

Hazard Communications Program



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OSHAcademy Course 705 Study Guide

Hazard Communications Program

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This study guide is designed to be reviewed off-line as a tool for preparation to successfully complete OSHAcademy Course 705.

Read each module, answer the quiz questions, and submit the quiz questions online through the course webpage. You can print the post-quiz response screen which will contain the correct answers to the questions.

The final exam will consist of questions developed from the course content and module quizzes.

We hope you enjoy the course and if you have any questions, feel free to email or call:

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Course Introduction

The numbers

More than 30 million workers are potentially exposed to one or more chemical hazards. There are an estimated 650,000 existing hazardous chemical products, and hundreds of new ones are being introduced annually. This poses a serious problem for exposed workers and their employers.

The OSHA Hazard Communication Standard (HCS) - 29 CFR 1910.1200 provides workers exposed to hazardous chemicals with the right-to-know the identities and hazards of those materials, as well as appropriate protective measures. When workers have such information, they can take steps to protect themselves from experiencing adverse effects from exposure.

It's important that you be familiar with OSHA's hazard communication standards to help save lives and avoid OSHA citations. Look at OSHA's top 10 most cited violations for 2016 and you will see that hazard communication ranks high.

Top 10 most frequently cited OSHA standards violations for 2016:

1. Fall protection
- 2. Hazard communication**
3. Scaffolds
4. Respiratory protection
5. Lockout/tagout
6. Powered industrial trucks
7. Ladders
8. Machine guarding
9. Electrical wiring
10. Electrical, general requirements

Protection under the Hazard Communication Standard (HCS) includes all workers exposed to hazardous chemicals in all industrial sectors. This standard is based on a simple concept - that employees have both a need and a right to know the hazards and the identities of the chemicals they are exposed to when working. They also need to know what protective measures are available to prevent adverse effects from occurring.

Benefits

The HCS covers both physical hazards (such as flammability or the potential for explosions), and health hazards (including both acute and chronic effects). By making information available to employers and employees about these hazards, and recommended precautions for safe use, proper implementation of the HCS will result in a reduction of illnesses and injuries caused by chemicals. Employers will have the information they need to design an appropriate protective program. Employees will be better able to participate in these programs effectively when they understand the hazards involved, and take steps to protect themselves. Together, these employer and employee actions will prevent the occurrence of adverse effects caused by the use of chemicals in the workplace.

Requirements

The HCS established uniform requirements to make sure the hazards of all chemicals imported into, produced, or used in U.S. workplaces are evaluated and that this hazard information is transmitted to affected employers and exposed employees.

This program ensures that all employers receive the information they need to inform and train their employees properly and to design and put in place employee protection programs. It also provides necessary hazard information to employees so they can participate in, and support, the protective measures in place at their workplaces.

All workplaces where employees are exposed to hazardous chemicals must have a written plan which describes how the standard will be implemented in that facility. The only work operations which do not have to comply with the written plan requirements are laboratories and work operations where employees only handle chemicals in sealed containers.

The written program must reflect what employees are doing in a particular workplace. For example, the written plan must list the chemicals present at the site, indicate who is responsible for the various aspects of the program in that facility and where written materials will be made available to employees.

The written program must describe how the requirements for labels and other forms of warning, material safety data sheets, and employee information and training are going to be met in the facility.

Course Objectives

This course will focus on the responsibilities of the employer in establishing and implementing an effective hazard communication program. By the end of this course you should be able to:

1. List the primary Hazard Communications Standard responsibilities for manufacturers, distributors, importers, and employers.
2. Describe the four basic elements of the Hazard Communications Program.
3. Discuss the nature of chemical hazards and the types of exposures they present.
4. List the information required on each of the four types of hazardous chemical containers.
5. Describe each of the 16 sections of a Safety Data Sheet.
6. Identify the basic requirements of the hazard communication training program.

Module 1: General Responsibilities

Introduction

In order to ensure chemical safety in the workplace, the employer must make sure employees have information and understand the identities and hazards of chemicals with which they work. OSHA's Hazard Communication Standard (HCS) requires employers and manufacturers to develop and distribute chemical information as stated below:

- Chemical manufacturers and importers must classify the hazards of the chemicals they produce or import, and prepare labels and safety data sheets to convey the hazard information to their downstream customers;
- All employers with classified hazardous chemicals in their workplaces must have labels and safety data sheets for their exposed workers, and train workers to handle the chemicals appropriately.

As we mentioned in the introduction, the new HCS 2012 is now aligned with the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS) that provides many benefits, including the following:

- Provides a common and coherent approach to classifying chemicals and communicating hazard information on labels and safety data sheets;
- Improves the quality and consistency of hazard information in the workplace
- Helps reduce trade barriers;
- Results in productivity improvements for American businesses that regularly handle, store, and use classified hazardous chemicals;
- Provides cost savings for American businesses that periodically update safety data sheets and labels for classified chemicals.

Remember, the old HCS 1994 gave workers the right to know, but the new HCS 2012 gives workers the right to understand.

Purpose of the Standard

The purpose of the HCS 2012 is to make sure that:

1. The hazards of all chemicals produced or imported are classified, and
2. Information about the classified hazards is transmitted to employers and employees.

Classifying the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, may include:

- Developing and maintaining a written hazard communication program;
- Listing hazardous chemicals present;
- Labeling containers of chemicals in the workplace;
- Labeling containers of containers of chemicals being shipped to other workplaces;
- Preparing and distributing SDSs to employees and downstream employers;
- Developing and implementing employee training programs

Remember, OSHA's new HCS 2012 is intended to be consistent with the provisions of the United Nations' GHS. (This will be on the exam!)

Scope of the Standard

The HCS 2012 requires chemical manufacturers or importers to classify the hazards of chemicals which they produce or import. The standard requires all employers to provide information to their employees about the hazardous chemicals they are exposed, by means of:

1. A hazard communication program,
2. Labels and other forms of warning,
3. Safety data sheets, and
4. Information and training.

In addition, the HCS requires distributors to transmit the required information to employers.

Employers who do not produce or import chemicals need only focus on those parts of this rule that deal with establishing a workplace program and communicating information to their workers.

Application

The HCS 2012 applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.

"Foreseeable emergency" means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.

The phrase "known to be present" is important. If a hazardous chemical is known to be present by the chemical manufacturer or the employer, it is covered by the standard.

"Hazardous chemical" means 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.

This includes chemicals to which employees may be exposed during normal operations or in a foreseeable emergency. This means that even though an employer was not responsible for the manufacture of the hazardous chemical, the employer has the responsibility for transmitting information about the hazardous chemical to his or her employees.

Employees, such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered. For example, an office worker who occasionally changes the toner in a copying machine would not be covered by the standard. However, an employee who operates a copying machine as part of her/his work duties would be covered by the provisions of the HCS.

What about Laboratories?

The HCS applies to laboratories only as follows:

Employers must:

1. Ensure labels on incoming containers of hazardous chemicals are not removed or defaced
2. Maintain any safety data sheets that are received with incoming shipments of hazardous chemicals, and
3. Ensure safety data sheets are readily accessible during each work shift,

4. Provide appropriate information and training about the hazards of the chemicals laboratory employees use.

Note: Laboratory employers that ship hazardous chemicals are considered to be either a chemical manufacturer or a distributor, and thus must:

1. Properly label any containers of hazardous chemicals leaving the laboratory, and
2. Provide a safety data sheet to distributors and other employers as required by the HCS.

Employees Handling Chemicals in Sealed Containers

In work operations where employees only handle chemicals in sealed containers which are not opened under normal conditions of use (such as are found in marine cargo handling, warehousing, or retail sales), employers must do the following:

1. Ensure labels on incoming containers of hazardous chemicals are not removed or defaced.
2. Maintain copies of any safety data sheets that are received with incoming shipments of the sealed containers of hazardous chemicals.
3. Obtain a safety data sheet as soon as possible if sealed containers do not have safety data sheets.
4. Ensure the safety data sheets are readily accessible during each work shift.
5. Provide appropriate information and training about the hazards of the chemicals employees use.
6. Protect employees in the event of a spill or leak of a hazardous chemical from a sealed container.

HCS Labeling Requirements

HCS Labeling Requirements are not required in the following instances:

- Regulated pesticides;
- Any chemical substance or mixture as defined in the Toxic Substances Control Act when subject to the labeling requirements of that Act and the EPA;

- Regulated food, food additives, color additive, drug, cosmetic, or medical or veterinary device or product, including materials intended for use as ingredients (e.g. flavors and fragrances);
- Regulated distilled spirits (beverage alcohols), wine, or malt beverage intended for non-industrial use;
- Any consumer product or hazardous substance as those terms are defined in the Consumer Product Safety Act and Federal Hazardous Substances Act when subject to a consumer product safety standard or labeling requirement of those Acts, or regulations issued under those Acts by the Consumer Product Safety Commission; and,
- Regulated agricultural or vegetable seed treated with pesticides and labeled in accordance with the Federal Seed Act and the labeling regulations issued by the Department of Agriculture.

