

Global Harmonization System (GHS) Hazard Communications Update



01CP1485 Revision 00

October 2012

This PowerPoint represents the content of the online web course, but does not have the interactive functionality of the online course.

Developers:

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0ICP1485 Revision 00

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Introduction



Dr. David Michaels discusses the publication of the Final Rule for Hazard Communication.

[Click here to view the transcript](#)





Intro &
Terminal Objective

The Globally
Harmonized System

GHS Pictograms

Safety Data Sheets

GHS Labels

Terminal Objective



Given a Global Harmonization System (GHS) pictogram, hazardous chemical label, or safety data sheet, identify the hazards communicated with 100% accuracy.





Please be patient as page contents load depending on your system & connection.....

Welcome to the DOE Hazard Communication Standard Update Training!

To get started, we'll explore the purpose of the Globally Harmonized System (GHS), and what it will mean to you in your everyday activities.

Next, you'll learn about the elements of GHS pictograms which replace the current hazard signage and labels. We have included a tour of all nine pictograms and the hazards they represent.

Moving along, we'll analyze the new GHS label requirements and finish with a closer look at the 16 standardized sections used for the new GHS Safety Data Sheets (SDSs).

Lastly, we hope you will enjoy this presentation, as we have created it with YOU in mind, keeping it informative and engaging.

You can move back and forth at your leisure and repeat any part of this course until you are satisfied with your learning experience.

Let's get started.....



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Objective 1:



- State the purpose of GHS/Hazard Communication





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The purpose of the Globally Harmonized System/Hazard Communication is to establish internationally-agreed upon criteria for classification of chemical hazards and standardize the approach for labeling and safety data sheets.

On March 26, 2012, the Occupational Safety and Health Administration (OSHA) published a final rule that updates its 25-year-old title 29, Code of Federal Regulations CFR, part 1910.1200, Hazard Communication Standard (HCS). This is the first major revision in 29 years.

Adopting this international system will improve the quality, consistency, and clarity of hazard information for workers. The revised standard went into effect on May 25, 2012, with deadlines in 2013, 2015, and 2016 for training workers and for full implementation.



The GHS was negotiated in a multi-year process by hazard communication experts from many different countries, international organizations, and stakeholder groups. It is based on major existing systems around the world, including OSHA's Hazard Communication Standard and the chemical classification and labeling systems of other US agencies.



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Objective 2:



Discuss the changes the new GHS will bring to Hazard Communication Processes.





What changes will the new GHS bring to Hazard Communication Processes?

The result of this negotiation process is the United Nations' document entitled '**Globally Harmonized System of Classification and Labeling of Chemicals**', commonly referred to as 'The Purple Book', which was the basis for the OSHA standard.

This document provides harmonized classification criteria for health, physical, and environmental hazards of chemicals. It also includes standardized label elements that are assigned to these hazard classes and categories, and provides the appropriate signal words, pictograms, and hazard and precautionary statements to convey the hazards to users.

The Globally Harmonized System recommends a standardized order of information for safety data sheet and OSHA has adopted that approach in its revised Hazard Communication standard.



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Objective 3:



Identify when GHS changes will take place.





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When will these GHS changes take place?



When will GHS take Effect in the USA?

December 1, 2013:

Employers must train employees regarding the new label elements and safety data sheets format.

June 1, 2015:

Manufacturers, importers, and employers must implement all provisions of the revised rule.

December 1, 2015:

GHS-compliant shipping labels must be used by distributors.

June 1, 2016:

Employers must implement their updated HAZCOM programs and train workers on the updated program.



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In summary - why do we need a Globally Harmonized System?

Example of simplified Flammable Hazard Pictograph usage under GHS



BEFORE GHS IMPLEMENTATION

AFTER GHS IMPLEMENTATION



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QUESTION 1

WHAT IS THE GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELING OF CHEMICALS?

AN INTERNATIONAL
APPROACH TO HAZARD
COMMUNICATION

PART OF THE OSHA
STANDARD FOR HAZCOM

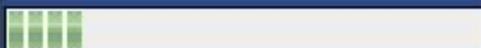
A COMBINATION OF U.S.
LABELING SYSTEMS

A MANDATORY UNIVERSAL
LABELING SYSTEM

Select a Response

PRIZE

\$1,000,000





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You have completed the Globally
Harmonized System section!

If you wish to return to review this section or
parts thereof, use the
The Globally Harmonized System
button on the left menu bar.



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Objective 4:



Discuss the specific properties of a GHS pictogram.





How does the GHS define pictograms?

Under the GHS, a **pictogram** is a graphical composition representation that includes a symbol plus other graphic elements, such as a border, background pattern or color intended to convey specific information. In the most basic terms, a pictogram is a picture plus a border used to convey information.

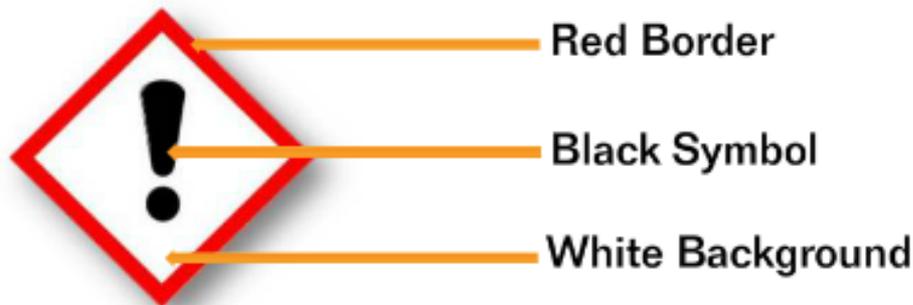
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Pictogram Name:
Exclamation Mark



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What are pictograms?

