



**HAZARD COMMUNICATION
PROGRAM**

&

**GLOBALY HARMONIZED
SYSTEM**

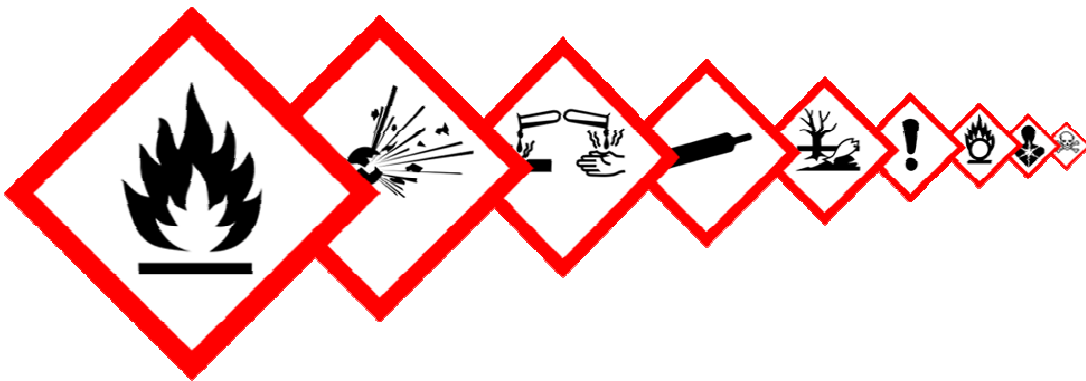


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GLOSSARY OF COMMON SAFETY TERMS

---A---

Acute Effect - An adverse effect on a human or animal body, with severe symptoms developing rapidly and coming quickly to a crisis. Also see "chronic."

Acute Toxicity - The adverse (acute) effects resulting from a single dose of or exposure to a substance. Ordinarily used to denote effects in experimental animals.

ACGIH - American Conference of Governmental Industry Hygienists.

ANSI - American National Standards Institute.

--B--

Boiling Point - The temperature at which a liquid changes to a vapor state, at a given pressure.

--C--

Celsius - a temperature scale, also known as centigrade.

CAA - Clean Air Act; federal law enacted to regulate/reduce air pollution. Administered by EPA.

Carcinogen - A substance or agent capable of causing or producing cancer in mammals. The OSHA Hazard Communication Standard defines a carcinogen as a substance evaluated by the International Agency for Research on Cancer or by the National Toxicology Program in the Annual Report on Carcinogens and found to be a carcinogen or potential carcinogen, or is regulated by OSHA as a carcinogen.

CAS - Chemical Abstracts Service

cc - Cubic centimeter

Ceiling - The maximum allowable human exposure limit for an airborne substance; not to be exceeded even momentarily.

Chemical Family - A group of single elements or compounds with a common general name.

Chronic Effect - An adverse effect on a human or animal body, with symptoms which develop slowly over a long period of time or which recur frequently.

Chronic Toxicity - Adverse (chronic) effects resulting from repeated doses of or exposures to a substance over a relatively prolonged period of time. Ordinarily used to denote effects in experimental animals.

Combustible - A term used by NFPA, DOT, OSHA, and others to classify certain liquids that will burn, having a flashpoint of 100 F (37.8 c) or higher.

Concentration - The relative amount of a substance when combined or mixed with other substances.

Corrosive - As defined by DOT, a corrosive material is a liquid or solid that causes visible destruction of, or irreversible alteration 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.

--D--

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

DOT - U.S. Department of Transportation.

--E--

EPA - U.S. Environmental Protection Agency

Evaporation Rate - The rate at which a material vaporizes (evaporates) compared to the rate of vaporization of a known material, usually normal-butyl acetate (NBUAC or n-BuAc), with a rate designed as 1.0. Evaporation rate can be useful in evaluating health and fire hazards of a material.

--F--

F - Fahrenheit; a temperature scale.

Flashpoint - The temperature at which a liquid will have given off enough flammable vapor to ignite.

Flammable - A "flammable liquid" is defined by NFPA, OSHA, and DOT as a liquid with a flashpoint below 100° F (37.8° C).

Formula - The conventional scientific designation for a material (water is H₂O)

--G--

General exhaust (or dilution ventilation) - A system for exhausting air which contains contaminants from a general work area. Also see "local exhaust."

g - gram

g/kg - grams per kilogram

--H--

Hazard - A toxic or hazardous substance regulated under this standard is any substance which has the capacity to produce personal injury or illness to man through ingestion, inhalation, or absorption through any body surface.

