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How To Read MATERIAL SAFETY DATA SHEETS



Your #1 Source for Industrial Identification & Communication Solutions!

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INTRODUCTION

WELCOME TO UNDERSTANDING MATERIAL SAFETY DATA SHEETS

In this guide you will find information on OSHA's labeling and information requirements for chemicals in work settings. It will explain the use and necessity of material safety data sheets and will suggest the best ways to get your company's chemical labeling up to code.

OSHA's HAZARD COMMUNICATION STANDARD BACKGROUND

Chemicals are present and used in a wide variety of work settings every day, all across the United States and the world. Chemical compounds can often be volatile and pose serious health hazards including irritation and sensitization, and even risk the development of cancer. If not properly handled, chemicals can also pose physical risks through their flammable, corrosive, and reactive characteristics. Workers that are exposed to dangerous chemical compounds without the knowledge of their hazards and identities are put at great risk of injury or illness from overexposure or mishandling.



OSHA's Hazard Communication Standard 1910.1200 (HCS) is designed to ensure workers are informed about all chemical hazards that exist in their work place, as well as the protective measures associated with these hazards.

OSHA defines any substance as hazardous if exposure to it causes adverse effects on the health or safety of employees including causing disease, behavioral abnormalities, cancer, genetic mutation, or physical deformations.

The HCS requires all chemical manufacturers and importers to evaluate the hazards of the chemicals they produce and provide information about them through labels and material safety data sheets (MSDSs), which provide more detailed safety information.

OSHA requires that all employers provide employees with information about the hazards and identities of chemicals in their workplace through the implementation of a hazard communication program. Knowledge acquired under a hazard communication program, as guided by the HCS, can allow employees to carry out proper work practices around chemicals and take the necessary precautions to avoid exposure. Increased knowledge results in increased safety and a reduction of work-related illnesses and injuries caused by chemicals.

The HCS design for hazard communication programs is simple and can be easily implemented in any work place. Chemical manufacturers and importers have to evaluate the hazards of chemicals they produce or import and use that information to prepare labels and detailed material safety data sheets for the employers that purchase those chemicals. The employers then must use the material safety data sheets to properly inform their employees of the risks related to the recently purchased chemicals.



WHAT ARE MSDSs & WHAT ARE THEY FOR?

Material safety data sheets are required for all chemicals present in work settings. They are produced by chemical manufacturers and have to be available for facility employees at all times.



Material safety data sheets are detailed descriptions that explain the hazards and safety precautions of the chemicals they accompany. They are used to inform workers of the proper procedures for handling and working with chemicals, and feature information about a chemical's physical data, toxicity, health effects, reactivity, storage, disposal, and the proper protective equipment for handling spills.

MSDSs are not meant for use by consumers. They provide information for those who use chemicals in a work setting. An employee who uses cleaning products for 40 hours a week would need access to an MSDS, but a person at home who uses it once a month would not.

There is no specific format required for MSDSs under the HCS, but they must be available to employees at all times during their work shifts. How they are made available can be accomplished on a case-by-case basis. As long as employees can get the information they need, any method of access is acceptable. MSDSs can be bound together in a centralized location, or they can be placed in a computerized system that can be accessed by one's company computer.

MSDSs must remain current and up-to-date for all chemicals available in a workplace, and employees must always have access to them.



OSHA REQUIREMENTS

Although there are no formal guidelines for the layout, design, and distribution of MSDSs throughout a workplace, the OSHA Hazard Communication 1910.1200 standard requires that all MSDSs be written in English and feature a minimum of information that includes:

- The common name of a hazardous single substance chemical.
- The chemicals and common names of the ingredients that contribute to a chemical mixture tested for hazards as a whole.
- If a hazardous chemical mixture has not been tested as a whole, then the chemical and common names of all ingredients that comprise one percent or greater of the mixture and are determined to be health hazards.
- The chemical and common names of all ingredients found to pose a physical hazard when in a mixture.
- Physical and chemical characteristics, such as vapor pressure and flash point, of a hazardous chemical.
- The potential physical hazards of the chemical, including fire, explosion, and reactivity.
- The potential health hazards of the chemical, including symptoms of exposure, and any medical conditions known as resulting from exposure to the chemical.
- Employee exposure limit, as dictated by OSHA, which details how long workers can safely be exposed to hazardous chemicals.
- Whether the chemical has been found to be a potential carcinogen by organizations including OSHA.
- Any general precautions for safely handling chemicals such as appropriate hygienic practices, protective measures during repair and procedures for clean-up of spills and leaks.