Generally speaking, a pictogram is a symbol or picture which represents a word or idea.

We see pictograms everyday in signs and labels. We are all familiar with the “No Smoking” pictogram posted in public buildings and the “No diving” signs painted on the decks of swimming pools.



The Department of Transportation (DOT) routinely requires labels with pictograms for vehicles carrying hazardous materials.



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There are three categories of hazards:

- PHYSICAL HAZARDS**

(Flammable or reactive materials)



- HEALTH HAZARDS**

(Harmful to human health)



- ENVIRONMENTAL HAZARDS**

(Harm to the aquatic environment or ozone layer)





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Objective 5:



Identify the hazards depicted by the following pictograms:

- Health Hazard
- Flame
- Exclamation Mark
- Gas Cylinder
- Corrosion
- Exploding Bomb
- Flame over Circle
- Skull and Crossbones
- Environment





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In this section, we will explore each of the nine pictograms listed by GHS and identify the hazards and specific characteristics of those hazards.

We will first show you the pictogram and then provide definitions for key hazards associated with the pictogram.

Let's get started.....





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Health Hazard Pictogram

Health hazards in the context of the Globally Harmonized System for Classifications and Labeling of Chemicals are chemicals that can harm the human body.

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HEALTH HAZARD PICTOGRAM



Definitions:

- **Carcinogen:** a substance or a mixture of substances which induce cancer or increase its incidence.
- **Mutagenicity:** genetic mutation at the cellular level - a permanent change in the amount or structure of the genetic material in a cell.
- **Reproductive Toxicity:** adverse effects on sexual function and fertility in adult males and females, as well as adverse effects on development of the offspring.
- **Respiratory Sensitizer:** a substance that causes hypersensitivity of the airways following inhalation of the substance.
- **Target Organ Toxicity:** targets specific organ(s), non-lethal.
- **Aspiration Toxicity:** the entry of a liquid or solid chemical directly through the oral or nasal cavity, or indirectly from vomiting, into the trachea and lower respiratory system resulting in severe effects such as chemical pneumonia, varying degrees of pulmonary injury or death following aspiration.



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Flame Pictogram

The flame indicates a substance that is flammable, self-reactive, pyrophoric, self-heating, water reactive, or is an organic peroxide.



FLAME PICTOGRAM



Definitions:

Flammables:

- **Flammable gas:** a gas having a flammable range with air at 20°C (68°F) and a standard pressure of 101.3 kPa (14.7 psi). A chemically unstable gas that is able to react explosively even in the absence of air or oxygen is also considered a flammable gas.
- **Aerosol:** any non-refillable receptacle containing a gas compressed, liquefied or dissolved under pressure, and fitted with a nozzle allowing the contents to be released as particles in suspension in a gas, or as a foam, paste, powder, liquid or gas - a flammable aerosol contains any component that is classified as a flammable liquid, gas, or solid.
- **Flammable liquid:** a liquid that has a flash point of not more than 93°C (199.4°F). Flash point means the minimum temperature at which a liquid gives off vapor in sufficient concentration to form an ignitable mixture.
- **Flammable solid:** a solid which is a readily combustible solid, or which may cause or contribute to fire through friction - readily combustible solids are powdered, granular, or pasty chemicals which are dangerous if they can be easily ignited by brief contact with an ignition source, such as a burning match, and if the flame spreads rapidly.

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FLAME PICTOGRAM - cont'd



Definitions: - cont'd

Pyrophoric

- **Pyrophoric liquid and solid:** a material which, even in small quantities, is liable to ignite within five minutes after coming into contact with air.
- **Self-Heating:** a solid or liquid chemical, other than a pyrophoric liquid or solid, which, by reaction with air and without energy supply, is liable to self-heat. The substances or mixtures differ from a pyrophoric liquid or solid in that they will ignite only when in large amounts (kg) and after long periods of time (hours or days).
 - **Emits Flammable Gas:** solid or liquid substances or mixtures which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.



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FLAME PICTOGRAM - cont'd



Definitions: - cont'd

Self Reactive

- Thermally unstable liquid or solid chemicals liable to give off heat even without participation of oxygen (air). This definition excludes chemicals classified as explosives, organic peroxides, oxidizing liquids or oxidizing solids. A self-reactive chemical is regarded as possessing explosive properties when heated under confinement.

Organic Peroxides:

- An organic peroxide is any organic (carbon-containing) compound having two oxygen atoms joined together (-O-O-). This chemical group is called "peroxy" group. Organic peroxides can pose severe fire and explosion hazards. In addition, they are thermally unstable and are subject to explosive decomposition, rapid burning, sensitivity to impact or friction, or can react dangerously with other substances.



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Exclamation Mark Pictogram

The exclamation mark depicts chemicals that are health hazards which can harm the body in specific ways, such as: skin and eye irritant, skin sensitizer, acute toxicity, narcotic effects, and respiratory tract irritant.