The Hazard Communications Standard does not apply to:

- Regulated hazardous waste when the hazardous substance is the focus of remedial or removal action;
- Tobacco or tobacco products;
- Wood or wood products, including lumber which will not be processed. Wood or wood products which have been treated with a hazardous chemical. Wood which may be subsequently sawed or cut, generating dust, are not exempted);
- Articles. Manufactured items other than fluids or particles:
 - which are formed to a specific shape or design during manufacture;
 - which have end use function(s) dependent in whole or in part upon its shape or design during end use; and
 - which under normal conditions of use do not release more than minute or trace amounts of a hazardous chemical and do not pose a physical hazard or health risk to employees;
- Food or alcoholic beverages which are sold, used, or prepared in a retail establishment, and foods intended for personal consumption by employees while in the workplace;

- Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace;
- Consumer products or hazardous substances where the employer can show that:
 - they are used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and
 - the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended;
- Nuisance particulates where the chemical manufacturer or importer can establish that they do not pose any physical or health hazard;
- Ionizing and non-ionizing radiation; and
- Biological hazards.

Evaluating Chemicals

Requirements for chemical manufacturers, distributors, and importers are different than those for employers who only use manufactured chemicals.

Chemical manufacturers and importers must evaluate chemicals produced in their workplaces or imported by them to classify the chemicals in accordance with the HCS 2012.

Employers are not required to classify chemicals. The only exception to this is if the employer chooses not to rely on the classifications performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.

Employer general responsibilities under the HCS 2012 include:

1. ensure proper container labeling,
2. Safety Data Sheet maintenance and use,
3. provide information and training, and
4. develop and implement a written hazard communication plan.

Throughout the rest of the course, pay special attention to those areas you've listed as inadequate. You may gain some good ideas about how to improve those areas.

Classifying the Hazards

"**Classification**" is a process to:

1. identify the relevant data regarding the hazards of a chemical;
2. review those data to ascertain the hazards associated with the chemical; and
3. decide whether the chemical will be classified as hazardous according to the definition of hazardous chemical.

In addition, classification for health and physical hazards includes the determination of the degree of hazard, where appropriate, by comparing the data with the criteria for health and physical hazards.

For each chemical, the chemical manufacturer or importer must determine the hazard classes, and where appropriate, the category of each class that apply to the chemical being classified.

Chemical manufacturers, importers and employers classifying chemicals must identify and consider the full range of available scientific literature and other evidence concerning the potential hazards.

There is no requirement to test the chemical to determine how to classify its hazards.

Employers are not required to classify chemicals if they choose to rely on the classification performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.

Mixtures:

When classifying mixtures they produce or import, chemical manufacturers and importers of mixtures may rely on the information provided on the current safety data sheets of the individual ingredients except where the chemical manufacturer or importer knows, or in the exercise of reasonable diligence should know, that the safety data sheet mis-states or omits information required by OSHA standards.

Module 1 Quiz

Use this quiz to self-check your understanding of the module content. You can also go online and take this quiz within the module. The online quiz provides the correct answer once submitted.

- 1. The purpose of the hazard communication program is to ensure that the hazards of _____ chemicals are assessed and that information is transmitted to employers and employees.**
 - a. hazardous
 - b. dangerous
 - c. all
 - d. workplace

- 2. Which of the following is not a primary method in the hazard communication program to inform employees of the hazards in the workplace?**
 - a. Container labeling
 - e. Safety Data Sheets
 - f. Medical exams
 - g. Information and training

- 3. Employees are required to be educated about all of the following hazard communication program subjects, except: _____.**
 - a. physical and health hazards
 - h. hazard communications rule requirements
 - i. availability of the written program
 - j. how to write an SDS

- 4. Employers are responsible for conducting research and producing SDSs?**
 - a. True
 - k. False

- 5. In the hazard communication program, employees should be trained in which of the following?**
- a. Use of the Material Data Safety Sheets (SDS)
 - l. How to use personal protective equipment (PPE)
 - m. How to label secondary containers
 - n. All of the above

Module 2: Analyzing the Workplace

Initial Assessment

Now that you have reviewed the scope of the Hazard Communication Rule and employer responsibilities, it's time to get down to business. The first task is to determine what chemicals you have in your workplace. It's important for the person conducting the initial assessment to be familiar with the definition and characteristics of "hazardous chemicals," so let's take a look.

What are Hazardous Substances and Chemicals?

OSHA has defined the term "**substance**" as chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.

For the purposes of the HCS, a **hazardous chemical** means any chemical which is classified as a physical hazard or health hazard, a simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified.

Physical hazards - a chemical that is classified as posing one of the following hazardous effects:

- explosive
- flammable (gases, aerosols, liquids, or solids)
- oxidizer (liquid, solid or gas)
- self-reactive; pyrophoric (liquid or solid)
- self-heating
- organic peroxide
- corrosive to metal
- gas under pressure or
- in contact with water emits flammable gas

See Appendix B to 1910.1200 -- Physical Hazard Criteria.

Health hazard - means a chemical which is classified as posing one of the following hazardous effects:

- acute toxicity (any route of exposure)
- skin corrosion or irritation
- serious eye damage or eye irritation
- respiratory or skin sensitization
- germ cell mutagenicity
- carcinogenicity
- reproductive toxicity
- specific target organ toxicity (single or repeated exposure) or
- aspiration hazard

The criteria for determining whether a chemical is classified as a health hazard are detailed in Appendix A to 1910.1200 -- Health Hazard Criteria.

Forms of Hazardous Chemicals

You might think that the chemicals which apply to the rule are those in liquid, gas or particulate form. But, the standard's definition of "chemical" is much broader than that commonly used. According to the HCS, chemicals that apply may exist in one of many forms:

Dusts - are finely divided particles. Example - wood dust.

Fumes - are even smaller particles usually formed when solid metal is heated and vaporized, and then condenses as tiny particles.

Fibers - are similar to dusts but are of an elongated shape. Examples - asbestos and fiberglass.

Mists - are liquid droplets that have been sprayed into the atmosphere.

Vapors - are gases formed when liquid evaporates.

Gases - are substances that are normally airborne at room temperature. A vapor is the gaseous phase of a substance which is a normally a liquid or solid at room temperature.

Solids - such as metal, treated wood, plastic.

Liquids - the most common form in the workplace.

Chemical Effects

The effects chemicals have on the various organs of the human body depend on several important factors:

1. The form of the chemical: is the chemical a solid, liquid, or gas?
2. How the chemical contacts the body: is the chemical ingested, inhaled, absorbed, or injected?
3. The amount, or dose, the body receives: how much chemical makes its way into the body?
4. How toxic the chemical is: how poisonous is the chemical?

Routes of Entry

Another important task when assessing the workplace for chemical hazards is to determine the route(s) of entry the chemicals may take. If we know the route(s) of entry, we can then determine appropriate engineering, administrative, and PPE controls to eliminate or reduce the exposure. Below are the four common routes of entry.

1. Ingestion - Do we eat or drink it?
2. Inhalation - Do we breathe it in?
3. Absorption - Does it pass through the skin, eyes or other membranes?
4. Injection - Does it enter through a puncture or cut?

We'll be talking more about the physical characteristics, routes of entry, and toxicity of hazardous chemicals later in the SDS module.

Assessing and Analyzing the Workplace for Chemical Hazards

There's a simple two-step process for assessing and analyzing the workplace for chemical hazards:

1. Assess the workplace to see which hazardous chemicals are currently being used. Do this by conducting a walk around inspection and checking records. Use the results of your assessment to create a list of hazardous chemicals. With chemical list in hand, obtain a SDS for each chemical in preparation for the next step.
2. With each SDS, analyze the hazards presented by each chemical in the workplace. The SDS is your primary tool to determine the physical and health hazards, routes of entry, toxicity, and other information about each chemical in your workplace.

Once you identify and know the nature of the hazards of each chemical, it becomes important to control those hazards by eliminating or reducing those hazards using a systematic approach.

Chemical Hazard Control Strategies

Hazardous materials can be used safely in workplaces if adequate control strategies are used to prevent exposure to those chemicals. A control strategy includes any device, procedure, piece of equipment, system, etc., that is used to keep hazardous chemicals from contacting workers at harmful levels. To eliminate or reduce exposure to hazardous chemicals, an effective protocol called the "Hierarchy of Controls" has been developed. When you determine during a workplace assessment that exposure to harmful levels of hazardous chemicals is present, try to eliminate or reduce that exposure using the following strategies in the following order:

The first three strategies focus on doing something with the hazard.

1. **Elimination:** The best solution is to totally eliminate hazardous substances. A personal story here: My daughter came down with leukemia back in 1998 and we had to get rid of all potentially hazardous chemicals in the house because her immune system would be compromised. I unloaded six shopping bags full of cleaners, soap, and other chemicals and replaced them all with one biodegradable, totally non-toxic, all-purpose "green" cleaner called "Planet Solutions." I don't think they make it anymore, but I could not believe the quantity of hazardous chemicals we had in the house! Go green!!! (P.S. My daughter came through with flying colors... a survivor 12 years out now!)
2. **Substitution:** Substitution is the next-best solution. Replace a toxic substance with a less-toxic substance. If you can't get rid of the toxic substances, you may be able to replace them with substances that are at least less toxic. The goal is to reduce the toxicity of the hazards to levels that do not require the use of administrative controls or personal protective equipment.

3. **Engineering Controls:** Redesign processes that use toxic chemicals to eliminate or reduce exposure to the chemical hazard itself. This strategy seeks to control the hazard at the source by using such methods as total enclosure. It also attempts to control the hazardous chemicals along the path by using such measures as ventilation.

The last two strategies focus on doing something with behaviors to reduce exposure to the hazard.

4. **Administrative Controls:** Change work procedures to reduce the duration, frequency, and severity of exposure to the chemical hazard. The chemical hazard, itself, is not eliminated or reduced using this strategy, only exposure to the chemical hazard. The primary focus is to incorporate safer work practices through written safety policies, rules, supervision and training. And that's a problem because you may have to regularly supervise employees as they perform a task. These controls work only so long as employees "behave" properly.
5. **Personal Protective Equipment (PPE):** The use of PPE is probably the most common strategy, and in many cases is a mandatory requirement when working with hazardous chemicals. The worker uses protective equipment to set up a barrier between worker and hazard. Once again, the chemical hazard is neither eliminated nor reduced, and a high reliance is placed on appropriate use of PPE for this strategy to be successful.

Remember, the first question you want to ask is, "How can I eliminate, reduce, or engineer out the hazard?" Hopefully you'll be able to eliminate the hazard or reduce it to the point where safe behaviors or PPE won't be necessary.

Module 2 Quiz

Use this quiz to self-check your understanding of the module content. You can also go online and take this quiz within the module. The online quiz provides the correct answer once submitted.

- 1. For the purposes of the Hazardous Communication Standard (HCS), a "hazardous chemical" as any chemical which poses a physical or a health hazard.**
 - a. True
 - o. False

- 2. The primary tool to determine the physical and health hazards of chemicals in the workplace is the: _____.**
 - a. job hazard analysis
 - p. the walk-around inspection
 - q. safety data sheet
 - r. employee survey

- 3. Which of the following is not one of the four "routes of entry" of hazardous chemicals?**
 - a. Ingestion
 - s. Inspiration
 - t. Absorption
 - u. Inhalation

- 4. Under the hazard communication rule, solids are not considered potentially hazardous chemicals.**
 - a. True
 - v. False

- 5. Which of the following is the first strategy to consider to control hazardous chemicals?**
 - a. Elimination
 - w. Administrative controls
 - x. Personal protective equipment
 - y. Engineering controls

Module 3: Container Labeling

Types of Containers

Container labeling can be a very effective method to communicate the physical and health hazards of chemicals used in the workplace. The information on a container label will vary depending on what type of container it is and how it is used. We'll discuss labeling requirements under the old 1994 HCS and the new (GHS) labeling requirements adopted by the HCS 2012 in this module.

We'll take a look at the labeling requirements for each of the types of containers referred to in the hazard communication standard:

- Shipped/Primary container labels - on shipped containers
- Workplace/Secondary container labels - on employer containers
- Stationary container labels - on large tanks, etc.
- Portable containers - there are NO label requirements

HSC Container Labeling

As of June 1, 2016, the new GHS labeling system must be used. We decided to continue to discuss the "old" labeling system as well as the new so that if you find any of the old labels in your workplace, you'll be able to recognize them and update them.

Primary Container Labels

The "old" Primary Container Label Requirements

Most containers shipped directly from the manufacturer or purchased from a distributor are called shipped or primary containers. Labeling information on these containers is usually adequate in communicating the hazards of the chemical. Under the old HCS 1994, the chemical manufacturer, importer, or distributor must ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked with the following three elements of information:

- **Identity** of the hazardous chemical(s)
- **Appropriate hazard warnings**, including target organ effects of the hazardous chemical, and

- **Name and address** of the chemical manufacturer, importer, or other responsible party.

It's important to understand that the hazard warning must convey the particular physical and health hazards of the chemical, including target organ effects. Employees exposed to health hazards must be apprised of both changes in body functions and the signs and symptoms that may occur to signal those changes.

Statements such as "Hazardous if Inhaled," "Caution," "Danger," are precautionary statements and are not to be considered appropriate hazard warnings. If, when inhaled, a chemical causes lung damage, then the appropriate warning is "may cause lung damage".

The "new" Shipped - Primary Container Label Requirements

Under the new HSC 2012, labels on primary containers shipped from manufacturers or distributors, the container must be labeled, tagged or marked with the following six items:

Product Identifier

- Product identifier should be used and it should match product identifier used on the SDS. If mixture is covered by UN Model regulations for transport of Dangerous goods, UN proper shipping name should also appear on package
- Label for substance should include the chemical identity of the substance. For mixtures and alloys - label should include chemical identities of all ingredients or alloying elements that contribute to acute toxicity, skin corrosion or serious eye damage, germ cell mutagenicity, carcinogenicity, reproductive toxicity, skin or respiratory sensitization, or specific target organ toxicity (STOT). When these hazards appear on the label
- Where a substance or mixture is supplied exclusively for workplace use, competent authority may choose to give suppliers discretion to include chemical identities on the SDS, in lieu of including them on labels.
- The competent authority rules for CBI take priority over the rules product identification and ingredients meeting criteria for CBI do not have to be included on the label

Signal words

- A word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. Signal words used in GHS are "Danger" and "Warning." Danger is for the more severe hazard categories. Signal words are assigned to each hazard category

Hazard Statements

- A phrase assigned to a hazard class and category that describes the nature of the hazards of a hazardous product, including when appropriate, the degree of the hazard.
- Hazard statement and code: Hazard statement codes are intended to be used for reference purposes - they are not part of the text and should not be used to replace it.

Pictograms

- Pictogram means a graphical composition that may include a symbol plus other elements, such as a border, background pattern or color that conveys specific information.

Precautionary statements

- Phrase (and/or pictogram) that describes the recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous product. GHS label should include appropriate precautionary information, the choice of which belongs to the labeler or competent authority.
- Precautionary codes are used to uniquely identify precautionary statements and are for reference purposes - they are not part of the precautionary text and should not be used to replace it.


Supplier identification

- Name, address and telephone number of the manufacturer or supplier of the substance or mixture should be provided on the label.

The next section gives you a good look at what these labels should look like.

Sample HCS 2012 Primary Container Label

As you can see, the new GHS primary container label on the following page provides much more information than the old HCS 1994 primary container label shown in the previous section.

SAMPLE LABEL	
<p style="text-align: center;">PRODUCT IDENTIFIER</p> <p>CODE _____</p> <p>Product Name _____</p> <p style="text-align: center;">SUPPLIER IDENTIFICATION</p> <p>Company Name _____</p> <p>Street Address _____</p> <p>City _____ State _____</p> <p>Postal Code _____ Country _____</p> <p>Emergency Phone Number _____</p> <p style="text-align: center;">PRECAUTIONARY STATEMENTS</p> <p>Keep container tightly closed. Store in cool, well ventilated place that is locked.</p> <p>Keep away from heat/sparks/open flame. No smoking.</p> <p>Only use non-sparking tools.</p> <p>Use explosion-proof electrical equipment.</p> <p>Take precautionary measure against static discharge.</p> <p>Ground and bond container and receiving equipment.</p> <p>Do not breathe vapors.</p> <p>Wear Protective gloves.</p> <p>Do not eat, drink or smoke when using this product.</p> <p>Wash hands thoroughly after handling.</p> <p>Dispose of in accordance with local, regional, national, international regulations as specified.</p> <p>In Case of Fire: use dry chemical (BC) or Carbon dioxide (CO₂) fire extinguisher to extinguish.</p> <p>First Aid</p> <p>If exposed call Poison Center.</p> <p>If on skin (on hair): Take off immediately any contaminated clothing. Rinse skin with water.</p>	<p style="text-align: center;">HAZARD PICTOGRAMS</p> <div style="text-align: center;">  </div> <p style="text-align: center;">SIGNAL WORD</p> <p style="text-align: center;">Danger</p> <p style="text-align: center;">HAZARD STATEMENT</p> <p style="text-align: center;">Highly flammable liquid and vapor. May cause liver and kidney damage.</p> <p style="text-align: center;">SUPPLEMENTAL INFORMATION</p> <p>Directions for use</p> <p>_____</p> <p>_____</p> <p>Fill weight: _____ Lot Number _____</p> <p>Gross weight: _____ Fill Date: _____</p> <p>Expiration Date: _____</p>

This label is intended to be an immediate visual reminder of the hazards of a chemical. However, it isn't necessary to list every hazard of the chemical on the label. The safety data sheet (SDS) is used for this purpose. Manufacturers, importers, and distributors will have to assess the evidence regarding the product's hazards and must consider exposures under normal conditions of use or in foreseeable emergencies when evaluating what hazards are listed on the label. This is not to say that only acute hazards are to be listed on the label, or that well-substantiated hazards should be left off the label because they appear on the data sheet.

Workplace or Secondary Container Labeling

Most employers use the primary containers they purchase to store and use chemicals. However, they may also use their own containers such as coffee cans, drums, plastic jugs, spray bottles, etc. to store and use smaller quantities of chemicals they purchase. These are called workplace or secondary containers.

The employer must ensure that each workplace or secondary container of hazardous chemicals in the workplace is labeled, tagged or marked with either:

1. The information required on shipped container labels; or,
2. Product identifier and words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under the hazard communication program, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.