- Any general control measures for working with chemicals, including engineering controls, work practices, or personal protective equipment.
- Emergency and first-aid procedures.
- The date of when the MSDS was prepared or the last time it was updated.
- The name, address and telephone number of the chemical manufacturer, importer or employer who can provide additional information about the hazardous chemical.

REQUIREMENTS FOR MANUFACTURERS



Chemical manufacturers, importers and distributors must provide employers with the appropriate MSDS with their initial shipment as well as any shipment after a MSDS is updated. The material safety data sheets must either be shipped with the chemicals or sent to the employer prior to the arrival of the shipment.

If the chemical manufacturer does not provide a MSDS with a shipment of hazardous chemicals, then the employer has the right to obtain one from the chemical manufacturer or importer as soon as possible. The manufacturer or importer must also provide employers with a MSDS any time upon request.

READING A TYPICAL MSDS

MSDSs feature organized information on all aspects of a chemical from physical composition and potential hazards to related first-aid and preventative safety measures. The ANSI Z400.1-2004 standardizes the development and format of material safety data sheets for hazardous chemicals to fully comply with OSHA's Hazard Communication Standard. It requires that all MSDSs conform to the 16-section structure to provide consistency for employees to quickly access the information they need.

The Z400.1-2004 works in partnership with the ANSI Z129.1 Labeling Standard, which presents unified guidelines for preparing precautionary labels for hazardous chemicals. In combination, the Z400.1-2004 and the Z129.1 will ease the United States' transition into the eventual implementation of the Globally Harmonized System of Classification (GHS).

The ANSI 16-section outline appears as follows:

1) Product Name and Manufacturer

- Details the commercial name of the chemical, any common synonyms, the chemical family or group of chemicals with associated chemical properties, and its Chemical Abstract Service (CAS) number.
- Lists the manufacturing company's name, address, phone numbers, and other contact information.

2) Chemical Composition

- Lists all ingredients present in a chemical that make up at least one percent of the compound. All carcinogens must be included as well.
 - If percentage does not add up to 100 percent, the compound features innocuous ingredients irrelevant to the MSDS.
 - If the chemical is a single substance, the name of the chemical will be listed at 100 percent.

3) Hazards Identification

- States potential health hazards of a chemical if it is inhaled or ingested or comes into contact with the skin or eyes.
- Details effects of chronic, long term exposure.
- Provides an emergency overview – Example: CAUTION Contents under pressure

4) First Aid Measures

- Explains the necessary first aid for the types of exposure detailed in the previous category.
 - First aid procedures for many chemicals include flushing with water.

5) Fire Fighting Measures

- Lists the chemical's flammable properties and explains the best methods for putting out flames created by the chemical.
- Features a chemical's flammable limits, which are the lowest and highest concentrations of vapor or gas in the air that will ignite when exposed to a spark or flame.
- States a chemical's flash point, which is the lowest temperature that a liquid can give off enough vapors to ignite with a spark or flame.
- Depending on the makeup of the chemical and the size of the fire, the appropriate fire-fighting procedure will be described.