EXCLAMATION MARK PICTOGRAM



Definitions:

- **Irritant (skin and eye):** a chemical that produces reversible damage to the skin or eye following exposure.
- **Skin Sensitizer:** a chemical that will lead to an allergic response following skin contact.
- **Acute Toxicity:** the adverse effects of a substance when ingested, inhaled, or applied to the skin - skin exposure and oral ingestion will show adverse effects occurring after a single dose of a substance, or multiple doses given within 24 hours, or an inhalation exposure for 4 hours.

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EXCLAMATION MARK PICTOGRAM - cont'd



Definitions: - cont'd

- **Narcotic Effects:** central nervous system depression including narcotic effects in humans such as drowsiness, narcosis, reduced alertness, loss of reflexes, lack of coordination, and vertigo are included.
These effects can also be manifested as severe headache or nausea, and can lead to reduced judgment, dizziness, irritability, fatigue, impaired memory function, deficits in perception and coordination, reaction time, or sleepiness - narcotic effects observed in animal studies may include lethargy, lack of coordination, the inability to right oneself, narcosis, and the inability to voluntarily coordinate muscles (as in walking).
- **Respiratory Tract Irritant:** characterized by localized redness, swelling, itching of the skin and/or pain that impair function with symptoms such as cough, pain, choking, and breathing difficulties.

Hazardous to Ozone Layer (Non-Mandatory) - see note

Note: OSHA has only implemented the parts of the GHS that apply to occupational exposure. Environmentally related terms such as this are not included in the revised HCS.



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Gas Cylinder Pictogram

A gas cylinder or tank is a pressure vessel designed to store compressed gas. A compressed gas is a gas, having neither independent shape nor volume and able to expand indefinitely. Hazards include oxygen displacement, explosion, fire, and exposure to toxins.



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GAS CYLINDER PICTOGRAM



Definitions:

- **Gas:** a substance which at 50°C (122°F) has a vapor pressure greater than 300 kPa, (3 atmosphere) or is completely gaseous at 20°C (68°F) at a standard pressure of 101.3 kPa (1 atmosphere).
- **Compressed Gas:** a gas, which when packaged under pressure, is entirely gaseous at -50°C.
- **Liquefied Gas:** a gas which, when packaged under pressure, is partially liquid at temperatures above - 50°C.
- **Dissolved Gas:** a gas which, when packaged under pressure, is dissolved in a liquid phase solvent.
- **Refrigerated Liquefied Gas:** a gas which, when packaged is made partially liquid because of its low temperature.



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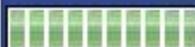
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Corrosion Pictogram

Corrosion of the body is the production of irreversible tissue damage or decay to any part when exposed to corrosive materials. Corrosion is also defined as a process in which a solid such as metal, is slowly deteriorated or changed by a chemical action and is included because corrosion of a solid could indirectly result in harm to a body.





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CORROSION PICTOGRAM



Definitions:

- **Corrosive Chemical:** a chemical that causes visible destruction of, or irreversible alterations in, living tissues by chemical action at the site of contact. (For example, a chemical is considered to be corrosive if, when tested under specific conditions, it destroys or changes irreversibly the structure of the tissue at the site of contact).
- **Skin Corrosion:** is the production of irreversible damage to the skin; namely, visible necrosis through the epidermis and into the dermis, following the application of a test substance for up to 4 hours. Corrosive reactions are typified by ulcers, bleeding, bloody scabs, and, by the end of observation at 14 days, by discoloration due to blanching of the skin, complete areas of alopecia, and scars.
- **Serious Eye Damage:** the production of tissue damage in the eye, or serious physical decay of vision, following application of a test substance to the anterior surface of the eye, which is not fully reversible within 21 days of application.
- **Corrosive to Metal:** Substance or a mixture which by chemical action will materially damage, or even destroy, metals.



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Explosion Bomb Pictogram

Explosion bomb depicts explosive substances which consist of liquids or solids or a mixture of substances which are capable, by chemical reactions, of producing mass explosion hazards; causing extreme physical damage to a specified area.



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EXPLODING BOMB PICTOGRAM



Definitions:

Explosives are divided into six categories ranging from extremely sensitive to extremely insensitive items. The extremely insensitive items pose negligible probability of accidental initiation or propagation of an explosion.

- **Explosive Substances:** solid or liquid substances (or mixture of substances) which are in themselves capable by chemical reaction of producing gases at such a temperature and pressure and at such a speed as to cause damage to the surroundings - pyrotechnic substances are included even when they do not involve gases
- **Pyrotechnic Substances:** substances designed to produce an effect by heat, light, sound, gas or smoke, or a combination of these as the result of non-detonative self-sustaining release of energy (heat) or chemical reactions.



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EXPLODING BOMB PICTOGRAM - cont'd



Definitions: - cont'd

- **Self-reactive Substances:** are thermally unstable liquid or solid substances liable to undergo strongly exothermic reactions even without participation of oxygen (air). This definition excludes substances or mixtures classified under the GHS as explosive, organic peroxides or as oxidizing.
- **Organic Peroxides:** are liquid or solid organic substances which contain the bivalent -O-O- structure and maybe considered derivatives of hydrogen peroxide, where one or both of the hydrogen atoms have been replaced by organic radicals. The term also includes organic peroxide formulation (mixtures).