Hazardous Chemical - any chemical which is a physical hazard or a health hazard.

Hazardous Material - In a broad sense, a hazardous material is any substance mixture of substances having properties capable of producing adverse effects to the health or safety of a human being.

--I--

Incompatible - Materials which could cause dangerous reactions from direct contact with one another are described as incompatible.

Ingestion - The taking in of a substance through the mouth.

Inhalation - The breathing in of a substance in the form of a gas, vapor, fume, mist, or dust.

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.

--L--

LC - Lethal Concentration

LC₅₀ - Lethal Concentration 50; the concentration of a material in air which, on the basis of laboratory tests, is expected to kill 50% of a group of test animals when administered as a single exposure (usually 1 or 4 hours).

LD - Lethal Dose; a concentration of a substance being tested that 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 percent of a group of test animals.

LEL, or LFL - Lower Explosive Limit or Lower Flammable Limit of vapor or gas.

Local exhaust - A system for capturing and exhausting contaminated air at the point where the contaminants are produced.

--M--

m³ - cubic meter

Melting Point - The temperature at which a solid substance changes to a liquid state.

Mechanical exhaust - A powered device, such as a motor-driven fan or air/steam venturi tube, for exhausting contaminants from a workplace, vessel, or enclosure.

mg - milligram weight

mg/kg - milligrams per kilogram concentration

mg/m³ - milligrams per cubic meter concentration

ml - milliliter volume

mm Hg - millimeters (mm) of mercury (Hg) pressing

Mutagen - A substance or agent capable of altering the genetic material in a living cell.

--N--

NIOSH - National Institute for Occupational Safety and Health of the Public Health Service.

--O--

Oral - used in or taken into the body through the mouth..

Oral Toxicity - Adverse effects resulting from taking a substance into the body via the mouth.

OSHA - Occupational Safety and Health Act.

Oxidation - In a literal sense, oxidation is a reaction in which a substance combines with oxygen provided by an oxidizer or oxidizing agent.

Oxidizer - DOT defines an oxidizer or oxidizing material as a substance that yields oxygen rapidly to stimulate the combustion (oxidation) of organic matter.

--P--

PEL - Permissible Exposure Limit; an exposure limit established by OSHA.

PMCC - Pensky-Martens Closed Cup; a flashpoint test method.

Poison, Class A - A DOT term for extremely dangerous poisons, that is, poisonous gases or liquids of such nature that a very small amount of the gas, or vapor of the liquid, is dangerous to life. Some examples: phosgene, dyanogen, hydrocyanic acid, nitrogen peroxide.

Poison, Class B - A DOT term for a liquid, solid, paste, or semisolid substance that is dangerous to life.

Polymerization - A chemical reaction in which one or more small molecules combine to form larger molecules. A hazardous polymerization is one which takes place at a rate which releases large amounts of energy.

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

ppb - Parts per billion, a unit for measuring the concentration of a gas or vapor in air.

psi - Pounds per square inch; for MSDS purposes, a unit for measuring the pressure material exerts on the walls of a confining vessel or enclosure.

--R--

Reaction - A chemical transformation or change; the interaction of two or more substances to form new substances.

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

Respiratory system - The breathing system; includes the lungs and the passages (trachea or "windpipe," larynx, mouth, and nose to the air outside plus the associated nervous and circulatory systems.

--S—

Specific chemical identity – the chemical name, Chemical Abstract Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.

--T—

Trade Secret: Any confidential formula, pattern, process, device, information, or compilation of information which gives its user an opportunity to obtain a business advantage over competitors who do not know or use it. A trade secret shall not include chemical identity information which is readily discoverable through qualitative analysis.

--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.

Use: to package, handle, react, emit, extract, generate as a by product, or transfer.

--W—

Water-reactive: a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

Work Area: a room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.

Workplace: an establishment, job site or project at one geographical location containing one or more work areas.

HAZARD COMMUNICATION PROGRAM

It is the City's policy to protect the health and safety of employees through the establishment of this Hazard Communication Program. The Program is to be available to all employees, and upon request to the employees' designated representatives, and other authorized persons as required by Section 5194 of the Title 8 General Industry Safety Orders.

