

WHITE PAPER



GHS IMPACT ON U.S. CHEMICAL MANUFACTURERS: REGULATORY CHANGES AND PRACTICAL GUIDANCE

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Chemical manufacturers bear the brunt of changes brought about in OSHA's 2012 Hazard Communication Standard. With the first deadline approaching, which requires employee training be completed by December 1, 2013, the meticulous work of classifying chemicals, compiling data for publication in the new safety data sheet format and changing labels is just beginning for U.S. chemical producers.

The following paper examines a number of topics, including:

- An overview of the new standard
- Changes from the 1983 standard
- The rationale for alignment with the international standard
- Global adoption of the United Nations' framework
- Practical guidance and resources for chemical companies to reference as their changeover work begins

I - INTRODUCTION

Trade globalization and cross-cultural communication are beginning to affect how U.S. chemical manufacturers classify and label their chemicals. On March 26, 2012, the U.S. Department of Labor's Occupational Safety & Health Administration (OSHA) revised its 1983 Hazard Communication Standard (HCS) by aligning it with the United Nations' global chemical communication system: the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). By the end of 2013, the first deadline outlined in the regulation will have passed and the largest change in workplace safety regulation since 1983 will be in full swing.

The spirit of the 2012 revision to 29 CFR 1910.1200, OSHA's HCS, was summed up by Dr. David Michaels, Assistant Secretary of Labor for Occupational Safety and Health.

"OSHA's 1983 Hazard Communication Standard gave workers the right to know," Michaels said. "This update will give them the right to understand, as well."

By December 1, 2013, all U.S. workers who come into contact with even one chemical in the workplace will have to be trained to understand how to interpret hazards communicated through pictograms and standardized material safety data sheets (MSDS), now called safety data sheets (SDS).

This "Right to Understand" has since become the buzz phrase around the 2012 HCS. It represents an enormous shift for chemical manufacturers and how chemical hazards are communicated downstream. While few of us like big changes, the rationale makes sense.

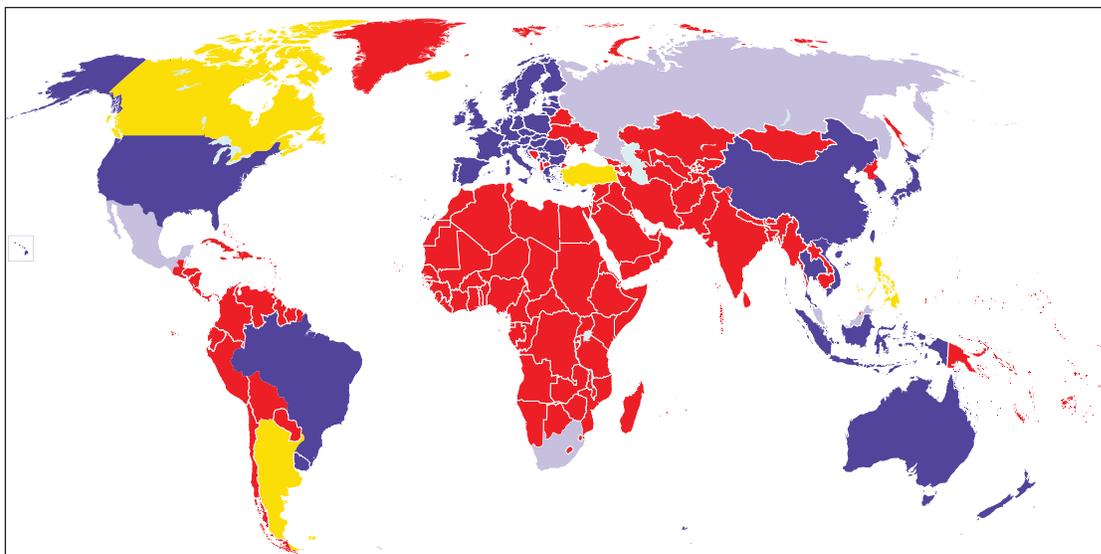


HCS/GHS SDS Training Poster, Style: GHISTRNPST2

Why OSHA Promulgated the 2012 HCS and GHS

Global Commerce:

The United Nations adopted GHS a decade ago. As of early 2013, the United Nations reports that 67 countries have folded GHS into their hazard communication standards⁽¹⁾. Without the changeover last year, U.S. chemical manufacturers faced the risk of being shut out of many of the world's largest markets, including China and most of Europe.



- Countries/regions that have already implemented GHS.
- Countries/regions that are in the process of implementing GHS.
- Countries/regions where GHS is voluntary.
- Countries/regions where GHS is not implemented or not available.

Without proper training and the “Right to Understand,” one can only imagine the confusion U.S. workers would have endured contending with imports from GHS-aligned countries.

OSHA projects that the impact on U.S. companies⁽ⁱⁱ⁾ will be:

- A safer work environment and improved relations with employees
- An increase in efficiency and reduced costs from compliance with hazard communication regulations
- Application of expert systems resulting in maximizing expert resources and minimizing labor and costs
- Facilitation of electronic transmission systems with international scope
- Expanded use of training programs on health and safety
- Reduced costs due to fewer accidents and illnesses
- Improved corporate image and credibility

Coherent Hazard Communication Across Cultures:

Language barriers related to worker safety are at the heart of the United Nations’ move toward GHS adoption. The system incorporates standardized, pictogram-based labeling that allows people from other countries to understand visually the hazards associated with the chemicals they import from the U.S. or from any country aligned with the GHS protocol. The system also standardizes SDS into 16 specific sections for easy and consistent reference.

According to OSHA, GHS adoption will⁽ⁱⁱⁱ⁾:

- Enhance the protection of human health and the environment by providing an internationally comprehensible system
- Provide a recognized framework to develop regulations for those countries without existing systems
- Facilitate international trade in chemicals whose hazards have been identified on an international basis
- Reduce the need for testing and evaluation against multiple classification systems

To put OSHA’s rationale for alignment with the United Nations’ framework into numbers, it is estimated that GHS adoption will save 43 U.S. worker lives on a yearly basis and account for an annual \$250 million in U.S. corporate savings associated with reduced occupational risk^(iv).

What is the Bottom Line? What is Going to Be Different?

Classification of Chemicals

The 2012 HCS covers chemical physical and health hazards, but does not address environmental hazards at this time.

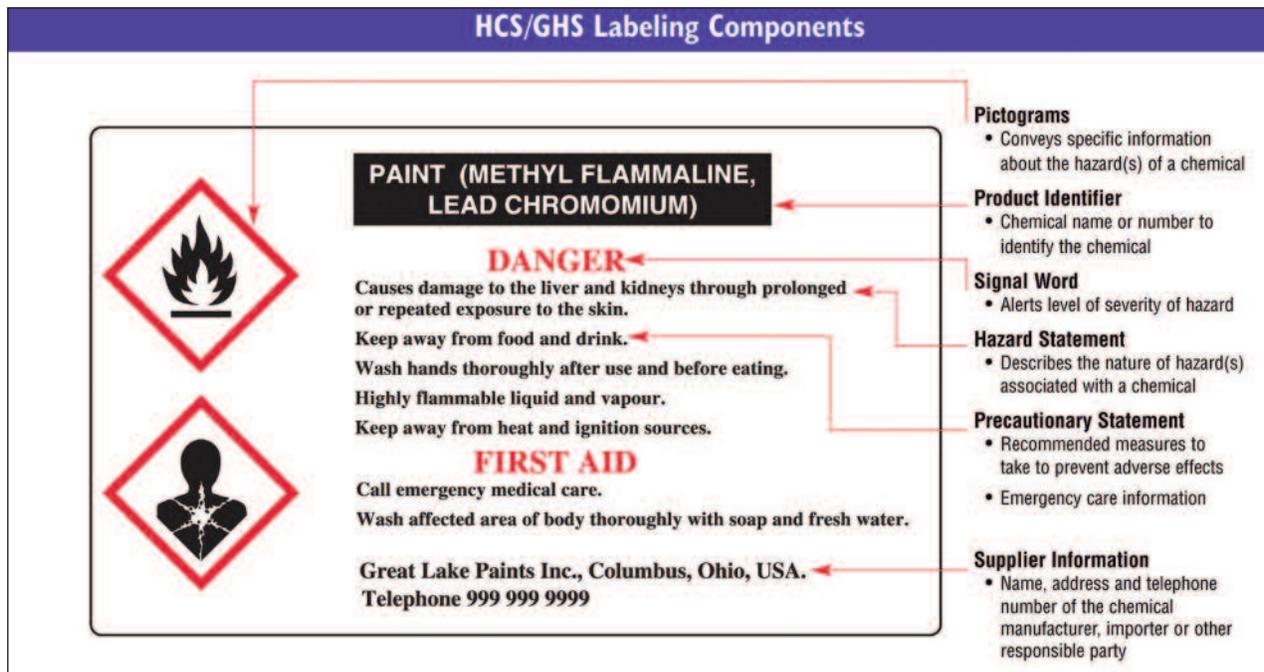
(For details on classification, see page 5)

Labeling

The chart below compares the current standard and the HCS 2012 changes:

Current HCS Label Requirements	HCS 2012/GHS Requirements
<p>Containers of Hazardous Chemicals</p> <ul style="list-style-type: none"> • Identity of Hazardous Chemical(s) • Appropriate Hazard Warnings • Name and Contact Information of Responsible Party • Three-Month Update of Significant Information Regarding Hazards 	<p>Containers of Hazardous Chemicals</p> <ul style="list-style-type: none"> • Product Identifier • Signal Word • Hazard Statement(s) • Pictogram(s) • Precautionary Statement(s) • Name and Contact Information of Responsible Party • In Certain Cases: <ul style="list-style-type: none"> • OSHA Defined Hazards • Percent of Ingredients in Mixture of Unknown Acute Toxicity • Supplemental Information • Six-Month Update of Significant Information Regarding Hazards • HNOC (Hazards Not Otherwise Classified) Are Exempt on Containers • No H/P Number or Codification

This simplified HCS provides much more information than is currently required. This depiction breaks out the new labeling requirements:



(For details on labeling, see page 8)

SDS

The 2012 HCS does away with diverse approaches to MSDS information presentation and requires 16 sections in the new SDS, providing consistency and harmonization for easy access to vital information. While labels have a six-month update requirement of information regarding hazards, the new SDS have a three-month requirement.

GHS pictograms may be used in the SDS; the symbol name may be substituted if use of the pictogram is not feasible. The manufacturer or importer must ensure the SDS is provided in English and provide copies in other languages as necessary.

Trade secret provisions exist in the regulation and are unchanged from the previous standard:

“Trade secret’ means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer’s business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix D sets out the criteria to be used in evaluating trade secrets.”

These changes to classification, labeling and SDS represent the largest change OSHA has implemented since the promulgation of the original HCS in 1983. Fortunately, there is time to develop a change plan.

SAFETY DATA SHEET	
<ul style="list-style-type: none"> Employers shall have a Safety Data Sheet (SDS) in the work place for each hazardous chemical which they use. The employer shall maintain in the workplace copies of the required SDS for each hazardous chemical and shall ensure that they are readily accessible during each work shift to employees when they are in their work areas). The SDS must be in English (although the employer may maintain copies in other languages as well) SDS must include sections 1-11 and 16 in numeric order. Sections 12-15 may be included in the SDS, but are not mandatory (Appendix D to 1910.1200) To be consistent with GHS, an SDS must also include the headings: If no relevant information is found for any of the sub-heading within a section on the SDS, the chemical manufacturer, importer or employer preparing the SDS 	
1. IDENTIFICATION...	<ul style="list-style-type: none"> (a) Product identifier used on the label (b) Other means of identification: (c) Recommended use of the chemical and restrictions on use; (d) Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party; (e) Emergency phone number.
2. HAZARD(S) IDENTIFICATION...	<ul style="list-style-type: none"> (a) Classification of the chemical in accordance with paragraph (d) of § 1910.1200. (b) Signal word, hazard statement(s), symbol(s) and precautionary statement(s) in accordance with paragraph (f) of § 1910.1200. (c) Hazard symbols may be provided as graphical reproductions in black and white or the name of the symbol (e.g., flame); (d) Describe any hazards not otherwise classified that have been identified during the classification process; (e) Where an ingredient with unknown acute toxicity is used in a mixture at a concentration ≥ 1% and the mixture is not classified based on testing of the mixture as a whole, a statement that 1% of the mixture consists of ingredient(s) of unknown acute toxicity is required.
3. COMPOSITION/INFORMATION ON INGREDIENTS...	<p>Except as provided for in paragraph (i) of § 1910.1200 on trade secrets:</p> <p>For Substances:</p> <ul style="list-style-type: none"> (a) Chemical name; (b) Common name and synonyms; (c) CAS number and other unique identifiers; (d) Inquiries and subclassing addresses which are themselves classified and which contribute to the classification of the substance. <p>For Mixtures:</p> <p>In addition to the information required for substances:</p> <ul style="list-style-type: none"> (a) The chemical name and concentration (exact percentage) or concentration ranges of all ingredients which are classified as health hazards in accordance with paragraph (d) of § 1910.1200 and (1) Are present above their cut-off/concentration limits; or (2) Present a health risk below the cut-off/concentration limits; (b) The concentration (exact percentage) shall be specified unless a trade secret claim is made in accordance with paragraph (i) of § 1910.1200, when there is batch-to-batch variability in the production of a mixture, or for a group of substantially similar mixtures (See A.O.S. 1.2) with similar chemical composition. In these cases, concentration ranges may be used. For all chemicals where a Trade Secret is Claimed: Where a trade secret is claimed in accordance with paragraph (i) of § 1910.1200, the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret is required.
4. FIRST-AID MEASURES...	<ul style="list-style-type: none"> (a) Description of necessary measures, subdivided according to the different routes of exposure, i.e., inhalation, skin and eye contact, and ingestion; (b) Most important symptoms/effects, acute and delayed; (c) Indication of immediate medical attention and special treatment needed, if necessary.
5. FIRE-FIGHTING MEASURES...	<ul style="list-style-type: none"> (a) Suitable and unstable extinguishing media; (b) Specific hazards arising from the chemical (e.g., nature of any hazardous combustion products); (c) Special protective equipment and precautions for fire-fighters.
6. ACCIDENTAL RELEASE MEASURES...	<ul style="list-style-type: none"> (a) Personal precautions, protective equipment, and emergency procedures; (b) Methods and materials for containment and cleaning up.
7. HANDLING AND STORAGE...	<ul style="list-style-type: none"> (a) Precautions for safe handling; (b) Conditions for safe storage, including any incompatibilities.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION...	<ul style="list-style-type: none"> (a) OSHA permissible exposure limit (PEL), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available; (b) Appropriate engineering controls; (c) Individual protection measures, such as personal protective equipment.

HCS/GHS SDS Training Card, Style: GHISTRNTC2
For more details on the 16 SDS sections and what they require, see page: 12

II - COMPLIANCE TIMELINE

OSHA has developed a phase-in transition to 2012 HCS/GHS that extends to June 1, 2016. Here is the breakdown of deadlines:

December 1, 2013	June 1, 2015	Dec. 1, 2015	June 1, 2016
Employers must train employees on the new label elements and safety data sheet (SDS) format	Chemical manufacturers, importers, distributors and employers must comply with all modified provisions	Distributors begin shipping containers labeled by the chemical manufacturer or importer with a HCS label	Employers must update alternative workplace labeling and hazard communication programs as necessary and provide additional employee training for newly identified physical or health hazards

- Training for employees must be completed for every organization with employees who come who are subject to the standard by December 1, 2013
- Chemical manufacturers and distributors must be in compliance with all HCS modified provisions by June 1, 2015
- Distributors begin shipping containers with GHS-compliant labels provided by chemical manufacturers by December 1, 2015
- All employers in full labeling and SDS compliance by June 1, 2016

III - IMPACT ON CHEMICAL MANUFACTURERS

Chemical manufacturers have the most work to do to comply with changes in the 2012 HCS. While OSHA provided some cushioning in the implementation timeline, it remains a daunting task. This paper breaks down the larger tasks involved and offers details on the regulation as it pertains to each area with some practical guidance.

Classifying Chemicals

Under the current HCS, “classification” was not formally defined because the standard required an “assessment of hazard” rather than classification. That changes in the 2012 HCS, as classification is clearly outlined in 29 CFR 1910.1200(c):

“Classification’ means to identify the relevant data regarding the hazards of a chemical; review those data to ascertain the hazards associated with the chemical; and decide whether the chemical will be classified as hazardous according to the definition of hazardous chemical in this section. 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.”

In the outgoing standard, “Chemical name” was defined as:

“...the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name which will clearly identify the chemical for the purpose of conducting a hazard evaluation.”

Note the change in the 2012 HCS:

“‘Chemical name’ means the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name that will clearly identify the chemical for the purpose of conducting a hazard classification.”

Practical Guidance:
<p>HCS 2012 is based on the U.N.’s Revision 3, which outlines physical and health hazard classes. Classifications not included in the 2012 HCS are:</p> <ul style="list-style-type: none"> • Environmental Hazards • Acute Toxicity Category 5 • Skin Corrosion/Irritation Category 3 • Aspiration Hazard Category 2 • Acute Aquatic Toxicity Categories 1-3 • Chronic Aquatic Toxicity Category 1-4 • Hazardous to the Ozone Layer

Physical Hazards:

Physical hazards of chemicals are defined in the 2012 HCS as follows:



HCS/GHS Pictogram Labels,
Style: GHIS0035

- Explosive:** An explosive chemical is a solid or liquid chemical 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 chemicals are included even when they do not evolve gases.
Appendix B.1
- Flammable Gases:** A flammable gas is a gas having a flammable range with air at 20°C (68°F) and a standard pressure of 101.3 kPa (14.7 psi). **Appendix B.2/Table B.2.1**
- Flammable Aerosols:** A flammable aerosol is any non-refillable receptacle containing a gas compressed, liquefied or dissolved under pressure, and fitted with a release device allowing the contents to be ejected as particles in suspension in a gas, or as a foam, paste, powder, liquid or gas.
Appendix B.3/Table B.3.1
- Oxidizing Gas:** Oxidizing gas means any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does.
Appendix B.4/Table B.4.1
- Gases Under Pressure:** Gases under pressure are gases which are contained in a receptacle at a pressure of 200 kPa (29 psi) (gauge) or more, or which are liquefied or liquefied and refrigerated. **Appendix B.5/Table B.5.1**
- Flammable Liquids:** Flammable liquid means a liquid having a flash point of not more than 93°C (199.4°F).
Appendix B.6/Table B.6.1
- Flammable Solids:** Flammable solid means a solid which is a readily combustible solid, or which may cause or contribute to fire through friction.
Appendix B.7/Table B.7.1
- Self-Reactive Chemicals:** Self-reactive chemicals are thermally unstable liquid or solid chemicals liable to undergo a strongly exothermic decomposition even without participation of oxygen (air). This definition excludes chemicals classified under this section as

explosives, organic peroxides, oxidizing liquids or oxidizing solids. **Appendix B.8**

- Pyrophoric Liquids:** Pyrophoric liquid means a liquid which, even in small quantities, is liable to ignite within five minutes after coming into contact with air. **Appendix B.9/Table B.9.1**
- Pyrophoric Solids:** Pyrophoric solid means a solid which, even in small quantities, is liable to ignite within five minutes after coming into contact with air. **Appendix B.10/Table B.10.1**
- Self-Heating Chemicals:** A self-heating chemical is a solid or liquid chemical, other than a pyrophoric liquid or solid, which, by reaction with air and without energy supply, is liable to self-heat; this chemical differs from a pyrophoric liquid or solid in that it will ignite only when in large amounts (kilograms) and after long periods of time (hours or days). **Appendix B.11/Table B.11.1**
- Chemicals Which, In Contact With Water, Emit Flammable Gases:** Chemicals which, in contact with water, emit flammable gases are solid or liquid chemicals which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities. **Appendix B.12/Table B.12.1**
- Oxidizing Liquids:** 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.
Appendix B.13/Table B.13.1
- Oxidizing Solids:** Oxidizing solid means a solid which, while in itself is not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material.
Appendix B.14/Table B.14.1
- Organic Peroxides:** An organic peroxide means a liquid or solid organic chemical which contains the bivalent -O-O- structure and as such is considered a derivative of hydrogen peroxide, where one or both of the hydrogen atoms have been replaced by organic radicals. The term organic peroxide includes organic peroxide mixtures containing at least one organic peroxide. Organic peroxides are thermally unstable chemicals, which may undergo exothermic self-accelerating decomposition. In addition, they may have one or more of the following properties:

Practical Guidance:

Refer to Appendix B to §1910.1200 (Health Hazard Criteria) for values and category tables at OSHA.gov

- (a) Be liable to explosive decomposition
- (b) Burn rapidly
- (c) Be sensitive to impact or friction
- (d) React dangerously with other substances

An organic peroxide is regarded as possessing explosive properties when in laboratory testing the formulation is liable to detonate, to deflagrate rapidly or to show a violent effect when heated under confinement. **Appendix B.15**

- **Corrosive to Metals:** A chemical which is “corrosive to metals” means a chemical which by chemical action will materially damage, or even destroy, metals. **Appendix B.16/ Table B.16.1**

Health Hazards:

Health hazards of chemicals are defined in the 2012 HCS as follows:

- **Acute Toxicity (any route of exposure):** Acute toxicity refers to those adverse effects occurring following oral or dermal administration of a single dose of a substance, or multiple doses given within 24 hours, or an inhalation exposure of four hours. **Appendix A.1/Tables A.1.1 & A.1.2 Mixtures**



HCS/GHS Pictogram Labels, Style: GHIS0038

- **Skin Corrosion or Irritation:** Skin corrosion is the production of irreversible damage to the skin; namely visible necrosis through the epidermis and into the dermis, following the application of a test substance for up to four hours. Corrosive reactions are typified by ulcers, bleeding, bloody scabs, and by the end of the observation period at 14 days, by discoloration due to blanching, of the skin, complete areas of alopecia, and scars. Skin irritation is the production of reversible damage to the skin following the application of a test substance for up to 4 hours. **Appendix A.2/Tables A.2.1 Skin Corrosion, A.2.2 Skin Irritation, and A.2.3 & A.2.4 for Concentrations**
- **Serious Eye Damage or Eye Irritation:** Serious eye damage occurs when eye tissue is damaged, or serious physical decay of vision is incurred, following the application of a test

Practical Guidance:

Refer to Appendix A to §1910.1200 (Health Hazard Criteria) for values and category tables at OSHA.gov

substance to the anterior surface of the eye, which is not fully reversible within 21 days of application. Eye irritation is the production of changes in the eye, following the application of a test substance to the anterior surface of the eye, which are fully reversible within 21 days of application. **Appendix A.3/Tables A.3.1 & A.3.2**

- **Respiratory or Skin Sensitization:** A respiratory sensitizer is a chemical that will lead to hypersensitivity of the airways following inhalation of the chemical. A skin sensitizer is a chemical that will lead to an allergic response following skin contact. **Appendix A.4/ Table A.4.5**
- **Germ Cell Mutagenicity:** A germ cell mutagenicity refers to a permanent change in the amount or structure of the genetic material in a cell. This applies to both heritable genetic changes that may be manifested at the phenotypic level and to the underlying DNA modifications, when known. **Appendix A.5/ Figure A.5.1, Table A.5.1**
- **Carcinogenicity:** Carcinogenicity is a substance or a mixture of substances which induce cancer or increase its incidence. Substances and mixtures which have induced benign and malignant tumors in well-performed studies on animals are considered also to be presumed or suspected human carcinogens unless there is strong evidence that the mechanism of tumor formation is not relevant for humans. **Appendix A.6/ Figure A.6.1 & Table A.6.1 for Cut-off and Concentration Values**
- **Reproductive Toxicity:** Reproductive toxicity refers to adverse effects on sexual function and fertility in adult males and females, as well as adverse effects on the development of any offspring. This includes effects on or through lactation as a subgroup. **Appendix A.7/ Figures A.7.1 & A.7.1(b), Table A.7.1 for Cut-off and Concentration Values**
- **Specific Target Organ Toxicity (single or repeated exposure):** