designed to ensure the safety of employees in the workplace.

Oxidizer - A chemical other than a blasting agent or explosive as defined in 29 CFR 1910.109(a) that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

PEL - Permissible exposure limit; the legally enforced exposure limit for a substance established by OSHA regulatory authority. The PEL indicates the permissible concentration of air contaminants to which nearly all workers may be repeatedly exposed eight (8) hours a day, forty (40) hours a week, over a working lifetime (30 years) without adverse health effects.

Physical Hazard - A chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, corrosive, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, self-reactive, self-heating, unstable (reactive) or water-reactive.

ppb - Parts per billion; a unit for measuring the concentration of a gas or vapor in air - parts (by volume) of the gas or vapor in a billion parts of air.

ppm - Parts per million; a unit for measuring the concentration of a gas or vapor in air - parts (by volume) of the gas or vapor in a million parts of air.

Pyrophoric - A chemical that will ignite spontaneously in air at a temperature of 130°F or below.

Reactivity - A description of the tendency of a substance to undergo chemical reaction with the release of energy.

Reproductive Toxin - Substances that affect the male and/or female reproductive systems and may impair the ability to have children.

Sensitizer - A substance which, on first exposure, causes little or no reaction in human or test animals but which, on repeated exposure, may cause a marked response not necessarily limited to the contact site.

Skin sensitization is the most common form of sensitization in the industrial setting, although respiratory sensitization to a few chemicals is also known to occur. *Examples: poison ivy and pollen.*

Solvent - A substance, usually a liquid, in which other substances are dissolved. The most common solvent is water.

Stability - An expression of the ability of a material to remain unchanged. For SDS purposes, a material is stable if it remains in the same form under expected and reasonable conditions of storage or use.

STEL - Short term exposure limit.

Systemic Poison - A poison, which spreads throughout the body, affecting all body systems, and organs. Its adverse effect is not localized in one spot or area.

Systemic Toxicity - Adverse effects caused by a substance, which affects the body in a general rather than local manner.

Target Organ Toxin - A toxic substance that attacks a specific organ of the body. *Example: overexposure to carbon tetrachloride can cause liver damage.*

Teratogen - A substance that may cause malformations in the fetus upon exposure. *Example: thalidomide.*

TLV - Threshold limit value; a term used by ACGIH to express the airborne concentration of a material to which nearly all persons can be exposed daily, without adverse effects. ACGIH expressed TLVs in three ways:

- **TLV-TWA:** The allowable time-weighted average concentration for a normal 8-hour work-day or 40-hour work-week.
- **TLV-STEL:** The short-term exposure limit or maximum concentration for a continuous 15-minute exposure period (maximum of four such periods per day, with at least 60 minutes between exposure periods, and provided that the daily TLV-TWA is not exceeded).
- **TLV-C:** The ceiling limit - the concentration that should not be exceeded even instantaneously.

Toxic Substance - Any substance which can cause acute or chronic injury to the human body, or which is suspected of being able to cause diseases or injury under some conditions.

Toxicity - The sum of adverse effects resulting from exposure to a material, generally by mouth, skin, or respiratory tract.

Trade Secret - Any confidential formula pattern, process, device, information or compilation of information that is used in an employer's business and that gives the employer an opportunity to obtain an advantage over their competitors.

TWA - Time weighted average exposure.

UEL - Upper explosive limit or upper flammable limit of a vapor or gas. The highest concentration of a substance in air that will combust when an ignition source is present.

Unstable - A chemical which will vigorously polymerize, decompose, condense, or become self-reactive under conditions of shock, pressure, or temperature. These chemicals are also referred to as reactive.

Vapor - The gaseous form of a solid or liquid substance as it evaporates.

Vapor Density - The weight of a vapor or gas compared to the weight of an equal volume of air; an expression of the density of the vapor or gas. Materials that are lighter-than-air have vapor densities less than 1.0 (Examples: propane, hydrogen sulfide, ethane, butane, chlorine, sulfur dioxide) have vapor densities greater than 1.0. All vapors and gases will mix with air but lighter materials will tend to rise and dissipate (unless confined). Heavier vapors and gases are likely to concentrate closer to the ground.

Vapor Pressure - The pressure exerted by saturated vapor above its own liquid in a closed container. When quality control tests are performed on products the test temperature is usually 100°F and the vapor pressure is expressed as pounds per square inch (psig or psia). However, vapor pressures reported on SDSs are in millimeters of mercury (mmHg) at 68°F unless otherwise stated. Additional info:

- Vapor pressure of a substance at 100°F will always be higher than the vapor pressure of the substance at 68°F.
- 760 mmHg is equivalent to 14.7 pounds per square inch.
- The lower the boiling point of a substance, the higher its vapor pressure.

Water-Reactive - A chemical that reacts with water.

APPENDIX B: Layout and Information on a Safety Data Sheet (SDS).

Section 1. Identification

This section provides the following information:

- Chemical or Product name
- Other production identification (CAS, Product number, etc.)
- Intended use
- Name, address, and telephone number of the manufacturer, importer, or other responsible party.
 - *Note: Make sure this is a U.S. address. Importers that bring a product into the U.S. are legally the manufacturers of record and must complete an SDS for the product with their information.*
- 24-hour emergency phone number.

Section 2: Hazard(s) Identification

This section provides the following information:

- List of hazards present (acute respiratory, Target organ toxicity, flammable, etc.)
- Classification of the hazards. This is a severity rating of 1-4. 1 being the most hazardous.
- Signal words. There are only two.
 - Danger – Severe hazards that are likely to cause severe injury or death
 - Warning – Hazards are less likely to be acute and/or as severe.
- Other hazards like if carcinogens present.

Section 3: Composition/Information on Ingredients

This section provides the following information:

- For single chemical substance:
 - Chemical name
 - Common name and synonyms
 - CAS number and other unique identifiers (IUPAC, EINECS, etc.)
 - Impurities and stabilizing additives which are themselves classified and contribute to the classification of this substance.
- For mixtures (products made of more than one chemical):
 - Chemical names and concentrations which are classified as health hazards in accordance with 1910.1200 and
 - Are present above their limits, or
 - Present a health risk below the limits.
 - The concentration shall be specified unless a trade secret claim is made in accordance with 1920.1200, when there is batch-to-batch variability in production, or for a group of substantially similar mixtures with similar chemical makeup. In these case concentration ranges are used.
 - Where “trade secret” is claimed, a statement will be here with a trade secret registration number if sold in states that require it.

Section 4. First Aid

This section provides the following information:

- Necessary first-aid procedures subdivided according to routes of exposure (skin, ingestion, absorption, etc.)
- Most important symptoms / effects, acute and delayed
- Indication of immediate medical attention and special treatment, if needed. For example, if hydrofluoric acid SDS, it would say to calcium gluconate or benzalkonium chloride in the first-aid kit and user should be trained to use it after any skin contact.

Section 5. Fire Fighting

This section provides the following information:

- What extinguishing media to use for a fire.
- Hazards present when this chemical/product is on fire.
- Special protective equipment needed for fire-fighting.

Section 6: Accidental Release Measures

This section provides the following information:

- Personal precautions for safe handling, PPE, and emergency procedures.
- Methods and materials for containment and safe clean-up.

Section 7: Handling & Storage

This section provides the following information:

- How to safely handle the chemical / product.
- Conditions for safe storage which includes segregation requirements because of possible reactions.

Section 8: Exposure Controls/Personal Protection

This section provides the following information:

- OSHA Permissible Exposure Limit (PEL), ACGIH Threshold Limit Value (TLV), and any other exposure limit used or recommended by the manufacturer, importer, or employer preparing the SDS. These are time-weighted averages
- Appropriate engineering controls including ventilation requirements.
- Individual protection measures including PPE.

Section 9: Physical & Chemical Properties

This section provides the following information:

- Appearance (physical state, color, etc.)

- Odor or lack thereof.
- Odor threshold which is the concentration in air when most people can smell the substance.
- pH indicating acidity. 0 to <7 is acidic. 7 is neutral. >7 to 12 is caustic.
- Melting point/freezing point
- Initial boiling point and boiling range (BP) which is sometimes called the vaporization point when a liquid begins to vaporize. The lower the BP the more hazardous the liquid.
- Flash point which is the lowest temperature at which a flammable liquid gives off sufficient vapor to ignite. The lower the flash point the more hazardous the liquid.
- Evaporation rate. The faster a chemical evaporates the more hazardous it is.
- Flammability
- Upper (UFL or UEL) and lower (LFL or LEL) flammability or explosive limits. These are the minimum concentrations in air between which an ignition can occur. Any thing between these limits can flash or explode.
- Vapor pressure (VP)
- Vapor density (VD) which compares the vapor weight to air. Materials with a VP greater than 1.0 are heavier than air and can cause oxygen displacement in a room.
- Relative Density (RD) is the heaviness relative to a reference substance.
- Solubility indicates the types of solvents in which the substance dissolves.
- Partition coefficient
- Auto-ignition temperature is the temperature at which a substance will spontaneously ignite.
- Decomposition temperature is the temperature at which the substance chemically decomposes.
- Viscosity is a measure of how thick, sticky, or semifluid a substance is in consistency.