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Flame over Circle Pictogram

Flame over Circle (Oxidizers) - an oxidizer contributes or yields oxygen resulting in the combustion of other material(s).



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FLAME OVER CIRCLE PICTOGRAM



Definitions:

- **Oxidizing Gas:** any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does
- **Oxidizing Solids or Liquids:** a solid or liquid which, while in itself not necessarily combustible, may generally by yielding oxygen, cause, or contribute to, the combustion of other material.



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Skull and Crossbones Pictogram

Skull and crossbones depict substances that are acutely toxic via oral, skin absorption, or inhalation route of entry into the body.



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SKULL AND CROSSBONES PICTOGRAM



Definitions:

- **Acute Toxicity:** this relates to the adverse effects of a substance when ingested, inhaled, or applied to the skin. Skin exposure and oral ingestion will show adverse effects occurring following oral or dermal administration after a single dose of a substance or multiple doses given within 24 hours, or an inhalation period of 4 hours.
- **LD₅₀:** the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals.
- **LC₅₀:** the concentration of a material in air that results in the death of 50% (one half) of a group of test animals following an inhalation exposure of 4 hours.



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Environment Pictogram - Hazardous to the Aquatic Environment

Substances that pose an acute or chronic toxicity hazard in the aquatic environment.



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ENVIRONMENT PICTOGRAM



NOTE: While the GHS includes criteria on classifying chemicals for aquatic toxicity, these provisions were not adopted in the Hazard Communication Final Rule because OSHA does not have the regulatory authority to address environmental concerns.

However, the "building block approach" is utilized here to provide classification and labeling guidance to support the goals of harmonization that are useful to other regulatory authorities (e.g. EPA).

See the Globally Harmonized System of Classification and Labelling of Chemicals (Rev.1 2005) [here](#) including Annexes 9 and 10 for detailed information. Clicking on the link will open a new browser window for your convenience.



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ENVIRONMENT PICTOGRAM - cont'd



Definitions:

- **Acute Aquatic Toxicity:** the intrinsic property of a material to cause injury to an aquatic organism in a short-term exposure.
- **Chronic Aquatic Toxicity:** the potential or actual properties of a material to cause adverse effects to aquatic organisms during exposures that are determined in relation to the life-cycle of the organism.



Review Question

What is the border color of pictograms?

- Red
- Black
- Magenta
- Orange





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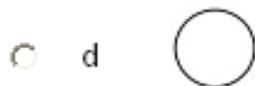
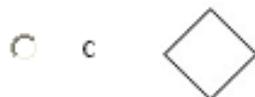
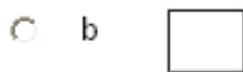
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Review Question

Which of the following shapes is used for all pictograms?





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Review Question

If you see this pictogram, what types of hazards might you expect?

- Flammable solid
- Aerosol or compressed gas
- A pyrophoric liquid
- All of the above





Review Question

Reproductive Toxicity is a term that relates to sexual dysfunction and loss of fertility from exposure to certain substances.

- True
- False

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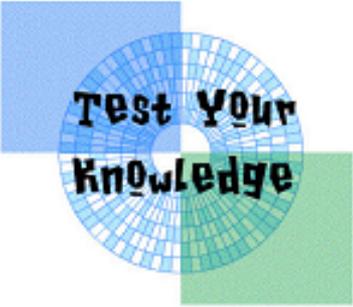
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Review Question

Some metals will burn. They are identified in two categories. What are these categories?

- Flammable powders
- Volatile and explosive
- Class IV and Class V
- Category 1 and Category 2



Test Your
Knowledge



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You have completed the pictogram section!

If you wish to return to review this section or parts thereof, use the **GHS Pictograms** button on the left menu bar.



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Objective 6:



Describe the sections of a GHS Safety Data Sheet.





Safety Data Sheets (SDS)

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In this section we will take a closer look at the contents of the new Safety Data Sheets (SDSs).

SDSs that conform to GHS guidelines may look very different than the safety data sheets you are used to seeing. GHS styles SDSs contain new standardized elements in section 2 that are also found on GHS formatted labels. These elements include signal words, hazard statements, pictograms, and precautionary statements.

We will begin with basic definitions and move on to take a closer look at each of the 16 sections.

Let's get started.....



Safety Data Sheets (SDS)



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Definitions

| | |
|--|--|
| Chemical | any substance or mixture of a substance. |
| Chemical Abstracts Service (CAS) Number | includes elements, isotopes, organic compounds, inorganic compounds, ions, organometallics, metals and nonstructurable materials such as materials on unknown, variable composition, or biological origin. |
| Chemical name | the scientific designation of a chemical or a name that will clearly identify the chemical for the purpose of conducting a hazard classification. |
| Classification | description of a chemical according to certain chemical functional or structural properties. |
| Decomposition products | a product of the separation of a chemical compound into elements or simpler compounds. |
| Hazard category | the division of criteria within each hazard class. These categories compare hazard severity within a hazard class. |
| Hazard class | the nature of the physical or health hazards, e.g., flammable solid, carcinogen, oral acute toxicity. |



Safety Data Sheets (SDS)