EMPLOYEE RIGHTS UNDER THE HAZARD COMMUNICATION PROGRAM

1. Employees have the right to know any operations in their work area where hazardous chemicals are present;
2. Employees have the right to know all known information regarding hazardous substances to which they may be exposed;
3. Employees have the right for their physician to receive information regarding hazardous substances to which they may be exposed;
4. Employees have the right against disciplinary action or other discrimination due to the employees' exercise of rights under the regulation; and
5. Employees have the right to know the location and availability of the written Hazard Communication Program, including the required list of hazardous chemicals and material safety data sheets.

LABELS

The Hazard Communication Program and Globally Harmonized System (GHS) contains specific labeling requirements. Labeling must be present on all hazardous chemicals that are shipped and that are used in the workplace.

Shipped Chemicals

Chemical manufacturers, importers and distributors shall make sure that each container of hazardous chemicals shipped from their workplace is labeled, tagged or marked with the following information:

1. Identity of the hazardous chemical/ingredients;
2. Appropriate hazard warnings; and
3. Name and address of the chemical company (manufacturer).

Identity

The term “identity” can refer to any chemical or common name designation for the individual chemical or mixture, as long as the term used is also used on the list of hazardous chemicals (for the particular workplace) and on the MSDS/SDS.

Hazard Warning

The hazard warning on the label must convey the specific physical or health hazard of the chemical. What target organs are affected and what handling precautions are recommended should also be documented. This can be words, pictures, symbols or any combination that conveys necessary information.

IN-HOUSE/HAZARDOUS MATERIALS

Each container of hazardous chemicals used in the work area must be labeled. These work area labels must be transferred to other containers to be used. Labels are available through various safety material suppliers.

FIRE PROTECTION LABELING

The National Fire Protection Association (NFPA) has a marking system it developed in 1961. It is one of several widely used systems in the United States. The system is intended to provide basic information to emergency personnel so they can better evaluate what fire fighting techniques to employ.

There are three categories of hazards identified by the NFPA system – health, flammability, and reactivity. The order of severity is indicated numerically by five divisions ranging for “four (4)” for severe hazard to “zero (0)” which indicates no special hazard.

The diamond-shaped label contains four colored squares, with a number appearing in each square. Besides having a blue square indicating health and a red square representing flammability, it has reactivity symbolized by a yellow square indicating a “special hazard,” such as an unusual reactivity with water. The usual symbol for alerting fire-fighting personnel to the possible hazard of using water is the letter “W” with a line through the center “~~W~~.”

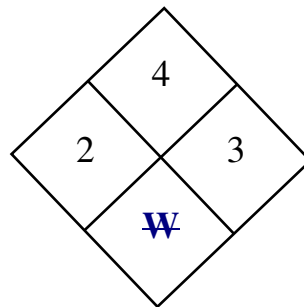
Emergency personnel prefer this system because they can tell from a distance what caution to use in approaching a container or handling fire. However, this marking system should not be used as a shipping label because it conflicts with DOT regulations.

Fire Hazard (Red)

- 0 – Will not burn
- 1 – Will ignite if preheated
- 2 – Will ignite if moderately heated
- 3 – Will ignite at most ambient conditions
- 4 – Burns readily at ambient conditions

Health Hazard (Blue)


- 0 – No more than of ordinary combustible hazards in a fire
- 1 – Slightly hazardous
- 2 – Hazardous
- 3 – Extreme danger
- 4 - Deadly



Reactivity (Yellow)

- 0 – Stable and not reactive with water
- 1 – Unstable if heated
- 2 – Violent chemical change
- 3 – Shock and heat may detonate
- 4 – May detonate

Special Hazard

OXY	Oxidizer
ACID	Acid
ALK	Alkali
COR	Corrosive
W	Use No Water
	Radiation Hazard

HAZARDOUS SUBSTANCE INVENTORY

Each Department shall conduct an annual inventory of hazardous materials used in Department operations. **Should this inventory result in the identification of hazardous materials, which are no longer used, such materials shall be disposed of in accordance with Federal, State and local requirements and City policy.** All other hazardous materials shall be inventoried and the inventory list along with Material Safety Data Sheets (MSDS)/ Safety Data Sheets (SDS) for those products shall be made available to all department employees.

PROCEDURES FOR CONDUCTING THE HAZARDOUS SUBSTANCES INVENTORY:

1. List all chemically based materials with a brief description of each and indicate where they are located in the workplace.
2. Industrial strength solvents and cleaners shall be included in the inventory.
3. Note who supplied the substance or mixture and its trade or common name.

Exception: Preparation and distribution of the MSDS/SDS does not apply to the following regardless of whether they contain a hazardous substance.