Section 10: Stability & Reactivity

This section provides the following information:

- Reactivity provides a list if there are chemicals that violently react with this substance.
- Chemical stability is the ability of the chemical to remain unchanged under reasonable conditions of storage and use.
- Possibility of hazardous reactions.
- Conditions to avoid like static discharge, shock, vibration, etc.)
- Incompatible materials
- Hazardous decomposition products lists hazardous by-product chemicals that are given off when the substance burns, degrades, or decomposes.

Section 11: Toxicological Information

- Description of various toxicological health effects.
- Information on the likely routes of exposure.
- Symptoms

- Whether it presents acute, delayed, or chronic effects given short-term or long-term exposure.
- Measure of toxicity which is usually derived from lethal dose (LD) or lethal concentration animal testing. LD50 and LC 50 is the concentration in air that will kill 50% of the animals when administered in a single exposure during a specific time period, usually one hour. This measurement is used to designate a substance as “non-toxic”, highly-toxic”, or “highly-toxic”.
- Category 1 is the most toxic with 5 being the least.
 - Category 1 thru 3 requires the toxic pictogram.
 - Category 4 requires the irritant pictogram.
 - Category 5 does not require a pictogram but a warning words like “harmful if swallowed” would be required if it applies.
- Whether the substance is a listed carcinogen.

Section 12: Ecological Information (non-mandatory)

- These are EPA rules and not managed by OSHA.
- Ecotoxicity (aquatic, terrestrial, where available).
- Persistence and degradability.
- Bioaccumulative potential.
- Mobility in soil.
- Other adverse effects (such as hazardous to the ozone layer).

Section 13: Disposal (non-mandatory)

- Department of Transportation (DOT) managed
- Description of waste residues and their safe handling and methods of disposal.

Section 14: Transport Information (non-mandatory)

- Department of Transportation (DOT) managed
- Regulatory requirements for hazardous materials transportation
- UN/ID/NA number is two letters followed by 4 numbers used for transportation load designation.

Section 15: Regulatory Information (non-mandatory)

- Safety, health, and environmental regulations specific to the substance in question.

Section 16: Other Info

- The date of SDS preparation or the last revision.

APPENDIX C: GHS Pictograms Flyer

GHS Pictograms and Hazards

The Globally Harmonized System (GHS) is an international standardized classification and labeling system for identifying chemical hazards. It establishes language and pictograms to classify the health, physical, and environmental hazards for hazardous materials.

<p style="text-align: center;"><u>Health Hazard</u></p>  <ul style="list-style-type: none"> • <u>Carcinogen</u> • <u>Mutagenicity</u> • <u>Reproductive Toxicity</u> • <u>Respiratory Sensitizer</u> • <u>Target Organ Toxicity</u> • <u>Aspiration Toxicity</u> 	<p style="text-align: center;"><u>Flammable</u></p>  <ul style="list-style-type: none"> • <u>Flammables</u> • <u>Pyrophorics</u> • <u>Self-Heating</u> • <u>Emits Flammable Gas</u> • <u>Self-Reactive</u> • <u>Organic Peroxide</u> 	<p style="text-align: center;"><u>Irritant</u></p>  <ul style="list-style-type: none"> • <u>Irritant (skin and eye)</u> • <u>Skin Sensitizer</u> • <u>Acute Toxicity (harmful)</u> • <u>Narcotic Effects</u> • <u>Respiratory Tract Irritant</u> • <u>Hazardous to Ozone Layer (Non-Mandatory)</u>
<p style="text-align: center;"><u>Compressed Gas</u></p>  <ul style="list-style-type: none"> • Gas Under <u>Pressure</u> 	<p style="text-align: center;"><u>Corrosive</u></p>  <ul style="list-style-type: none"> • <u>Skin Corrosion/Burns</u> • <u>Eye Damage</u> • <u>Corrosive to Metals</u> 	<p style="text-align: center;"><u>Explosive</u></p>  <ul style="list-style-type: none"> • <u>Explosives</u> • <u>Self-Reactive</u> • <u>Organic Peroxide</u>
<p style="text-align: center;"><u>Oxidizing</u></p>  <ul style="list-style-type: none"> • <u>Oxidizers</u> 	<p style="text-align: center;"><u>Environmental Hazard</u> (Non-Mandatory)</p>  <ul style="list-style-type: none"> • <u>Aquatic Toxicity</u> 	<p style="text-align: center;"><u>Toxic</u></p>  <ul style="list-style-type: none"> • <u>Acute Toxicity (fatal or toxic)</u>