The image shows a standard Material Safety Data Sheet (MSDS) form. The title is "Material Safety Data Sheet (MSDS)". The form is divided into several sections with black headers: 1. Identification: Includes Chemical Name, Synonyms, Chemical Formula, CAS No., and Chemical Name (in Spanish). 2. Hazards: Includes Hazardous Properties, Health Hazards, and Environmental Hazards. 3. Precautionary Statements: Includes Precautionary Statements, Environmental Precautionary Statements, and Environmental Precautionary Statements (in Spanish). 4. Control Measures: Includes Personal Protective Equipment (PPE), Engineering Controls, and Administrative Controls. 5. Physical and Chemical Properties: Includes Physical State, Boiling Point, Melting Point, Flash Point, and Vapor Pressure. 6. Stability and Reactivity: Includes Stability, Reactivity, and Incompatibilities. 7. Toxicological Information: Includes Acute Toxicity, Chronic Toxicity, and Carcinogenicity. 8. Ecological Information: Includes Ecotoxicity and Environmental Fate. 9. Regulatory Information: Includes OSHA Hazardous Material Regulations, DOT Hazardous Material Regulations, and Environmental Regulations. 10. Other Information: Includes Other Information and Revision History.

Courtesy of U.S. Mine Safety and Health Administration

6) Accidental Release Measures

- Explains safety precautions for instances when a chemical may be spilled or released into the air.
- Describes the best procedures for cleanup that are in accordance with federal, state, and local regulations.
- Recommends the necessary personal protective equipment (PPE) for cleaning up spills.

7) Handling and Storage

- Advises how to handle chemicals as well as what to do after handling, including washing hands and removing contaminated clothes.
- Recommends best conditions for chemical storage – usually in a cool dry place away from open flames and heat.

8) Exposure Controls / Personal Protection

- Can list the Personal Exposure Limit (PEL), which was established by OSHA to state the amount of an airborne substance that healthy adult workers can be exposed to without adverse effects.
- Can list the Threshold Limit Value (TLV), which states the air concentration levels of hazardous substances that employees can be exposed to without suffering adverse health effects.
- Lists the necessary equipment a facility needs to have available when people are working with the chemical, including eyewash stations, safety showers, and adequate exhaust ventilation.
- Lists the necessary levels of personal protective equipment, including gloves and eye protection.

9) Physical and Chemical Properties

- Lists all properties and characteristics of the chemical, including whether it is a liquid, solid, or gas at room temperatures, as well as its appearance, odor, freezing and boiling point, and other characteristics.
- Other physical properties include vapor pressure, which indicates how easily a liquid evaporates; vapor density, which is the weight of a vapor gas compared to an equal volume of air; and percent volatile, which gives the percentage of a liquid or solid that will evaporate at 70 degrees F.

10) Stability and Reactivity

- Describes the stability of the chemical, what conditions to avoid, and its incompatibility with other chemicals.
- Stability specifies which environmental conditions may cause a dangerous reaction with the chemical and whether or not the product will decompose over time.
- Reactivity is the rate that a chemical undergoes a chemical reaction in order to enter a more stable state.
- If a chemical has a polymerization hazard, specific storage instructions are listed. Polymerization is a process when molecules of a chemical combine to form larger molecules. If it happens too quickly, it may produce a large amount of heat that can result in a fire or explosion.

11) Toxicological Information

- Toxicology studies the symptoms and treatments of chemical poisoning in living organisms, especially humans.
- Toxicological information describes a chemical's carcinogenicity and lists the effects a chemical can have on human health including the brain, the reproductive system, and genetics.
 - States the adverse effects that result from various routes of exposure, including:
 - Ingestion – eating or drinking hazardous substances.
 - Inhalation – breathing in hazardous substances.
 - Skin contact/ absorption – hazardous chemicals that can corrode through the skin or be slowly absorbed into body tissue and the bloodstream.

12) Ecological Information

- Describes the effects the chemical may have on plants and animals.
- Explains a chemical's environmental fate, or what happens to the chemical after it has been released into the environment.

13) Disposal Considerations

- Suggests the best method for disposing the chemical, which is mostly done by contacting a licensed professional waste disposal service.
- All chemical disposals must follow federal, state, and local codes – chemicals should not enter sewers, watercourses, or low areas unless granted government approval.

14) Transportation Information

- Details the shipping and transportation of hazardous chemicals as regulated by the Department of Transportation (DOT).
- Provides DOT shipping name, chemical identification, hazard class, and labels that are required to be on the container.
- States limitations of transportation i.e. whether or not the chemical can be shipped by air, ground, or sea.

15) Regulatory Information

- Lists government regulations of the chemical and whether or not they classify them as being hazardous.
- Regulatory information comes from the Toxic Substances Control Act of 1976, European Inventory of Existing Commercial Chemical Substances, California Prop 65, Domestic/Non-Domestic Substances List, and the Comprehensive Environmental Response, Compensation, and Liability Act, as well as others.

4. REACTIVITY DATA	
Stability:	Stable
Conditions to Avoid:	Avoid contact with incompatible materials (materials to avoid): Contact with chlorine trifluoride, manganese trifluoride, and d
Incompatibility (materials to avoid):	Contact with chlorine trifluoride, manganese trifluoride, and d
Hazardous Decomposition Products:	Limestone ig alum, ammonium salts, and magnesium. Silica re
Hazardous Polymerization:	Not known to polym
5. FIRE AND EXPLOSION HAZARD DATA	
Flashpoint (Method used):	Not Flammable
Flammable Limits in Air:	Not Flammable
Extinguishing Agents:	None Required
Unusual Fire and Explosion Hazards:	Contact wit
(see section 4 of this MSDS).	
6. TOXICITY AND FIRST AID	
EXPOSURE LIMITS (When exposure to this prod	
be defined in the workplace.) Unless specified o	

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16) Other Information

- Features any further information not included in the preceding subsections.
- May include a manufacturer disclaimer declining liability for total accuracy of all information provided above.

CANADIAN VERSION OF MSDS

Workplace Hazardous Materials Information System (WHMIS) is Canada's national workplace hazard communication standard. It works with the federal, provincial and territorial governments in order to prevent trade barriers between provinces due to varying hazard communication systems. The WHMIS requires that MSDS guides be organized into nine consistent sections with specific headings for each. Although the sections and the layout vary from the United States' OSHA version, the information relayed is identical. The sections read as follows:

1) Production Information

2) Hazardous Ingredients

- In Canada, a manufacturer may apply to withhold the identity of one or more ingredients of its chemical products if they feel the information should remain confidential for business purposes.

3) Physical Data

4) Fire and Explosion Hazard Data

5) Reactivity Data

6) Toxicological Properties / Health Hazard Data

7) First Aid Measures

8) Preventive Measures

9) Preparation Information



The WHMIS requires safety label to be placed on all equipment that meets the guidelines of hazardous material classification. They are Canada's equivalent to the OSHA Right-To-Know labeling system.

CREATING SAFETY LABELS USING MSDSs

Benzenediol	
HEALTH	3
FLAMMABILITY	1
REACTIVITY	0
108-46-3 HEALTH HAZARDS: Corrosive	
ORGAN HAZARDS: cardiovascular system, central nervous system, blood, spleen, liver, kidneys	
CONSULT MSDS FOR MORE INFORMATION	

RIGHT-TO-KNOW (RTK) LABELS

In addition to an MSDS, all containers that hold potentially hazardous materials must be properly labeled using correct information from the MSDS. These labels are called Right-To-Know labels, or RTK labels, and are required as part of the OSHA Hazard Communication 1910.1200 standard.

RTK labels serve as immediate visual warnings of chemical hazards. RTK labels provide a clearly displayed, highly visible warning that quickly relays the information employees need. The OSHA Hazard Communication standard requires that each RTK label identify the hazardous chemical and provide an appropriate health hazard and target organ warning.

Color Bar or NFPA Diamond

DuraLabel Printers Make Both

DuraLabel PRO and Duralabel PRO 300 print die-cut RTK labels in sizes from 1" x 3" up to 4" x 6".

The DuraLabel 7000 and DuraLabel 9000 print die-cut RTK labels in sizes from 4" x 6" up to extra large 6.8" x 10.5" labels.

DuraLabel die-cut labels are long-life premium vinyl. They are resistant to fading (sunlight), moisture, abrasion, and most chemicals.

RTK database software, included with all DuraLabel printers, makes printing and storing RTK labels easy.

Call 1-800-788-5572 for more information, or visit:
www.DuraLabel.com

COLOR BAR RTK LABELS

Color Bar RTK labels are compliant with OSHA's Hazard Communication Standard for use by employees who regularly handle hazardous chemicals in the workplace. The color system lets employees quickly understand "Health," "Flammability," and "Reactivity" hazards in the chemicals they use.

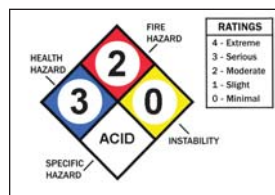


Numbers are used to rate the severity of the hazard on a scale of 0 to 4, with 4 representing the most severe and 0 representing minimal or no danger. The numbering system is meant to convey health and safety information under non-emergency conditions.

The design of the color bar label provides enhanced visibility from long distances, allowing employees to be aware of hazardous materials prior to entering an area that requires personal protective equipment.

NFPA DIAMOND LABELS

NFPA diamond labels are similar to Color Bar RTK labels in that they use a color code and numeric rating system to communicate the type and severity of hazard. However, NFPA diamond labels are used to serve two different purposes.



The NFPA diamond was originally created to provide information to fire fighters and emergency personnel responding to urgent situations such as a fire or chemical spill. For this application only the NFPA diamond is required. However, if health hazard information is included on the label, NFPA diamond labels are compliant with OSHA's Hazard Communication Standard for RTK labels. This means NFPA diamond labels have the advantage of serving double duty by providing both emergency responder information and RTK information on a single label.

The NFPA diamond uses a color code that is similar to that of Color Bar RTK labels. It identifies "Health" risks in blue, "Flammability" in red and "Reactivity" in yellow. As with Color Bar labels, a rating of 0 to 4 gives the severity of the hazard. The "White" area at the bottom of the NFPA diamond adds a fourth rating that identifies specific hazards. This information identifies substances as having characteristics such as being an oxidizer, a simple asphyxiant, as reactive with water, or as radioactive.

When used to provide information for emergency responders this is all the information that is needed. You commonly see this use of the NFPA diamond on trucks and rail cars.

With the addition of the CAS number, and appropriate health hazard information, labels using the NFPA diamond can be used as RTK labels.



A significant difference between Color Bar labels and NFPA diamond labels is that on Color Bar labels the 0 to 4 hazard rating is based on non-emergency conditions. On the NFPA diamond the 0 to 4 hazard rating is based on the assumption that a fire or emergency condition is present. This difference may require the specific use of a Color Bar label or a NFPA diamond label in some situations.

Both NFPA diamond and color bar RTK labels can be used for a variety of applications, including labeling drums, drum lockers, bins, barrels, boxes, doors and entryways.

LABEL PLACEMENT

RTK labels serve employees as an immediate visual warning of chemical hazards and should be clearly displayed on any container that has hazardous contents. Larger labels provide greater visibility, particularly when used on tanks and vessels or in places that require labels to be read from a distance. Pipes which hold hazardous chemicals and valve tags, should also have RTK labels as a precaution should there be a leak.

LABEL MAINTENANCE

Depending on the environment, dust, dirt, debris, grease or oil may accumulate on labels and signs. These should be cleaned so that the legibility of the label is not affected. If the right label material has been selected for the environment in which the label will be used, quality labels can be cleaned – usually just by wiping them with a cloth -- without harming the label.

If a label needs to be replaced, the old label should first be removed. If quality labels have been used removing an old label may be difficult unless a tool such as a Vinyl Zapper is used (available from Graphic Products, 1-800-788-5572). The Vinyl Zapper uses a rubber eraser wheel to cleanly remove labels without harming the underlying surface.

SUMMARY

Overexposure to chemicals is a real risk for employees in many work facilities, but with regulated material safety data sheets and the ability to produce long-lasting and highly visible RTK labels with DuraLabel printers and supplies, your workplace can significantly reduce the threat of chemical-related accident or injury.

When used in compliance with OSHA's Hazard Communication Standard 1910.1200, material safety data sheets and RTK labels can help to reduce risk, promote safety and decrease work-related accidents and injuries.

This guide is produced to increase understanding of the benefits and necessity of material safety data and RTK labels. Using these safety precautions will increase employee safety and morale as well as the overall success of your organization.

This guide is for general purposes only. It is not a substitute for review of applicable standards.

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DURALABEL PRINTERS

DuraLabel delivers powerful features to produce long-lasting, effective, industrial labels. Because DuraLabel supplies cost less, DuraLabel printers create premium quality labels at an economical price.

The desktop DuraLabel PRO and DuraLabel PRO 300 are ideal for handling standard RTK labeling requirements. They print both color bar and NFPA diamond die-cut RTK labels in sizes up to 4" x 6". Both printers open wide to provide fast and easy access for changing supplies.

The DuraLabel PRO and DuraLabel PRO 300 are the most versatile printers you can get. With over 41 types of supplies available, they can handle more types of labeling applications than any other industrial label printer.



DuraLabel PRO 300 - economic, versatile marking system



Battery Pack-
print anywhere,
indoors or out!

Mobile Print Station 150 Plus - everything you need right at your finger tips



All DuraLabel printers ship with:

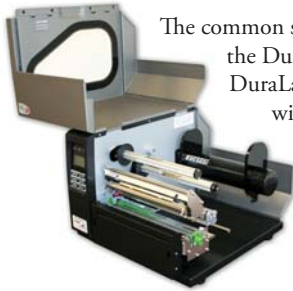
- ILS Software:
 - RTK Label Database
 - Arc Flash Database
- OpenOffice
- Acrobat Reader
- dBEST Bar Code Software
- Over 950 Word and Excel templates
- 450 industry standard symbols



RTK labeling requirements can be met quickly and conveniently using DuraLabel Printers and supplies. All DuraLabel printers come with the comprehensive **Industrial Labeling Suite (ILS) software** for RTK label making.

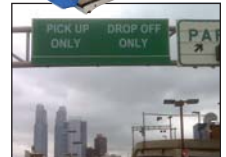
- Over 1,700 chemicals pre-entered in the database (editable)
- Add new chemicals to the database
- Look up chemicals by name or by CAS number.
- Modify and create all your labels directly on screen
- Up to 99 copies of the same label can be printed in one batch

The wide format DuraLabel 7000 and DuraLabel 9000 handle the need for larger labels. Both of these machines can print color bar and NFPA diamond labels from 4" x 6" in size up to 6.8" x 10.5" – giving you extra large labels for use on tanks, drums, doorways, vessels, and wherever high visibility RTK labels are needed.





The common sense design of the DuraLabel 7000 and DuraLabel 9000 provides

wide open access for fast and easy changing of supplies, a rugged all-metal case, and the ability to handle a wide range of label and sign making application in addition to RTK labels.



Use any desktop DuraLabel printer to make standard or custom RTK labels. These quality vinyl labels are resistant to water, chemicals, abrasion and UV light.

Die-cut Color Bar RTK labels are available in five sizes:	Die-cut NFPA Diamond labels come in six different sizes including:
<ul style="list-style-type: none"> • 1.251" x 3" • 2.2" x 2" • 3.5" x 4" • 6" x 9" • 6.8" x 10.5" 	<ul style="list-style-type: none"> • 1" x 3" • 2" x 2" • 3" x 5" • 4" x 6" • 6" x 9" • 6.8" x 10.5" 

RTK labels are not only required by OSHA, but they serve as a simple and effective tool for making a safer workplace.

Call 1-800-788-5572 to learn more about DuraLabel printers and supplies.



GLOSSARY

Action Level – The level of a harmful substance that requires an increase in medical, industrial hygienic and biological monitoring. Action levels are typically set at one half of the Permissible Exposure Limit.

Acute Exposure – Short term or one-time exposure to a hazardous substance.

Acute Toxicity – Negative health effects caused by a single exposure to a hazardous chemical substance. Effects occur within 14 days of the chemical exposure.

Allergen – An abnormal reaction of the body caused by the introduction of a foreign agent through inhalation, ingestion, injection, or skin contact. Reactions include itchy eyes, runny nose, and skin rash.

Asphyxiant – A gaseous substance, usually devoid of smell or taste, which displaces oxygen in the atmosphere and leads to suffocation if breathed long enough.

Auto Ignition Temperature – The lowest temperature that a chemical or substance can spontaneously ignite without an external igniter like a flame or spark.

Carcinogen – A substance that promotes the development or increases the spread of cancer.

Caustics – Substances that cause corrosion and are capable of destroying living tissue.

Ceiling Limit – The legal limit in the United States for employee exposure to a chemical substance. Enforced as a part of OSHA's Permissible Exposure Limit.

Chronic Exposure – Long-term exposure to a hazardous substance for more than one year.

Chronic Health Effect – Negative health effects resulting from long-term exposure to a hazardous substance. The onset of these health effects is gradual, making it difficult for individuals to initially recognize them.

Chronic Toxicity – The toxic effects on a living organism after continuous or repeated exposure to a hazardous substance.

Cryogen – A substance that acts as a refrigerant to obtain very low temperatures. Liquid nitrogen is a common cryogen.

Decomposition – A chemical reaction that separates a chemical compound into elements or smaller compounds. It usually occurs upon interaction with extreme environmental conditions like heat, radiation, humidity or the acidity of a solvent.

Flammable Limits – The range wherein the concentration of a substance in a compound can produce a fire or explosion when introduced to an ignition source.

Flash Point – The lowest temperature that a liquid can form a flammable vapor in air. The fire point is a slightly higher temperature at which the vapor can continue to burn after ignition.

Fume – Vapors, dusts, or smoke that result from a chemical transformation of a substance by reaction, heating, explosion or detonation.

Health Hazard – Any chemical denoted as a carcinogen, toxic agent, reproductive toxin, irritant or sensitizer, or damage the lungs, skin, eyes, or mucous membranes.

Incompatible – An undesired chemical reaction, such as an explosion or fire, produced from a mixture of chemicals.

Inert Gases – Gases that are not reactive with other elements.

Inflammation – Swelling and redness caused by an influx blood to an area of the body affected by injury, disease or foreign substance.

Irritant – Substances that cause inflammation after immediate, prolonged, or repeated contact.

Mechanical Irritation – Damage or injury to human tissue caused by an external physical force.

Mixture – A combination of two or more chemicals that is not the result of a chemical reaction.

Mutagen – A substance or chemical that increases the rate or change in genes. The cell changes can be passed along in cell reproduction, which can lead to defective or cancerous cells.

Organic – Substances and materials that are based on carbon.

Organic Peroxide – A compound that contains carbon and is highly flammable, powerful and volatile.

Oxidation – A chemical reaction of a substance with oxygen, which adds oxygen atoms to the substance. The addition of oxygen atoms to the substance forces a reduction in the substance's electrons.

Permissible Exposure Limit – Enforced by OSHA, PELs limit the amount or concentration of a substance in the air. They are based on an eight hour time-weighted average of exposure.

Physical Hazard – Any chemical that is a combustible, explosive, flammable, unstable, or pyrophoric.

Pyrophoric – Substances that are capable spontaneously igniting in air because their autoignition temperature is below room temperature.

Sensitizer – A chemical that causes an extensive allergic reaction in the normal tissue of most people or animals after repeated exposure. The allergic reaction is due to an immune response to the chemical.

Solvent – A substance that dissolves another substance to form a solution. The solvent composes the largest amount of the solution and determines if it is in a solid, liquid, or gaseous state.

Specific Gravity – The ratio of the mass of material to the mass of an equal volume of water at 39 degrees F.

Systemic Hazard – A hazard that affects all body systems and organs rather than just one specific area or organ.

Target Organs – Indicate which body organs can be affected by exposure to a substance.

Vapor Density – The density of a vapor relative to the density of hydrogen. It is defined as the mass of a volume of a substance divided by the mass of the same volume as hydrogen.

Viscosity – A measure of a fluid's resistance to flow, or its "thickness".

Volatility – Measure of the readiness of a substance, typically in a liquid form, to vaporize.

Water Reactive – Substances that undergo a chemical reaction with water and produce a gas that is either flammable or toxic. A reaction with water may cause materials to spontaneously combust or explode.



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