- Hazardous wastes covered by the Federal Environmental Protection Agency (EPA) regulations.
- Substances used in retail food establishments, or other retail trade establishments, exclusive of processing and repair work.
- Consumer products packaged for distribution to the general public, except where the industrial usage and resulting employee exposure to such products exceeds the reasonable use and exposure of the same product in a non-employment (i.e. home) setting.
- Substances already labeled under the Federal Insecticide, Fungicide, and Rodenticide Act. However, for such substances the manufacturer must still prepare a MSDS/SDS and make available upon request.

MATERIAL SAFETY DATA SHEETS (MSDS)/SDS

Material Safety Data Sheets (MSDS)/Safety Data Sheets (SDS) will be kept by all Departments for all items on the Hazardous Substances Inventory. The term Hazardous includes chemicals which are flammable, carcinogenic, toxic or are reproductive toxins. These include agents, which may damage the lungs, skin, eyes and/or mucus membranes. As noted, MSDS/SDS and the Inventory shall be available for employee review.

UPDATING MSDS/SDS FILES:

The following procedures shall be followed to ensure that MSDS/SDS are available for all hazardous substances used in the workplace. Under no circumstances shall a hazardous

substances be used prior to the receipt and review of the MSDS/SDS with all affected employees who will be working with the hazardous substance.

Each Department/Division/Section shall designate an individual who will be responsible for the coordination of their Hazardous Substances Inventory, obtaining MSDS/SDS for new or revised products; and proper container labeling.

The Program Administrator/Safety Coordinator and Department shall be responsible for:

1. Maintaining a general file of MSDS/SDS for hazardous substances received and stocked in the City.
2. Notifying all Departments when a new hazardous substance is being stocked in the City and shall advise Departments of the availability of the MSDS/SDS sheet.
3. Notifying all Departments when a currently stocked item has been revised and a new MSDS/SDS has been received. Staff shall advise affected Departments of the availability of a revised MSDS/SDS.
4. Requesting an MSDS/SDS when procuring specific items through a Purchase Order. Incoming MSDS/SDS received for specific purchases will not be maintained in a general file, but will be forwarded on to the Department purchasing such items.
5. Forwarding MSDS/SDS on to Departments for those individual items where an MSDS/SDS has been received for items purchased.

HOW TO READ AND UNDERSTAND A MATERIAL SAFETY DATA SHEET/SAFETY DATA SHEET

Although General Industry Safety Order §5149, the Cal/OSHA regulation which implements the Hazardous Substances Information and training Act specifies what information must be included in a Material Safety Data Sheet (MSDS)/Safety Data Sheet (SDS), it does not specify the format to be used. Therefore, many manufacturers and formulators have developed their own formats – and, as a result, it may take careful reading to get the information you need from an MSDS/SDS.

The Hazardous Substances Information and Training Act states that a completed OSHA Form 20 (blank Form 20s are available from OSHA) can be used by manufacturers and formulators to fulfill the requirements regarding development of an MSDS/SDS for any of their products which are listed, or which contain substances listed, as hazardous in Section 339 of Title 8 (a copy of the List of Hazardous Substances is available from Cal/OSHA Communications, 525 Golden Gate Avenue, 3rd Floor, San Francisco, CA 94102).

GUIDELINES FOR READING AND UNDERSTANDING AN MSDS/SDS

Read and be familiar with Material Safety Data Sheets (MSDS)/Safety Data Sheets (SDS) under the Globally Harmonized System (GHS) of Classification and Labeling of Chemicals – before handling any hazardous chemical.

Not all Material Data Sheets/Safety Data Sheets will contain all of the information discussed here. The information will vary depending upon the degree to which the material is hazardous. But this will give you an idea of the kind of information that is expected when you read an MSDS/SDS.

Every page of the MSDS/SDS should have the name of the substance written on it.

If the MSDS/SDS is blank or has only a trade name and a lot of N/A's ("not applicable") on it, it is not going to be useful. Most MSDS/SDS have at least some of the information filled in. By cross-checking the information in various sections, you can determine what you need to know about the hazards of the material.

I. PRODUCTION IDENTIFICATION

- The manufacturer or distributor listed should be able to provide detailed information on the hazards of the material(s) covered by the MSDS/SDS.
- Does the trade name on the MSDS/SDS agree with the one on the label on the container.
- The chemical synonyms should be those most commonly used for the product.
- Make sure the chemical name and the formula is listed for single substances, and that the trade or brand name and the chemical family are listed if the substance is a mixture. You will find ingredient information in Section II of the MSDS/SDS.

II. HAZARDOUS INGREDIENTS

- The materials listed should be those in the product which individually are listed in the List of Hazardous Substances, Section 339, Title 8 of the California Administrative Code. One ingredient of a multicomponent product might be listed because of the toxicity (the health hazards it poses), another because of its flammability and a third both for its toxicity and its reactivity.
- Toxicity data should be stated in terms of concentration, mode of exposure or test, and animal used; i.e., 100 ppm LC 50 (lethal concentration) rat, 25mg/ M LD 50 (lethal dose) oral mouse. Permissible exposure limits shall be used from published sources such as Section 5155, Title 8 CCR or the TLF list published by the American Conference of Governmental Industrial Hygienists.
- Flammable or reactive data should be included as well as flash point, shock sensitivity, or brief data to indicate the nature of the hazard.

- If the concentration of the material in the mixture is 1% or greater and/or has a Permissible Exposure Limit (PEL) or Threshold Limit Value (TLV) – check it against:
1. Section III – Physical Hazard Data. Information in this section should be filled in if the substance is a solvent, catalyst or vehicle.
 2. Section IV – Fire and Explosion Data. Information in this section should be filled in with either numbers or procedures if the substance is a solvent, catalyst, vehicle, oxidizer or explosive metal.
 3. Section V – Health Hazard Information. If a substance has a TLV, it most likely presents a health hazard(s). Identify whether the “effects of overexposure” line lists both long-term (chronic) and short-term (acute) consequences of exposure. This is especially true for substances which have some sort of toxic rating, such as LD 50, either in Section 1 or Section II.
 4. Section VI – Reactivity Data. Information in this section should be filled out if the substance is a catalyst, a polymer, a copolymer, a concentrated acid, base or other reactive substance. Also, a chemical may be incompatible with some other substance(s), which should be listed on the “incompatibility” line.
 5. Section VII – If the substance has a PEL or TLV, procedures to follow in the event of a spill or leak should be specified.
 6. Section VIII – Special Protection. If the substance has a PEL or TLV, this section should always have some information in it no matter what kind of substance it is, because it will either pose a breathing hazard, a skin or eye hazard. This section must give information on protection against any or all of these kinds of exposures.
 7. Section IX – Special Precautions. If the substance is flammable, highly reactive, corrosive, explosive or has some other dangerous properties, this section must have information on special handling and storage.

III. PHYSICAL DATA

This section is one of the most important and useful sections on the MSDS/SDS both for assessing how hazardous the substance is and how completely the MSDS/SDS is filled out. This is especially true for solvents, and that is why solvents are used as an example throughout this program.

The data in this section should be for the total mixture or product. Do not be confused by the terms. Once you know the definitions of the terms, you can make cross checks.

Terms:

- **Boiling Point** is the temperature in degrees Fahrenheit or Centigrade at which liquid boils (or becomes gas). Ranges are given for mixtures.
- **Vapor Pressure** – A high vapor pressure indicates that a liquid will evaporate easily.

The term “volatile” is used to describe a liquid that evaporates easily. This is important to know because it indicates that air concentrations can build up quickly when the material is worked with in its liquid form. Materials with high vapor pressures can be especially hazardous if you are working with them in an enclosed area or in an area with poor air circulation. Vapor pressures are measured in units or millimeters of mercury (mm Hg) at a certain temperature. For example, Xylene with a vapor pressure of 10 mm Hg at 27° - 32° C and toluene with a vapor pressure of 36 mm Hg at 30° C are two solvents, for instance, the use of which can lead to hazardous air concentrations. However, even materials with lower vapor pressures may pose an inhalation hazard because the method of handling (for example, spraying versus brushing) also affects the concentration in air. A vapor pressure will always list a temperature too.

- **Vapor Density** is the relative density or weight of a vapor or gas compared with an equal volume of air. If the vapor density of a substance is less than one, it will tend to rise in air; if the vapor density is greater than one, it will fall in air. Substances with high vapor densities pose a particular problem because they will collect in the bottom of tanks.
- **Solubility** in water refers to the percentage by weight of the substance, which can be dissolved in water. Less than 0.1% is considered negligible; 1% is slight; 1% - 10% is moderate; more than 10% is appreciable; and if it can be dissolved in all proportions, it has complete solubility.
- **Appearance and Order** may help you identify the substance you are working with. Do not rely on odor to indicate whether there is a hazardous concentration of the substance in air. Some substances can reach hazardous levels and not have a noticeable odor.
- **Specific Gravity** refers to the ratio of the weight of an equal volume of liquid to the weight of an equal volume of water at a specified temperature. If a substance has a specific gravity greater than one, it will sink in water; if it has a specific gravity less than one, it will float in water.
- **Percent Volatile by Volume** refers to the percentage of a liquid or solid that evaporates at room temperature. The higher the percentage, the faster the substance will evaporate.
- **Evaporation Rate** is the rate at which the material evaporates compared to ether which evaporates very quickly or to butyl acetate which evaporates very slowly. The chemical which is used for comparison (ether or butyl acetate) should be listed. If a substance has an evaporation rate greater than one, it evaporates more easily than the