Definitions - cont'd

| | |
|--|---|
| Hazard not otherwise classified | an adverse physical or health effect identified through evaluation of scientific evidence during the classification process that does not meet the specified criteria for the physical and health hazard classes addressed in this section. |
| Hazard statement | a statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard. |
| Hazardous chemicals | any chemical which is classified as a physical hazard or a health hazard, a simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified. |
| Chemical compatibility | chemical compatibility is a measure of how stable a substance is when mixed with another substance. |
| Pictogram | a composition that may include a symbol plus other graphic elements, such as a border, background pattern, or color that is intended to convey specific information about the hazards of a chemical. Nine pictograms are designated under this standard for application to a hazard category. |
| Precautionary statement | A standardized phrases that provided advice about the correct handling of chemical substances and mixtures. |
| Product Identifier | Chemical name or number. |

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Safety Data Sheets (SDS)

Definitions - cont'd

| | |
|--------------------|--|
| Reactivity | the rate at which a chemical substance tends to undergo a chemical reaction. |
| Signal word | a word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used in this section are "danger" and "warning." "Danger" is used for the more severe hazards, while "warning" is used for the less severe. |
| Stability | determines if the chemical substance will stay stable if exposed to heat or other chemicals. |

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Safety Data Sheets (SDS)

Section 1 – Identification

This section identifies the chemical on the SDS as well as the recommended uses. It also provides the essential contact information of the supplier. The required information consists of:

1. Product identifier used on the label and any other common names or synonyms by which the substance is known.
2. Name, address, phone number of the manufacturer, importer, or other responsible party, and emergency phone number.
3. Recommended use of the chemical (e.g., a brief description of what it actually does, such as flame retardant) and any restrictions on use (including recommendations given by the supplier).





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Section 2 – Hazard(s) Identification

This section identifies the hazards of the chemical presented on the SDS and the appropriate warning information associated with those hazards. The required information consists of:

1. The hazard classification of the chemical (e.g., flammable liquid, category).
2. Signal word.
3. Hazard statement(s).
4. Pictograms (the pictograms or hazard symbols may be presented as graphical reproductions of the symbols in black and white or be a description of the name of the symbol (e.g., skull and crossbones, flame).
5. Precautionary statement(s).
6. Description of any hazards not otherwise classified.
7. For a mixture that contains an ingredient(s) with unknown toxicity, a statement describing how much (percentage) of the mixture consists of ingredient(s) with unknown acute toxicity. Please note that this is a total percentage of the mixture and not tied to the individual ingredient(s).





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Section 3 – Composition/Information

This section identifies the ingredient(s) contained in the product indicated on the SDS, including impurities and stabilizing additives. This section includes information on substances, mixtures, and all chemicals where a trade secret is claimed. The required information consists of:

1. Substances
2. Chemical name
3. Common name and synonyms
4. Chemical Abstracts Service (CAS) number and other unique identifiers
5. Impurities and stabilizing additives, which are themselves classified and which contribute to the classification of the chemical
6. Mixtures
7. Same information required for substances.





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Section 3 – Composition/Information - cont'd

9. The chemical name and concentration (i.e., exact percentage) of all ingredients which are classified as health hazards and are:
 - Present above their cut-off/concentration limits or
 - Present a health risk below the cut-off/concentration limits.

10. The concentration (exact percentages) of each ingredient must be specified except concentration ranges may be used in the following situations:
 - A trade secret claim is made,
 - There is batch-to-batch variation, or
 - The SDS is used for a group of substantially similar mixtures.

11. Chemicals where a trade secret is claimed
12. A statement that the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret is required.





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Section 4 – First Aid Measures

This section describes the initial care that should be given by untrained responders to an individual who has been exposed to the chemical. The required information consists of:

1. Necessary first-aid instructions by relevant routes of exposure (inhalation, skin and eye contact, and ingestion).
2. Description of the most important symptoms or effects, and any symptoms that are acute or delayed.
3. Recommendations for immediate medical care and special treatment needed, when necessary.

Section 5 – Fire Fighting Measures

This section provides recommendations for fighting a fire caused by the chemical. The required information consists of:

1. Recommendations of suitable extinguishing equipment, and information about extinguishing equipment that is not appropriate for a particular situation.
2. Advice on specific hazards that develop from the chemical during the fire, such as any hazardous combustion products created when the chemical burns.
3. Recommendations on special protective equipment or precautions for firefighters.





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Section 6 – Accidental Release Measures

This section provides recommendations on the appropriate response to spills, leaks, or releases, including containment and cleanup practices to prevent or minimize exposure to people, properties, or the environment. It may also include recommendations distinguishing between responses for large and small spills where the spill volume has a significant impact on the hazard. The required information may consist of recommendations for:

1. Use of personal precautions (such as removal of ignition sources or providing sufficient ventilation) and protective equipment to prevent the contamination of skin, eyes, and clothing.
2. Emergency procedures, including instructions for evacuations, consulting experts when needed, and appropriate protective clothing.
3. Methods and materials used for containment (e.g., covering the drains and capping procedures).
4. Cleanup procedures (e.g., appropriate techniques for neutralization, decontamination, cleaning or vacuuming; adsorbent materials; and/or equipment required for containment/clean up).