Bottom line, the employer must ensure that employees still get all of the hazard information from the elements of the hazard communication program implemented in their workplaces that they would have gotten from a shipping label. To do this, the employer should conduct additional training, discuss SDS information, use signs, process sheets or other types of warning to supplement the secondary label information.

Look at the image to the right. OSHA inspectors see this all of the time and cite the employer for lack of proper labeling. This also tells the OSHA inspector they need to look at the overall HAZCOM Program because it's obvious the program is not working.



Alternative Labeling Methods

Both the HCS 1994 and 2012 recognize and allow the use of alternative in-plant labeling systems such as the HMIS (Hazardous Materials Information System), NFPA (National Fire Protection Association), and others which may be used in industry as long as they convey the required information. These alternative systems use color, numbers and other information to convey the hazards of the chemical. These images show the NFPA and HMIS labels under the current HCS 1994. In Module 3.12, you can see the GHS pictogram labels required under the HCS 2012.

The key to evaluating the effectiveness of any alternative labeling method is to determine whether employees can correlate the visual warning on the in-plant container with the applicable chemical and its appropriate hazard warnings. The alternative labeling system must also be readily accessible to all employees in their work area throughout each work shift. For purposes of this provision, the term "other such written materials" does not include safety data sheets used in lieu of labels.



Stationary Process Container Labeling

Stationary process containers are...well...stationary! Storage tanks are good examples. The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required on secondary containers. The written materials must be readily accessible to the employees in their work area throughout each work shift.

Portable Container Labeling

Portable containers are used to transfer hazardous chemicals from labeled containers, and are intended only for the immediate use of the employee who performs the transfer. The employer is not required to label portable containers. Drugs which are dispensed by a pharmacy to a health care provider for direct administration to a patient are exempted from labeling.

Figure this out...

It's important to know that portable containers must be under the positive control of the employee using it. Let's say an employee is cleaning some parts with solvent he has placed in a plastic container. As long as he is using it for immediate use and can prevent another employee from exposure, labeling is not required. But what must he do if he walks away from the workstation to go on a break (or for any reason), losing control of the chemical?

Since he loses positive control of the container, it must be labeled as a secondary container. OSHA inspectors routinely find containers in workplaces that are not properly labeled. As a safety person, make sure you're always on the hunt for unlabeled secondary containers!

Labeling solid materials

For solid metal (such as a steel beam or a metal casting), solid wood, or plastic items that are not exempted as articles due to their downstream use, or shipments of whole grain, the required label may be transmitted to the customer at the time of the initial shipment, and need not be included with subsequent shipments to the same employer unless the information on the label changes.

The label may be transmitted with the initial shipment itself, or with the safety data sheet that is to be provided prior to or at the time of the first shipment.

For example, treated lumber is covered since the lumber is not completely cured at the time of shipment and the hazardous chemical will, to a varying degree, offgas during shipment and be available for exposure to employees. Railroad ties treated with creosote should have an accompanying safety data sheet (SDS) when shipped.

This exception to requiring labels on every container of hazardous chemicals is only for the solid material itself, and does not apply to hazardous chemicals used in conjunction with, or known to be present with, the material and to which employees handling the items in transit may be exposed (for example, cutting fluids or pesticides in grains).

Other Important Labeling Requirements

Labels are useless unless they accurately communicate the hazards of their associated chemicals. It's important to keep labels in good condition at all times. The employer must not remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.

The employer must ensure that labels or other forms of warning are:

- legible, in English,
- prominently displayed on the container, or
- readily available in the work area throughout each work shift

Employers having employees who speak other languages may add the information in their language to the material presented, as long as the information is presented in English as well.

Updating Labels

Chemical manufacturers, importers, distributors, or employers who become newly aware of any significant information regarding the hazards of a chemical must revise the labels for the chemical within six months of becoming aware of the new information, and must ensure that labels on containers of hazardous chemicals shipped after that time contain the new information.

If the chemical is not currently produced or imported, the chemical manufacturer, importer, distributor, or employer must add the information to the label before the chemical is shipped or introduced into the workplace again.

HCS 2012 Pictogram Requirements

As of June 1, 2015, the HCS 2012 will require GHS pictograms on labels to alert users of the chemical hazards to which they may be exposed. Each pictogram consists of a symbol on a white background framed within a red border and represents a distinct hazard(s). The pictogram on the label is determined by the chemical hazard classification.

HCS Pictograms and Hazards

Health Hazard



- Carcinogen
- Mutagenicity
- Reproductive Toxicity
- Respiratory Sensitizer
- Target Organ Toxicity
- Aspiration Toxicity

Flame



- Flammables
- Pyrophorics
- Self-Heating
- Emits Flammable Gas
- Self-Reactives
- Organic Peroxides

Exclamation Mark



- Irritant (skin and eye)
- Skin Sensitizer
- Acute Toxicity
- Narcotic Effects
- Respiratory Tract Irritant
- Hazardous to Ozone Layer (Non-Mandatory)

Gas Cylinder



- Gases Under Pressure

Corrosion



- Skin Corrosion/Burns
- Eye Damage
- Corrosive to Metals

Exploding Bomb



- Explosives
- Self-Reactives
- Organic Peroxides

Flame Over Circle



- Oxidizers

Environment (Non-Mandatory)



- Aquatic Toxicity

Skull and Crossbones



- Acute Toxicity (fatal or toxic)

Module 3 Quiz

Use this quiz to self-check your understanding of the module content. You can also go online and take this quiz within the module. The online quiz provides the correct answer once submitted.

1. Hazcom container label categories include all of the following except?

- a. Primary label
- z. Secondary label
- aa. Chemical label
- bb. Stationary process label
- cc. Portable label

2. Using the picture, what is the color of the primary, secondary and portable containers?

Primary Container	Secondary Container	Portable Container
blue	blue	blue
yellow	yellow	yellow
white	white	white

3. A _____ container does not require a label.

- a. Primary
- dd. Secondary
- ee. Stationary process
- ff. Portable

4. Which label must include the name and address of the chemical manufacturer?

- a. Primary container label
- gg. Secondary container label
- hh. Stationary process container label
- ii. Portable container label

5. All of the below hazard warnings may be appropriate except?

- a. may cause eye injury
- jj. carcinogenic
- kk. danger
- ll. may cause skin rash

Module 4: Safety Data Sheet (SDS) Management

What's a Safety Data Sheet (SDS)?

The safety data sheet (SDS) is used to communicate chemical hazard information from the manufacturer to the employee. This is the information needed to inform and train employees on the safe use of hazardous chemicals. The employer is required to have an SDS for each hazardous chemical product they use. This module will examine the SDS and the requirements for maintaining an effective SDS system. So, let's get going.

Who Must Have Them?

- Chemical manufacturers and importers must obtain or develop a SDS for each hazardous chemical they produce or import. Employers that mix chemicals that result in an interaction may be considered to be manufacturers and required to develop a SDS for the new chemical. If the chemicals in the mixture do not interact, the employer may be able to use the existing SDSs for each chemical in the mixture. Check with OSHA if you have questions about mixing chemicals in your workplace.
- Employers must have a SDS in the workplace for each hazardous chemical which they use.

The SDS Form

Let's take a look at the SDS form, itself. Some of the terms in each section link to additional information. You can check out the [glossary](#) for general information on terms you may not be familiar with. I'll detail important points related to each SDS section and then show you an example that illustrates those points. So, let's start the review.

The chemical manufacturer or importer preparing the safety data sheet must ensure that it is in English (although the employer may maintain copies in other languages as well).

The SDS must include the information as specified in 1910.1200, Appendix D, Table D.1 under the section number and heading indicated for sections 1-11 and 16. If no relevant information is found for any given subheading within a section, the SDS shall clearly indicate that no applicable information is available. Sections 12-15 may be included in the SDS, but are not mandatory. Note: Not all sections are mandatory: only sections 1-11 and 16. Remember that because it's on the exam!

Let's review each of the sections in the sample SDS below:

Sample GHS Safety Data Sheet

1. Identification

Product Name:	Chemical Stuff
Synonyms:	Methyltoxy Solution
CAS Number:	000-00-0
Product Use:	Organic Synthesis
Manufacturer/Supplier:	My Company
Address:	Any Street, Mytown, TX 00000
General Information:	555-123-4567
Transportation Emergency Number:	CHEMTREC: 800-424-9300

2. Hazards Identification

GHS Classification:

Health	Environmental	Physical
Acute Toxicity - Category 2 (inhalation), Category 3 (oral/dermal) Eye Corrosion - Category 1 Skin Corrosion - Category 1 Skin Sensitization - Category 1 Mutagenicity - Category 2 Carcinogenicity - Category 1B Reproductive/Developmental - Category 2 Target Organ Toxicity (Repeated) - Category 2	Aquatic Toxicity - Acute 2	Flammable Liquid - Category 2

GHS Label:

Symbols: flame, skull and crossbones, corrosion, health hazard	
Hazard Statements DANGER! Highly Flammable Liquid and Vapor. Fatal if inhaled. Causes severe skin burns and eye damage. May cause allergic skin reaction. Toxic if swallowed and in contact with skin May cause cancer. Suspected of damaging the unborn child. Suspected of causing genetic defects. May cause damage to cardiovascular, respiratory, nervous, and gastrointestinal systems and liver and blood through prolonged or repeated exposure. Toxic to aquatic life.	Precautionary Statements Do not eat, drink or use tobacco when using this product. Do not breathe mist/vapors. Keep container tightly closed. Keep away from heat/sparks/open flame. - No smoking. Wear respiratory protection, protective gloves and eye/face protection. Use only in a well-ventilated area. Take precautionary measures against static discharge. Use only non-sparking tools. Store container tightly closed in cool/well-ventilated place. Wash thoroughly after handling.