chemical it is compared to; if the rate is less than one, it evaporates more slowly than the chemical it is compared to.

The information in Section III, Physical Data is useful for the control of toxic vapors. Boiling point, vapor density, percent volatile, vapor pressure and evaporation are all useful for designing proper ventilation systems. This information is also useful for design and use of adequate fire and spill containment equipment and procedures.

Make these checks. The boiling point, vapor pressure, percent volatile and evaporation rate are all characteristics of a substance which gives off vapors into the air. If one of these characteristics has been listed, all of them should be filled out.

If a material has a percent volatile greater than 10%, a boiling point below 100° C, and a vapor pressure over five millimeters of mercury (mm Hg), check the following sections to make sure they are filled out and for information:

1. Check the TLV in Section II. A low TLV (i.e. less than 10) means that the material can be very hazardous. You may be better off using a highly volatile substance, like acetone, with a high TLV, than a less volatile substance like benzene with a low TLV. In fact, a useful way to compare the hazards of solvents when selecting a solvent to use is to divide the evaporation rate by the TLV and see which one is higher, and therefore more hazardous.
2. In Section IV, check to see that the Flash Point and Flammable Limits are filled out. A substance with a vapor pressure of over 5 mm Hg at a room temperature and an evaporation rate of greater than 1 and a flash point of less than 140 F and low LEL (less than 2%) can be a dangerous fire hazard, especially if the percent volatile is also high.
3. Check Section V "Effects of Overexposure" to see if breathing the vapors of the substance can be harmful.
4. Check Section VII, Special Protection Information, to see whether there are recommendations for respiratory protection and/or ventilation controls. If the substance has a TLV and is volatile, this section must be filled out.
5. Make sure that there are some recommendations for storage and handling in Section IX, Special Precautions, especially if the substance has a vapor density that is heavier than air.

IV. FIRE AND EXPLOSION DATA

If you are working with flammables, solvents, peroxides, explosives, metal dusts and other unstable substances, this section is important. If the product does not pose a fire hazard, that should be stated in this section.

Some terms you need to know are:

- **Flash Point** is the lowest temperature at which a liquid gives off enough vapor to make an ignitable mixture of vapor in air in a test container. Flash point and autoignition should be listed in temperature degrees of Fahrenheit or Centigrade or both. Liquids with flash points below 140° F are specially classified liquids by OSHA and require special precautions. Check Section IX, Special Precautions, to see what they are.
- **Flammable Liquids – LEL (Lower Explosive Limit) and UEL (Upper Explosive Limit)** are the lower and upper limits of vapor and air concentration, given as a percentage, which can cause an explosion. The flash point and flammable limits are the most important when related to the boiling point, vapor pressure, per cent volatile and evaporation rate in Section III. If any one of these items is listed, all of the items should be listed in order to provide enough information about the hazards of the material.
- **Extinguishing Media** means what kind of fire extinguisher to use. If the substance is not flammable and/or is completely inert, the MSDS should say so. Otherwise this line must always be filled out.

Special Fire Fighting Procedures and Unusual Fire and Explosion Hazards would need to be described for any combustible material. Some concentrated corrosives, calcium carbide or reactive metals must not have water applied in case of fire. Check Section II to see if the material is a catalyst, and check Section VI for reactivity with water and polymerization (: a chemical reaction in which two or more molecules combine to form larger molecules that contain repeating structural units) in water or air.

V. REACTIVITY DATA

The information in this section will assist in determining safe storage and handling of hazardous and/or unstable substances. Instability or incompatibility or the product to common substances such as water, direct sunlight, metals used in piping or containers, acids, alkalies, etc. should be listed in this section of the MSDS.