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Section 7 – Handling and Storage

This section provides guidance on the safe handling practices and conditions for safe storage of chemicals. The required information consists of:

1. Precautions for safe handling, including recommendations for handling incompatible chemicals, minimizing the release of the chemical into the environment, and providing advice on general hygiene practices (e.g., eating, drinking, and smoking in work areas is prohibited).
2. Recommendations on the conditions for safe storage, including any incompatibilities. Provide advice on specific storage requirements (e.g., ventilation requirements).

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Section 8 – Exposure Control/Personal Protection

This section indicates the exposure limits, engineering controls, and personal protective measures that can be used to minimize worker exposure. The required information consists of:

1. OSHA Permissible Exposure Limits (PELs), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available.
2. Appropriate engineering controls (e.g., use local exhaust ventilation, or use only in an enclosed system).
3. Recommendations for personal protective measures to prevent illness or injury from exposure to chemicals, such as personal protective equipment (PPE) (e.g., appropriate types of eye, face, skin or respiratory protection needed based on hazards and potential exposure).
4. Any special requirements for PPE, protective clothing or respirators (e.g., type of glove material, such as PVC or nitrile rubber gloves; and breakthrough time of the glove material).





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Section 9 – Physical and Chemical Properties

This section identifies physical and chemical properties associated with the substance or mixture. The minimum required information consists of:

- Appearance (physical state, color, etc.)
- Odor
- Vapor pressure
- Odor threshold
- Vapor density
- pH
- Relative density
- Melting point/freezing point
- Solubility(ies)
- Initial boiling point and boiling range
- Odor
- Vapor pressure
- Odor threshold
- Vapor density
- pH
- Relative density
- Melting point/freezing point
- Viscosity





Safety Data Sheets (SDS)

Section 9 – Physical and Chemical Properties - cont'd

The SDS may not contain every item on the previous list because information may not be relevant or is not available. When this occurs, a notation to that effect must be made for that chemical property.

Manufacturers may also add other relevant properties, such as the dust deflagration index (Kst) for combustible dust, used to evaluate a dust's explosive potential.

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Section 10 – Stability and Reactivity

This section describes the reactivity hazards of the chemical and the chemical stability information. This section is broken into three parts: reactivity, chemical stability, and other. The required information consists of:

1. Reactivity
2. Description of the specific test data for the chemical(s). This data can be for a class or family of the chemical if such data adequately represent the anticipated hazard of the chemical(s), where available
3. Chemical stability
4. Indication of whether the chemical is stable or unstable under normal ambient temperature and conditions while in storage and being handled
5. Description of any stabilizers that may be needed to maintain chemical stability
6. Indication of any safety issues that may arise should the product change in physical appearance.
7. Other

.....continued on the next page





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Section 10 – Stability and Reactivity - cont'd

continued from previous page.....

8. Indication of the possibility of hazardous reactions, including a statement whether the chemical will react or polymerize, which could release excess pressure or heat, or create other hazardous conditions. Also, a description of the conditions under which hazardous reactions may occur.
9. List of all conditions that should be avoided (e.g., static discharge, shock, vibrations, or environmental conditions that may lead to hazardous conditions)
10. List of all classes of incompatible materials (e.g., classes of chemicals or specific substances) with which the chemical could react to produce a hazardous situation
11. List of any known or anticipated hazardous decomposition products that could be produced because of use, storage, or heating. (Hazardous combustion products should also be included in Section 5 (Fire-Fighting Measures) of the SDS.)





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Section 11 – Toxicology Information

This section identifies toxicological and health effects information or indicates that such data is not available. The required information consists of:

1. Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact). The SDS should indicate if the information is unknown.
2. Description of the delayed, immediate, or chronic effects from short- and long-term exposure.
3. The numerical measures of toxicity (lethal - nonlethal).
4. Description of the symptoms. This description includes the symptoms associated with exposure to the chemical including symptoms from the lowest to the most severe exposure.
5. Indication of whether the chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions) or found to be a potential carcinogen by OSHA.

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Section 12 – Ecological Information (Non-mandatory)

This section provides information to evaluate the environmental impact of the chemical(s) if released to the environment. The information may include:

1. Data from toxicity tests performed on aquatic and/or terrestrial organisms.
2. Whether there is a potential for the chemical to persist and degrade in the environment either through biodegradation or other processes, such as oxidation or hydrolysis.
3. Results of tests of bio-accumulation potential, such as pesticides in the water, and the bio-concentration factor (BCF), where available.
4. The potential for a substance to move from the soil to the groundwater (indicate results from adsorption studies or leaching studies).
5. Other adverse effects (e.g., environmental fate, ozone layer depletion potential, photochemical ozone creation potential, endocrine disrupting potential, and/or global warming potential).

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Section 13 – Disposal Considerations (Non-mandatory)

This section provides guidance on proper disposal practices, recycling or reclamation of the chemical(s) or its container, and safe handling practices. To minimize exposure, this section should also refer the reader to Section 8 (Exposure Controls/Personal Protection) of the SDS. The information may include:

1. Description of appropriate disposal containers to use.
2. Recommendations of appropriate disposal methods to employ.
3. Description of the physical and chemical properties that may affect disposal activities.
4. Language discouraging sewage disposal.
5. Any special precautions for landfills or incineration activities.