3. Composition / Information on Ingredients

Component	CAS Number	Weight %
Methyltoxy	000-00-0	80
(See Section 8 for Exposure Limits)		

4. First Aid Measures

Eye: Eye irritation. Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Get immediate medical attention.

Skin: Itching or burning of the skin. Immediately flush the skin with plenty of water while removing contaminated clothing and shoes. Get immediate medical attention. Wash contaminated clothing before reuse.

Inhalation: Nasal irritation, headache, dizziness, nausea, vomiting, heart palpitations, breathing difficulty, cyanosis, tremors, weakness, red flushing of face, irritability. Remove exposed person from source of exposure to fresh air. If not breathing, clear airway and start cardiopulmonary resuscitation (CPR). Avoid mouth-to-mouth resuscitation.

Ingestion: Get immediate medical attention. Do not induce vomiting unless directed by medical personnel.

5. Fire Fighting Measures

Suitable Extinguishing Media: Use dry chemical, foam, or carbon dioxide to extinguish fire. Water may be ineffective but should be used to cool fire-exposed containers, structures and to protect personnel. Use water to dilute spills and to flush them away from sources of ignition.

Fire Fighting Procedures: Do not flush down sewers or other drainage systems. Each exposed firefighter must wear a NIOSH-approved positive pressure self-contained breathing apparatus with full-face mask and full protective clothing.

Unusual Fire and Explosion Hazards: Dangerous when exposed to heat or flame. Will form flammable or explosive mixtures with air at room temperature. Vapor or gas may spread to distant ignition sources and flash back. Vapors or gas may accumulate in low areas. Runoff to sewer may cause fire or explosion hazard. Containers may explode in heat of fire. Vapors may concentrate in confined areas. Liquid will float and may reignite on the surface of water.

Combustion Products: Irritating or toxic substances may be emitted upon thermal decomposition. Thermal decomposition products may include oxides of carbon and nitrogen.

6. Accidental Release Measures

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. (Also see Section 8).

Vapor protective clothing should be worn for spills and leaks. Shut off ignition sources; no flares, smoking or flames in hazard area. Small spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: Dike far ahead of liquid spill for later disposal.

Do not flush to sewer or waterways. Prevent release to the environment if possible. Refer to Section 15 for spill/release reporting information.

7. Handling and Storage

Handling - Do not get in eyes, on skin or on clothing. Do not breathe vapors or mists. Keep container closed. Use only with adequate ventilation. Use good personal hygiene practices. Wash hands before eating, drinking, smoking. Remove contaminated clothing and clean before re-use. Destroy contaminated belts and shoes and other items that cannot be decontaminated.

Keep away from heat and flame. Keep operating temperatures below ignition temperatures at all times. Use non-sparking tools.

Storage - Store in tightly closed containers in cool, dry, well-ventilated area away from heat, sources of ignition and incompatibles. Ground lines and equipment used during transfer to reduce the possibility of static spark-initiated fire or explosion. Store at ambient or lower temperature. Store out of direct sunlight. Keep containers tightly closed and upright when not in use. Protect against physical damage.

Empty containers may contain toxic, flammable and explosive residue or vapors. Do not cut, grind, drill, or weld on or near containers unless precautions are taken against these hazards.

8. Exposure Controls / Personal Protection

Exposure Limits

Component, Methyltoxy - TWA: 3 ppm (skin) - **STEL:** C 15 ppm (15 min.)

Engineering Controls: Local exhaust ventilation may be necessary to control air contaminants to their exposure limits. The use of local ventilation is recommended to

control emissions near the source. Provide mechanical ventilation for confined spaces. Use explosion-proof ventilation equipment.

Personal Protective Equipment (PPE)

Eye Protection: Wear chemical safety goggles and face shield. Have eye-wash stations available where eye contact can occur.

Skin Protection: Avoid skin contact. Wear gloves impervious to conditions of use. Additional protection may be necessary to prevent skin contact including use of apron, face shield, boots or full body protection. A safety shower should be located in the work area. Recommended protective materials include: Butyl rubber and, for limited contact, Teflon.

Respiratory Protection: If exposure limits are exceeded, NIOSH approved respiratory protection should be worn. A NIOSH approved respirator for organic vapors is generally acceptable for concentrations up to 10 times the PEL. For higher concentrations, unknown concentrations and for oxygen deficient atmospheres, use a NIOSH approved air-supplied respirator. Engineering controls are the preferred means for controlling chemical exposures. Respiratory protection may be needed for non-routine or emergency situations. Respiratory protection must be provided in accordance with OSHA 29 CFR 1910.134.

9. Physical and Chemical Properties

Flashpoint:	2°C (35°F)
Autoignition Temperature:	480°C (896°F)
Boiling Point:	77°C (170.6°F) @ 760 mm Hg
Melting Point:	-82°C
Vapor Pressure:	100.0 mm Hg @ 23°C
Vapor Density:	1.7; (Air = 1)
% Solubility in Water:	10 @ 20°C
Pour Point:	NA
Molecular Formula:	Mixture
Odor/Appearance:	Clear, colorless liquid with mild, pungent odor.

Lower Flammability Limit:	>3.00%
Upper Flammability Limit:	<15.00%
Specific Gravity:	0.82g/ml @ 20°C
% Volatile:	100
Evaporation Rate (Water=1):	5(Butyl Acetate =1)
Viscosity:	0.3 cP @ 25°C
Octanol/Water Partition Coefficient:	log K _{ow} : 0.5
pH:	7, 8% aqueous solution
Molecular Weight:	Mixture

10. Stability and Reactivity

Stability/Incompatibility: Incompatible with ammonia, amines, bromine, strong bases and strong acids.

Hazardous Reactions/Decomposition Products: Thermal decomposition products may include oxides of carbon and nitrogen.

11. Toxicological Information

Signs and Symptoms of Overexposure: Eye and nasal irritation, headache, dizziness, nausea, vomiting, heart palpitations, difficulty breathing, cyanosis, tremors, weakness, itching or burning of the skin.

Eye Contact: may cause severe conjunctival irritation and corneal damage.

Skin Contact: may cause reddening, blistering or burns with permanent damage. Harmful if absorbed through the skin. May cause allergic skin reaction.

Inhalation: may cause severe irritation with possible lung damage (pulmonary edema).

Ingestion: may cause severe gastrointestinal burns.

Target Organ Effects: May cause gastrointestinal (oral), respiratory tract, nervous system and blood effects based on experimental animal data. May cause cardiovascular system and liver effects.

Chronic Effects: based on experimental animal data, may cause changes to genetic material; adverse effects on the developing fetus or on reproduction at doses that were toxic to the mother. Methyltoxy is classified by IARC as group 2B and by NTP as reasonably anticipated to be a human carcinogen. OSHA regulates Methyltoxy as a potential carcinogen.

Medical Conditions Aggravated by Exposure: preexisting diseases of the respiratory tract, nervous system, cardiovascular system, liver or gastrointestinal tract.

Acute Toxicity Values

Oral LD₅₀ (Rat) = 100 mg/kg

Dermal LD₅₀ (Rabbit) = 225-300 mg/kg

Inhalation LC₅₀ (Rat) = 200 ppm/4 hr., 1100 ppm vapor/1 hr

12. Ecological Information

LC₅₀ (Fathead Minnows) = 9 mg/L/96 hr

EC₅₀ (Daphnia) = 8.6 mg/L/48 hr

Bioaccumulation is not expected to be significant. This product is readily biodegradable.

13. Disposal Considerations

As sold, this product, when discarded or disposed of, is a hazardous waste according to Federal regulations (40 CFR 261). It is listed as Hazardous Waste Number Z000, listed due to its toxicity. The transportation, storage, treatment and disposal of this waste material must be conducted in compliance with 40 CFR 262, 263, 264, 268 and 270. Disposal can occur only in properly permitted facilities. Refer to state and local requirements for any additional requirements, as these may be different from Federal laws and regulations. Chemical additions, processing or otherwise altering this material may make waste management information presented in the SDS incomplete, inaccurate or otherwise inappropriate.

14. Transport Information

U.S. Department of Transportation (DOT)

Proper Shipping Name: Methyltoxy

Hazard Class: 3, 6.1

UN/NA Number: UN0000
Packing Group: PG 2
Labels Required: Flammable Liquid and Toxic

International Maritime Organization (IMDG)

Proper Shipping Name: Methyltoxy
Hazard Class: 3 Subsidiary 6.1
UN/NA Number: UN0000
Packing Group: PG 2
Labels Required: Flammable Liquid and Toxic

15. Regulatory Information

U.S. Federal Regulations

Comprehensive Environmental Response and Liability Act of 1980 (CERCLA):

The reportable quantity (RQ) for this material is 1000 pounds. If appropriate, immediately report to the National Response Center (800/424-8802) as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies.

Toxic Substances Control Act (TSCA): All components of this product are included on the TSCA inventory.

Clean Water Act (CWA): Methyltoxy is a hazardous substance under the Clean Water Act. Consult Federal, State and local regulations for specific requirements.

Clean Air Act (CAA): Methyltoxy is a hazardous substance under the Clean Air Act. Consult Federal, State and local regulations for specific requirements.

Superfund Amendments and Reauthorization Act (SARA) Title III Information:

SARA Section 311/312 (40 CFR 370) Hazard Categories:

Immediate Hazard: X
Delayed Hazard: X
Fire Hazard: X
Pressure Hazard:

Reactivity Hazard:

This product contains the following toxic chemical(s) subject to reporting requirements of SARA Section 313 (40 CFR 372)

Component	CAS Number	Maximum %
Methyltoxy	000-00-0	80

State Regulations

California: This product contains the following chemicals(s) known to the State of California to cause cancer, birth defects or reproductive harm:

Component	CAS Number	Maximum %
Methyltoxy	000-00-0	80

International Regulations

Canadian Environmental Protection Act: All of the components of this product are included on the Canadian Domestic Substances list (DSL).

Canadian Workplace Hazardous Materials Information System (WHMIS):

Class B-2 Flammable Liquid

Class D-1-B Toxic

Class D-2-A Carcinogen

Class D-2-B Chronic Toxin

Class E Corrosive

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

European Inventory of Existing Chemicals (EINECS): All of the components of this product are included on EINECS.

EU Classification: F Highly Flammable; T Toxic; N Dangerous to the Environment
EU Risk (R) and Safety (S)

Phrases:

R11: Highly flammable.

R23/24/25: Toxic by inhalation, in contact with skin and if swallowed.

R37/38: Irritating to respiratory system and skin.

R41: Risk of serious damage to eyes.

R43: May cause sensitization by skin contact.

R45: May cause cancer.

R51/53: Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

S53: Avoid exposure - obtain special instructions before use.

S16: Keep away from sources of ignition - No Smoking.

S45: In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S9: Keep container in a well-ventilated place.

S36/37: Wear suitable protective clothing and gloves.

S57: Use appropriate container to avoid environmental contamination.

16. Other Information

National Fire Protection Association (NFPA) Ratings: This information is intended solely for the use of individuals trained in the NFPA system.

Health: 3

Flammability: 3

Reactivity: 0

Revision Indicator: New SDS

Disclaimer: The information contained herein is accurate to the best of our knowledge. ABC Inc. makes no warranty of any kind, express or implied, concerning the safe use of this material in your process or in combination with other substances.

SDS Management

Here are some more important requirements manufacturers, importers and distributors must meet:

The manufacturer or importer must:

- Prepare one SDS that applies to all similar mixtures where complex mixtures have similar hazards and contents (i.e. the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture).
- Ensure that the SDS information recorded accurately reflects the scientific evidence used in making the hazard classification.
- Add new information to the SDS within three months after becoming aware of any significant new information regarding the hazards of a chemical, or ways to protect against the hazards.
- If the chemical is not currently being produced or imported, add any new information to the material SDS before the chemical is introduced into the workplace again.
- Provide an appropriate SDS with the initial shipment, with the first shipment after a SDS is updated, and as requested by the employer or distributor.
- Provide SDSs with the shipped containers or send the SDSs to the distributor or employer prior to or at the time of the shipment.

Distributors Must:

- Ensure that SDSs, and updated information, are **provided to other distributors and employers with their initial shipment** and with the first shipment after a SDS is updated;
- Provide SDSs with the shipped containers, or send them to the other distributor or employer prior to or at the time of the shipment;
- Retail distributors selling hazardous chemicals to employers having a commercial account must:

1. provide a SDS to such employers upon request, and

2. post a sign or otherwise inform them that a SDS is available.

If an employer without a commercial account purchases a hazardous chemical from a retail distributor not required to have SDSs on file (i.e., the retail distributor does not have commercial accounts and does not use the materials), the retail distributor must provide the employer, upon request, with the name, address, and telephone number of the chemical manufacturer, importer, or distributor from which a SDS can be obtained.

Chemical manufacturers, importers, and distributors need not provide SDSs to retail distributors that have informed them that the retail distributor does not sell the product to commercial accounts or open the sealed container to use it in their own workplaces.

- Wholesale distributor selling hazardous chemicals to employers over-the-counter must:
 1. provide SDSs upon the request of the employer at the time of the over-the-counter purchase, and
 2. post a sign or otherwise inform such employers that a SDS is available.

What about employer responsibilities?

Employers must obtain a SDS from the chemical manufacturer or importer as soon as possible if the SDS is not provided with a shipment that has been labeled as a hazardous chemical.

Employers must maintain copies of the required SDSs in their workplace for each hazardous chemical, and must ensure that SDSs are readily accessible during each work shift to employees when they are in their work area(s).

Electronic access and other alternatives to maintaining paper copies of the SDS are permitted as long as no barriers to immediate employee access in each workplace are created by such options. Make sure employees know how to quickly access SDS information that is stored in on computers or online.

Where employees must travel between workplaces during a work shift, i.e., their work is carried out at more than one geographical location, **the SDSs may be kept at the primary workplace facility**. In this situation, the employer must ensure that employees can immediately obtain the required information in an emergency.

Employees who work at more than one site during the work shift must be able to obtain SDS information immediately (within seconds) **in an emergency**.

SDSs may be kept at the primary workplace facility; as long as the employer has a representative available at all times to ensure **ready access** (within a few minutes) to this information. This is the only situation in which an employer is allowed to transmit hazard information via voice communication. The employer must address in the written hazard communication plan how SDS information will be conveyed to remote worksites.

SDSs may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals.

However, the employer must make sure that in all cases the required information is provided for each hazardous chemical, and is readily accessible during each work shift to employees when they are in their work area(s).

Module 4 Quiz

Use this quiz to self-check your understanding of the module content. You can also go online and take this quiz within the module. The online quiz provides the correct answer once submitted.

- 1. The _____ must conduct valid research and assess the hazards of the chemicals they produce.**
 - a. manufacturer
 - mm. distributor
 - nn. employer
 - oo. employee

- 2. What language MUST the SDS be provided in?**
 - a. English
 - pp. Any language
 - qq. Language of originating country
 - rr. Language of destination country

- 3. Distributors and employers who in good faith choose to rely upon the SDSs provided to them by the chemical manufacturer/importer assume no responsibility for the content and accuracy of the SDSs.**
 - a. True
 - ss. False

- 4. When employees must travel between workplaces during a work shift, the safety data sheets: _____.**
 - a. may be kept anywhere
 - tt. must be in the cab of the truck
 - uu. may be kept at the primary workplace facility
 - vv. must be filed in a computer

- 5. Safety data sheets may be kept in any form, including operating procedures.**
 - a. True
 - b. False

Module 5: Information and Training

Introduction

Education is the beginning point for developing and maintaining a world-class HAZCOM program. This module focuses on communicating information about hazards and training employees to work safely while being exposed to those hazards. This module discusses basic employer responsibilities for effectively communicating the HAZCOM to employees.

When to Inform and Train

Employers must provide employees with effective information and training on hazardous chemicals in their work area at:

- the time of their initial assignment, and
- whenever a new chemical hazard the employees have not previously been trained about is introduced into their work area.

Information

Employees must be informed of:

- The **requirements** of the HCS 2012;
- Any **operations** in their work area where hazardous chemicals are present; and,
- The **location and availability of the written hazard communication program**, including the required list(s) of hazardous chemicals, and SDSs required by the HCS.

Training Topics

Employee training must include at least:

- Methods and observations that may be used to **detect the presence or release of a hazardous chemical** in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);
- The **physical, health hazards, simple asphyxiation, combustible dust, and pyrophoric gas hazards**, as well as hazards not otherwise classified, of the chemicals in the work area; Note: Training need not be conducted on each specific chemical found in the

workplace, but may be conducted by categories of hazard (e.g., carcinogens, sensitizers, acutely toxic agents) that are or may be encountered by an employee during the course of his duties.

- The **measures employees can take to protect themselves** from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used;
- The **details of the hazard communication program** developed by the employer, including an explanation of the labels received on shipped containers and the workplace labeling system used by their employer; the safety data sheet, including the order of information and how employees can obtain and use the appropriate hazard information.

The employer must also **evaluate** each employee's knowledge about:

- the hazards in the workplace,
- their familiarity with the requirements of the standard, and
- the hazard communication program.

Training Topics

It's important to understand that employees must be trained at the time they are assigned to work with a hazardous chemical. The intent is to inform employees **prior** to exposure to prevent the occurrence of adverse health effects. Of course, this intent cannot be met if training is delayed until a later date.

Also, training requirements are not satisfied solely by giving employees the SDS to read. An employer's training program is to be a forum for explaining the who, what, where, why and when (the education) to employees of the hazards of the chemicals in their work area, but also **how** (the training) to work safely using safe procedures as required by the hazard communication program. This can be accomplished in many ways, including:

- Classroom instruction
- Interactive video

- Hands-on demonstration

Regardless of the training method, all employees should have an opportunity to ask questions to ensure that they understand the information presented to them. Furthermore, the training must be comprehensible. If employees receive job instructions in a language other than English, then the HAZCOM training and information will also need to be conducted in that foreign language.

And, here's a subtle, but important point to remember: Additional training is to be done whenever a new physical or health hazard is introduced into the work area, not a new chemical. Here are a couple of examples that help to understand this requirement:

Example 1: If a new solvent is brought into the workplace, and it has hazards similar to existing chemicals for which training has already been conducted, then no new training is required. However, as with initial training, and in keeping with the intent of the standard, the employer must:

- make employees specifically aware which hazard category (i.e., corrosive, irritant, etc.) the solvent falls within.
- make the substance-specific data sheet available, and
- properly label the new product.

Example 2: If the newly introduced solvent is a suspect carcinogen, and there has never been a carcinogenic hazard in the workplace before, then new training for carcinogenic hazards must be conducted for employees in those work areas where employees will be exposed.

What about retraining new hires?

It is not necessary that the employer retrain each new hire if that employee has received prior training by a past employer, an employee union, or any other entity. The new employee should be able show proof that training on the hazardous substances to which they would be exposed on the job has been conducted. General information, such as the rudiments of the HCS could be expected to remain with an employee from one position to another. The employer, however, **maintains the responsibility and is held accountable** to ensure that their employees are adequately trained and are equipped with the knowledge and information necessary to conduct their jobs safely.

Remember, it is likely that additional training will be needed since employees must know the specifics of their new employers' programs such as where the SDSs are located, details of the

employer's in-plant labeling system, and the hazards of new chemicals to which they will be exposed.

Training at Multi-Employer Worksites

The training requirements also apply if the employer becomes aware via the multi-employer worksite provision of exposures of his/her employees to hazards for which they have not been previously trained.

Training Temporary Employees

Training temporary employees is a responsibility that is shared between the host employer and temporary agency.

- **Host Employer.** The host employer is responsible for training on the company's HCS program including specific labeling, chemical hazards and safe work procedures in their workplace.
- **Temporary Agency.** The temporary agency, in turn, maintains a continuing relationship with its employees and would be expected to inform employees of the general requirements of the HCS standard.

Contracts between the temporary agency and the host-employer should be examined to determine if they clearly set out the training responsibilities of both parties, in order to ensure that the employers have complied with all requirements of the regulation.

Training for Emergencies

A frequently overlooked portion of the training provisions is that dealing with emergency procedures. In workplaces where there is a potential for emergencies, the employer's HCS training program would have to address the HAZWOPER emergency response plan and/or emergency action plan.

The scope and extent of employee training regarding emergency procedures will depend upon the employer's Emergency Response Plan (ERP).

- If the employer merely intends to evacuate the work area, the training in emergency procedures could be limited to, for example, information on the emergency alarm system in use at the worksite, evacuation routes, and reporting areas as detailed in the employer's emergency action plan.

- Where employees are expected to moderate or control the impact of the emergency in a manner similar to an emergency responder, training under 1910.120, Hazardous Waste and Emergency Operations (HAZWOPER), would be required.

Controlled and Uncontrolled Releases

Controlled Releases

It's important to remember that the Hazard Communication Standard (HCS) only covers response to incidental hazardous substance spills that:

- are controllable,
- are limited in quantity, exposure potential and toxicity
- present only minor safety and health hazards to the immediate work area,
- can be easily cleaned up by employees, and
- do not have the potential for becoming an emergency.

Training for responding to incidental spills is covered under the Hazard Communication Standard (HCS) and includes spill cleanup procedures and the use of appropriate PPE.

Uncontrolled Releases

If there is an uncontrollable release of hazardous substances, OSHA Standard 1910.120, Hazardous waste operations and emergency response (HAZWOPER). OSHA's HAZWOPER standard and its training requirements apply to efforts that are "HAZWOPER emergency responses" and hazardous waste site cleanups. Remember, training required for emergency response workers is quite different than that required for hazardous waste site workers. See OSHA's [Emergency Preparedness and Response](#) page.

Module 5 Quiz

Use this quiz to self-check your understanding of the module content. You can also go online and take this quiz within the module. The online quiz provides the correct answer once submitted.

- 1. All of the following are examples of acceptable HAZCOM training methods except?**
 - a. Interactive video
 - b. Classroom training
 - c. Reading a SDS
 - d. Hands-on demonstration

- 2. No matter what training method you use, make sure HAZCOM training includes: _____?**
 - a. mind mapping exercises
 - b. opportunity to ask questions
 - c. safety inspection
 - d. video

- 3. The host employer is required to train temporary employees on specific HAZCOM procedures.**
 - a. True
 - b. False

- 4. Hazardous Waste Operations (HAZWOPER) cover response to incidental spills that do not have the potential for becoming an emergency.**
 - a. True
 - b. False

- 5. In the hazard communications program, employees should be training in which of the following?**
 - a. Use of Safety Data Sheet (SDS)
 - b. How to use fall protection
 - c. How to administer first aid
 - d. The use of fire extinguishers

Module 6: Program Analysis Exercise (This Module is Optional)

Introduction

It's time to take what you've learned in the other modules and put it all together by analyzing the facts surrounding an actual accident that occurred in Oregon few years ago (Names have been changed). In answering the questions, we'll get involved with uncovering management weaknesses in the employer's hazard communication program, and in problems with overall safety leadership. Read through the scenario below and answer the questions.

Findings: Severe Hydrofluoric Acid Burns at XYZ Power Wash

1. XYZ Power Wash uses dilute hydrofluoric acid (HF), a clear, colorless liquid with mild detergent odor, to wash industrial vehicles with a mobile pressurized cleaning system. The company has seven employees. In cleaning operations, the company mainly uses dilute HF (0.1%) at all their operations. However, a few contracts require the use of concentrated HF (4 - 10%) to provide better brightening of aluminum truck parts.
2. The victim, Mr. Jones, stated he had received severe chemical burns on his hands during a powerwash operation in the pit area at Jupiter Equipment Company while preparing to clean heavy equipment. Jupiter Transport did not want Mr. Jones to use the XYZ concentration, but rather their own concentration at 10% HF.
3. While filling a garden sprayer with the 10% HF Mr. Jones accidentally splashed it on his gloves and forearms. Mr. Jones stated that, since he did not feel any pain, or stinging, he did not worry about getting his hands wet.
4. According to Mr. Jones, later that evening, his hand and forearm began to ache. Eventually he hurt so much that he went to the local hospital emergency room where he received immediate treatment for HF burns. However, due to the delayed treatment, he suffered severe damage to tissue and the bones of his hand. (Fluorosis of the bone: fluorine ions replace calcium in the bone.) As a result, part of his hand had to be amputated.
5. Mr. Smith, the employer, stated that Mr. Jones had received training on the safe handling of HF and was informed to wear gloves when working with the concentrated HF. However, he states that Mr. Jones was not wearing gloves when the accident occurred. No written documentation of training could be located.

6. Mr. Smith provided a statement by Mr. Bill, of Jupiter Transport stating he observed the above incident and warned Mr. Jones to wear gloves while handling HF.
7. Mr. Jones stated that he had never been provided hazard communication training on this or any other chemical used by XYZ and denies speaking to Mr. Bill at the time of his accident.
8. Employee interviews substantiate Mr. Jones' claim that hazard communication training was not being accomplished. No SDS was on hand at either XYZ or Jupiter. No eye wash or shower facilities were available in the vicinity of the area where employees handle 10% HF.

Module 6 Quiz

- 1. Discuss the surface causes (Hazardous conditions, unsafe behaviors, inappropriate supervisor actions) that caused this accident.**

- 2. Discuss the underlying root causes (inadequate design or implementation of safety policies, plans, programs, processes, procedures and practices) for the accident.**

- 3. Give at least two recommendations to eliminate or reduce the probability of this accident occurring again.**

Glossary

Aerosols means any non-refillable receptacles made of metal, glass or plastics and containing a gas compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder, and fitted with a release device allowing the contents to be ejected as solid or liquid particles in suspension in a gas, as a foam, paste or powder or in a liquid state or in a gaseous state. Aerosol includes aerosol dispensers.

Alloy means a metallic material, homogeneous to the naked eye, consisting of two or more elements so combined that they cannot be readily separated by mechanical means. Alloys are considered to be mixtures for the purpose of classification under the GHS.

Aspiration means the entry of a liquid or solid chemical product into the trachea and lower respiratory system directly through the oral or nasal cavity, or indirectly from vomiting;

ASTM means the "American Society of Testing and Materials".

BCF means "bioconcentration factor".

BOD/COD means "biochemical oxygen demand/chemical oxygen demand".

CA means "competent authority".

Carcinogen means a chemical substance or a mixture of chemical substances which induce cancer or increase its incidence.

CAS means "Chemical Abstract Service".

CBI means "confidential business information".

Chemical identity means a name that will uniquely identify a chemical. This can be a name that is in accordance with the nomenclature systems of the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS), or a technical name.

Competent authority means any national body(ies) or authority(ies) designated or otherwise recognized as such in the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

Compressed gas means a gas which when packaged under pressure is entirely gaseous at -50°C; including all gases with a critical temperature \leq -50°C.

Contact sensitizer means a substance that will induce an allergic response following skin contact. The definition for "contact sensitizer" is equivalent to "skin sensitizer".

Corrosive to metal means a substance or a mixture which by chemical action will materially damage, or even destroy, metals.

Criteria means the technical definition for the physical, health and environmental hazards;

Critical temperature means the temperature above which a pure gas cannot be liquefied, regardless of the degree of compression.

Dermal Corrosion: see skin corrosion;

Dermal irritation: see skin irritation.

Dissolved gas means a gas which when packaged under pressure is dissolved in a liquid phase solvent.

EC50 means the effective concentration of a substance that causes 50% of the maximum response.

EC Number or (ECN°) is a reference number used by the European Communities to identify dangerous substances, in particular those registered under EINECS.

ECOSOC means the "Economic and Social Council of the United Nations".

EINECS means "European Inventory of Existing Commercial Chemical Substances".

End Point means physical, health and environmental hazards;

ErC50 means EC50 in terms of reduction of growth rate.

EU means "European Union".

Explosive article means an article containing one or more explosive substances.

Explosive substance means a solid or liquid substance (or mixture of substances) which is, in itself, capable by chemical reaction of producing gas 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 emit gases.

Eye irritation means the production of changes in the eye following the application of test substance to the front surface of the eye, which are fully reversible within 21 days of application.

Flammable gas means a gas having a flammable range with air at 20°C and a standard pressure of 101.3kPa.

Flammable liquid means a liquid having a flash point of not more than 93°C.

Flammable solid means a solid which is readily combustible, or may cause or contribute to fire through friction.

Flash point means the lowest temperature (corrected to a standard pressure of 101.3 kPa) at which the application of an ignition source causes the vapors of a liquid to ignite under specified test conditions.

Gas means a substance which (i) at 50 °C has a vapor pressure greater than 300 kPa; or (ii) is completely gaseous at 20 °C at a standard pressure of 101.3 kPa.

GESAMP means "the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection of IMO/FAO/UNESCO/WMO/WHO/IAEA/UN/UNEP."

GHS means "the Globally Harmonized System of Classification and # Labelling of Chemicals".

Hazard category means the division of criteria within each hazard class, e.g., oral acute toxicity includes five hazard categories and flammable liquids includes four hazard categories. These categories compare hazard severity within a hazard class and should not be taken as a comparison of hazard categories more generally.

Hazard class means the nature of the physical, health or environmental hazard, e.g., flammable solid carcinogen, oral acute toxicity.

Hazard statement means a statement assigned to a hazard class and category that describes the nature of the hazards of a hazardous product, including, where appropriate, the degree of hazard;

IARC means the "International Agency for the Research on Cancer".

ILO means the "International Labor Organization".

IMO means the "International Maritime Organization".

Initial boiling point means the temperature of a liquid at which its vapor pressure is equal to the standard pressure (101.3kPa), i.e., the first gas bubble appears.

IOMC means the "Inter-organization Program on the Sound Management of Chemicals".

IPCS means the "International Program on Chemical Safety".

ISO means International Standards Organization.

IUPAC means the "International Union of Pure and Applied Chemistry".

Label means an appropriate group of written, printed or graphic information elements concerning a hazardous product, selected as relevant to the target sector(s), that is affixed to, printed on, or attached to the immediate container of a hazardous product, or to the outside packaging of a hazardous product.

Label element means one type of information that has been harmonized for use in a label, e.g., pictogram, signal word.

LC50 (50% lethal concentration) means the concentration of a chemical in air or of a chemical in water which causes the death of 50% (one-half) of a group of test animals.

LD50 means the amount of a chemical, given all at once, which causes the death of 50% (one half) of a group of test animals.

L(E)C50 means LC50 or EC50.

Liquefied gas means a gas which when packaged under pressure, is partially liquid at temperatures above -50°C. A distinction is made between.

High pressure liquefied gas: a gas with a critical temperature between -50°C and +65°C; and

Low pressure liquefied gas: a gas with a critical temperature above +65°C.

Liquid means a substance or mixture which at 50°C has a vapor pressure of not more than 300kPa (3bar), which is not completely gaseous at 20 °C and at a standard pressure of 101.3kPa, and which has a melting point or initial melting point of 20°C or less at a standard pressure of 101.3 kPa. A viscous substance or mixture for which a specific melting point cannot be determined shall be subjected to the ASTM D 4359-90 test; or to the test for determining fluidity (penetrometer test) prescribed in section 2.3.4 of Annex A of the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR).

MARPOL means the "International Convention for the Prevention of Pollution from Ships".

Mixture means a mixture or a solution composed of two or more substances in which they do not react.

SDS means Safety Data Sheet (SDS).

Mutagen means an agent giving rise to an increased occurrence of mutations in populations of cells and /or organisms.

Mutation means a permanent change in the amount or structure of the genetic material in a cell;

NGO means "non-governmental organization".

NOEC means the "no observed effect concentration".

OECD means "The Organization for Economic Cooperation and Development".

Organic peroxide means a liquid or solid organic substance which contains the bivalent -O-O- structure and may be considered a derivative 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)**.

Oxidizing gas means any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does.

Oxidizing liquid means a liquid which, while in itself not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material.

Oxidizing solid means a solid which, while in itself not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material.

QSAR means "quantitative structure-activity relationships".

Pictogram means a graphical 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.

Precautionary statement means a phrase (and/or pictogram) that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous product, or improper storage or handling of a hazardous product.

Product identifier means the name or number used for a hazardous product on a label or in the SDS. It provides a unique means by which the product user can identify the substance or mixture within the particular use setting (e.g. transport, consumer or workplace).

Pyrophoric liquid means a liquid which, even in small quantities, is liable to ignite within five minutes after coming into contact with air.

Pyrophoric solid means a solid which, even in small quantities, is liable to ignite within five minutes after contact with air.

Pyrotechnic article means an article containing one or more pyrotechnic substances;

Pyrotechnic substance means a substance or mixture of 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 exothermic (heat-related) chemical reactions.

Readily combustible solid means powdered, granular, or pasty substance or mixture which is dangerous if it can be easily ignited by brief contact with an ignition source, such as a burning match, and if the flame spreads rapidly.

Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria means the latest revised edition of the United Nations publication bearing this title, and any published amendment thereto.

Recommendations on the Transport of Dangerous Goods, Model Regulations means the latest revised edition of the United Nations publication bearing this title, and any published amendment thereto.

Refrigerated liquefied gas means a gas which when packaged is made partially liquid because of its low temperature.

Respiratory sensitizer means a substance that induces hypersensitivity of the airways following inhalation of the substance.

RID means The Regulations concerning the International Carriage of Dangerous Goods by Rail [Annex 1 to Appendix B (Uniform Rules concerning the Contract for International Carriage of Goods by Rail) (CIM) of COTIF (Convention concerning international carriage by rail)], as amended.

SAR means "Structure Activity Relationship".

SDS means "Safety Data Sheet" .

Self-Accelerating Decomposition Temperature (SADT) means the lowest temperature at which self-accelerating decomposition may occur with substance as packaged.

Self-heating substance means a solid or liquid substance, other than a pyrophoric substance, which, by reaction with air and without energy supply, is liable to self-heat; this substance differs from a pyrophoric substance in that it will ignite only when in large amounts (kilograms) and after long periods of time (hours or days).

Self-reactive substance means a thermally unstable liquid or solid substance liable to undergo a strongly exothermic decomposition even without participation of oxygen (air). This definition excludes substances or mixtures classified under the GHS as explosive, organic peroxides or as oxidizing.

Serious eye damage means the production of tissue damage in the eye, or serious physical decay of vision, following application of a test substance to the front surface of the eye, which is not fully reversible within 21 days of application.

Signal word means a word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The GHS uses 'Danger' and 'Warning' as signal words.

Skin corrosion means the production of irreversible damage to the skin following the application of a test substance for up to 4 hours.

Skin irritation means the production of reversible damage to the skin following the application of a test substance for up to 4 hours.

Skin sensitizer means a substance that will induce an allergic response following skin contact. The definition for "skin sensitizer" is equivalent to "contact sensitizer".

Solid means a substance or mixture which does not meet the definitions of a liquid or gas.

SPR means "Structure Property Relationship".

Substance means chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.

Substance which, in contact with water, emits flammable gases means a solid or liquid substance or mixture which, by interaction with water, is liable to become spontaneously **flammable or to give off flammable gases in dangerous quantities**.

Supplemental label element means any additional non-harmonized type of information supplied on the container of a hazardous product that is not required or specified under the GHS. In some cases this information may be required by other competent authorities or it may be additional information provided at the discretion of the manufacturer/distributor.

Symbol means a graphical element intended to succinctly convey information.

Technical name means a name that is generally used in commerce, regulations and codes to identify a substance or mixture, other than the IUPAC or CAS name, and that is recognized by the scientific community. Examples of technical names include those used for complex mixtures (e.g., petroleum fractions or natural products), pesticides (e.g., ISO or ANSI systems), dyestuffs (Color Index system) and minerals.

UNCED means the "United Nations Conference on Environment and Development".

UNCETDG/GHS means the "United Nations Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals".

UNITAR means the "United Nations Institute for Training and Research";

UNSCEGHS means the "United Nations Sub-Committee of Experts on the Globally Harmonized System of Classification and Labelling of Chemicals".

UNSCETDG means the "United Nations Sub-Committee of Experts on the Transport of Dangerous Goods".