- **Stability** – Cross check with other sections:
 1. Section II: A mixture may be unstable if the ingredients include catalysts and vehicles, peroxides, explosives and other unstable or highly reactive substances.
 2. Section IV: Identify unusual fire and explosive hazards?
 3. Section IX: If there are very specific instructions in this section regarding precautions to take in handling and storage, it may indicate that the material is unstable.
- **Incompatibility** – Common materials or contaminants which the specific material could be expected to come into contact with and which could produce a reaction should be listed here. Conditions to avoid should also be listed in this section. Sections IV and IX may contain information on incompatibility not listed in Section VI.

- **Hazardous Decomposition Products** should list gasses, vapors or fumes released if the substance is exposed to aging, heating, burning, and oxidation or allowed to react. The product's shelf life should also be listed in this section when applicable. Although some materials are harmless in their original form, when they are exposed to the conditions such as aging, burning, etc., they could form hazardous products.

1. Check Section IV for fire and explosion hazards regarding these chemicals.

- **Hazardous Polymerization** is a reaction with extremely high or uncontrolled release of energy. If this section is checked, the conditions under which it could occur should be explained, as this may be very dangerous.

1. Check Section II. If the substance contains any catalyst and vehicle it may indicate that hazardous polymerization can occur.

VI. HEALTH HAZARD INFORMATION

- **Health Hazard Data** should be the combined estimate of the hazard of the total product. This might be stated as a time-weighted average concentration, permissible exposure limit (PEL) or threshold limit value (TLV).

- **Routes of Exposure** should contain information about the potential hazard from absorption of the product, the severity of the effect and the basis for that determination. The basis might be animal studies, analogy with similar products or human exposure. This section should list common effects by route of exposure, usually inhalation or absorption by skin contact. It should include chronic and acute effects; as well as information on carcinogenicity, teratogenicity or mutagenicity

Typical comments might be:

- Skin contact, single short contact – no adverse effects likely
- Prolonged or repeated skin contact – mild irritation and possibly some blistering
- Eye contact – some pain and mild transient irritation. No corneal scarring.

Check Section II to see if TLVs are listed for any of the ingredients. If TLVs are listed there, they should also be listed in this section; make sure the numbers are the same. If the substance is a mixture of several compounds and a TLV for the mixture is listed in this section, this is only appropriate if all of the ingredients in the mixture contributing to the TLV have the same harmful health effects, such as petroleum solvent vapors which cause drowsiness and unconsciousness. Check Sections I and IV for this information.

If inhalation is a primary route of exposure, check the following sections:

- Section III because this section can help you determine how great the hazard might be. Chemicals with high vapor pressure and high volatility usually pose more of an inhalation problem than chemicals with low vapor pressure and low volatility.

- Section VIII because this section should give information on proper respiratory protective devices (with type specified and/or necessary ventilation requirements.)

If skin contact or absorption is a problem, Section VIII should list proper protective equipment (gloves and eye and skin protection).

- **Effects of Overexposure** should indicate relevant signs, symptoms and diseases that could result from acute and chronic exposure to the hazardous substance.
- **Emergency and First Aid Procedures** should contain treatment information that could be used by paramedics and individuals trained in first aid.

Any substance with a PEL or TLV should have emergency first aid procedures listed for acute exposures, especially if the material has a low TLV. Check Section IV to see if the chemical presents any unusual fire or explosive hazards.

- **Note to Physician** should include special information which would be important to a doctor including required or recommended preplacement and periodic medical examinations, diagnostic procedures, and medical management of overexposed employees.

VII. SPILL OR LEAK PROCEDURES

- Detailed procedures and protective clothing and equipment and/or ventilation to be used for cleaning up a spill and safe disposal should be indicated here.
 1. Check Section II for TLV. A low TLV such as HCN has with a TLV of 10 ppm indicates greater health hazard than a high TLV such as acetone has with a TLV of 750 ppm.
 2. Check Section III for volatility and vapor pressure. A high vapor pressure indicates a greater volatility and a greater hazard.
 3. Check Section IV for fire and explosive data (combustible and flammable?)
 4. Check Section V for health data (inhalation hazard? skin contact hazard?)
 5. Check Section VI for reactivity (incompatibility? hazardous polymerization? unstable?)
 6. Check Section VIII for information on personal protective equipment.

For example, if a material has a low TLV, is highly volatile, is flammable, unstable and has severe effects of overexposure listed, then very specific procedures on handling a spill or leak need to be listed. This section should state whether the substance is incompatible with common clean up procedures or media (such as water).

- **Waste Disposal Methods:** If labeling and special handling of clean-up residue is necessary, that should be stated along with the appropriate method of disposal - for instance, sanitary landfill, incineration, etc.

1. Check Section II. If hazardous materials are listed, there should be specific procedures for waste disposal.

VIII. SPECIAL PROTECTION INFORMATION

➤ Respiratory Protection

1. Check Section V to see if inhalation is a probable means of overexposure.
2. Check Section III to see how volatile the substance is, to determine the potential degree of hazard.
 - If respirators are required or recommended, the type and class should be stated, such as "supplied air" or "organic vapor cartridges," or suitable for dust no more toxic than lead, etc. Contact your Department Safety Representative for information regarding the Respiratory Protection Program.
 - If protective clothing is required, the type and material of that clothing should be indicated.

➤ Ventilation

1. Check Sections II, III, and V, volatility and route of exposure to assess the degree of inhalation hazard. If the substance is very volatile and the exposure limit is low, local exhaust ventilation, (which captures contaminants at this point where they are generated), is probably the most effective control. Mechanical, general or dilution ventilation is not recommended for chemicals with a low exposure limit, especially if they are highly volatile or have high evaporative rates.

➤ Protective Gloves

1. Check Section II for the exposure limits of the substance and Section V to determine if the skin is a primary route of exposure.
2. If gloves are recommended, the type should be specified. Check Section I to make sure proper gloves are being recommended.

➤ Eye Protection

1. Check Section V for information regarding hazards to the eye. First aid procedures may be listed, such as flooding with water. If splashes may occur, eye protection and eyewash facilities should be recommended.

IX. SPECIAL PRECAUTIONS

- Substance labeling, or required signage to be posted might be listed here, as well as any information on safety or health which has not been covered in other sections of the MSDS/SDS.
 1. Check Section III for volatility, Section IV for flash point and flammability, Section IV for exposures and Section VI for reactivity.
- References to published guides (NIOSH) or procedures for more specific information for identification, handling or storage of the product might be listed here. Other information such as Department of Transportation placarding, freight handling or storage requirements and environmental control procedures might be listed here.

It is essential that the name and address of the responsible person who prepared the MSDS/SDS and the date the information was compiled be included in the MSDS/SDS so that you can contact that person for additional information if necessary.

UNLABELED PIPES

Each Department shall provide training to all employees called on to perform non-routine tasks with information about any known hazards associated with those tasks. This information will be provided by the supervisors before the non- routine tasks begin.

The city will provide employees with information about any unlabeled pipes in their work areas that contains known hazardous substances. This information will be provided by supervisors.

NOTIFICATION OF OUTSIDE CONTRACTORS AND VISITORS

When there is a possibility that visitors to the city and employees of outside contractors will be exposed to hazardous substances they must be warned and protective measures taken. They also must be provided access to MSDS/SDS for the hazardous substance upon request.

Contractors are required to notify the Public Works Department, before bringing hazardous substances into a City workplace. In such cases, MSDS/SDS must be made available to City Staff upon request.

HAZARD COMMUNICATION PROGRAM EMPLOYEE TRAINING

Both current and new employees will receive required Hazard Communication Program Training. This training shall include the following:

1. The details of the Hazard Communication Program/Globally Harmonized Program.
2. All departments are to inform their employees about the health and physical hazards associated with any hazardous processes or procedures while performing tasks with these substances.

3. Department employees are to be provided with unlimited access to review and read the written Hazard Communication Program.
4. Employees are to have complete access to the Department's Material Safety Data Sheets/SDS and Hazardous Substances List for any hazardous substances located in the workplace.
5. Employees are to be provided information on how to read and interpret MSDS/SDS's under the Globally Harmonized System (GHS) of Classification of Labeling Chemicals.
6. Departments are to train employees how to work safely with hazardous substances and to select the proper Personal Protective Equipment (PPE) to be used when handling hazardous substances.
7. Employees shall be trained on proper emergency procedures in the event of a spill, chemical release, or dangerous exposure occurs.
8. Written records shall be made and kept by departments of all HCP-related employee training. As a minimum, these records will include when the training was given and list of the employees who have received the training.
9. In addition to the initial training, periodic "refresher" training will be provided for all employees who might be exposed to hazardous substances in the workplace on an annual basis through the citywide Safety Training and Communications Program.
10. Special training must also be provided to employees within 30 days from the date that:
 - a) A new hazardous substance is brought into the workplace, or
 - b) An updated MSDS/SDS identifies a new hazard related to substance already present in the workplace.