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Section 14 – Transport Information (Non-mandatory)

This section provides guidance on classification information for shipping and transporting of hazardous chemicals by road, air, rail, or sea. The information may include:

1. UN number (i.e., four-figure identification number of the substance).
2. UN proper shipping name.
3. Transport hazard class(es).
4. Packing group number, if applicable, based on the degree of hazard.
5. Environmental hazards (e.g., identify if it is a marine pollutant according to the International Maritime Dangerous Goods Code (IMDG Code)).
6. Guidance on transport in bulk (according to Annex II of MARPOL 73/78 and the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (International Bulk Chemical Code (IBC Code))).
7. Any special precautions which an employee should be aware of or needs to comply with, in connection with transport or conveyance either within or outside their premises (indicate when information is not available).

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Section 15 – Regulatory Information (Non-mandatory)

This section identifies the safety, health, and environmental regulations specific for the product that is not indicated anywhere else on the SDS. The information may include:

- Any national and/or regional regulatory information of the chemical or mixtures (including any OSHA, Department of Transportation, Environmental Protection Agency, or Consumer Product Safety Commission regulations)

Section 16 – Other Information

- This section indicates when the SDS was prepared or when the last known revision was made. The SDS may also state where the changes have been made to the previous version. You may wish to contact the supplier for an explanation of the changes. Other useful information also may be included here.





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QUESTION 1

THE IDENTIFICATION SECTION OF A SDS CONTAINS:

HAZARD STATEMENT

NAME, ADDRESS AND PHONE
NUMBER OF THE
MANUFACTURER

PICTOGRAM

SIGNAL WORD

Select a Response

PRIZE

\$1,000,000

\$500,000

\$250,000

\$100,000

\$50,000





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QUESTION 2

IN WHICH SECTION OF THE SDS WOULD YOU FIND THE EXACT PERCENTAGES OF EACH INGREDIENT?

EXPOSURE CONTROLS

PHYSICAL AND CHEMICAL PROPERTIES

COMPOSITION INFORMATION

TOXICOLOGY INFORMATION

Select a Response

PRIZE

\$1,000,000

\$500,000

\$250,000

\$100,000

\$50,000





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QUESTION 3

NUMERICAL TOXICITY MEASURES RELATES TO:

LEVEL OF SEVERITY OF
INJURY – LETHAL OR NON-
LETHAL

INCREMENTAL DESCRIPTION
SYMPTOM SEVERITY

SEVERITY OF THE TOXINS

NUMBER OF ROUTES OF
EXPOSURE

Select a Response

PRIZE

\$1,000,000

\$500,000

\$250,000

\$100,000

\$50,000





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QUESTION 4

IN WHICH SECTION WOULD YOU FIND SPECIAL PRECAUTIONS FOR LANDFILLS?

SECTION 4 - FIRST AID MEASURES

SECTION 2, HAZARDS

SECTION 16 - OTHER INFORMATION

SECTION 13, DISPOSAL CONSIDERATIONS

Select a Response

PRIZE

\$1,000,000

\$500,000

\$250,000

\$100,000

\$50,000





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QUESTION 5

THE CAS NUMBER WILL BE LISTED UNDER WHICH SECTION OF THE SDS?

IDENTIFICATION SECTION

COMPOSITION SECTION

HAZARDS SECTION

ACCIDENTAL RELEASE SECTION

Select a Response

PRIZE

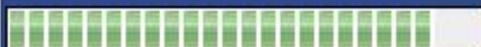
\$1,000,000

\$500,000

\$250,000

\$100,000

\$50,000





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You have completed the **GHS Safety Data Sheets** section!

If you wish to return to review this section or parts thereof, use the **Safety Data Sheets** button on the left menu bar.





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Objective 7:



Describe the elements of a GHS Hazardous Chemical Label.





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GHS Labels

In this section, we introduce the new GHS label to you and explain the elements required to be displayed on the label.

Note: While not all labels will have the same appearance, they must contain each of the required elements





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We will also explore how these labels will help you to recognize hazards, handle chemicals safely, and determine other useful information.

NOTE: The term MSDS - Material Safety Data Sheets - will be replaced with SDS: Safety Data Sheets. More on that later.....





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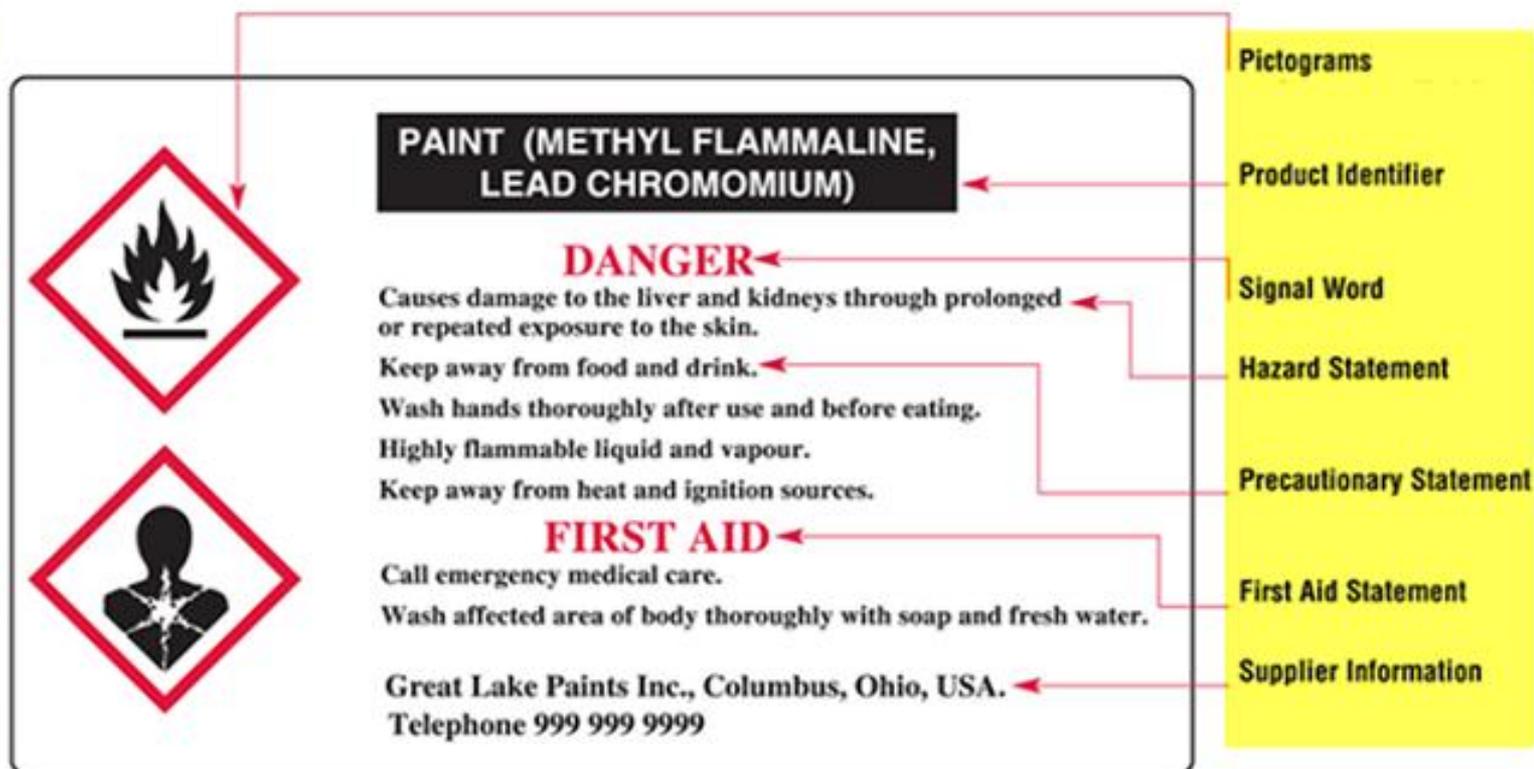
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GHS Labels

The new GHS labels are streamlined to make them easy to read, understand, and follow. The label has the following elements as shown in the example below:





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GHS Labels - Label Element Details

Pictograms: Discussed in previous section.

Product Identifier: *Chemical name or number* - the name or number used for a hazardous chemical on a label or in the Safety Data Sheet (SDS). It provides a unique means by which the user can identify the chemical. The product identifier used shall permit cross-references to be made among the list of hazardous chemicals required in the written hazard communication program, the label and the SDS.

Signal Word: *Level of severity of hazard* - a word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. "Danger" is used for the more severe hazards, while "warning" is used for the less severe.

Hazard Statement: *A statement assigned to a hazard class and category that describes the nature of hazard(s) associated with chemical.*

Precautionary Statement: *Recommended measures to prevent or minimize adverse effects resulting from exposure* - There are four different types of precautionary statements: Prevention, Response, Storage, and Disposal.

Supplier Information: *Name, address, and phone number of chemical manufacturer, importer, or other responsible party.*

Supplemental Information: *Example: Information regarding safe disposal.*





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While not all labels will have the same appearance, they must contain each of the 7 required elements.

- True
- False





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Which of the following indicates the severity of hazard?

- Hazard Pictogram
- Hazard Statement
- Signal Word





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The Product Identifier permits cross-references to be made among the list of hazardous chemicals required in the written hazard communication program, the label, and the SDS.

- True
- False





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A Hazard statement is _____.

- Specific information about the hazards of a chemical (only applies to pyrophoric substances)
- Nature of the hazards associated with a chemical
- Standardized phrases regarding the hazards of the chemical
- Chemical name or number





The product identifier differs from the supplier information because it doesn't include the name, address and phone number of the chemical manufacturer.

- True
- False

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A precautionary statement will include the rate at which a chemical can undergo a chemical reaction.

- True
- False





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A _____ may include a symbol and other graphic elements, such as a border, background pattern, or color, that conveys specific information about the hazards of a chemical.

- Product identifier
- Chemical name
- Pictogram
- Classification





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The Signal Word is a word used to _____ of a chemical.

- Determine the stability
- Indicate the relative level of severity of hazard
- Classify the physical hazard or health hazard
- Provide advice about the correct handling





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A physical hazard or health hazard such as a simple asphyxiant, combustible dust, or pyrophoric gas is in the _____ category.

- Chemical
- Decomposition products
- Hazard classification
- Hazardous chemicals





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You have completed the GHS labels
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If you wish to return to review this section or
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Congratulations!

You have completed the DOE GHS
Hazard Communications Update Training!

To review any part of this course, please use the menu
buttons on the left. To exit, simply select the exit button at
the top right bar of this window.

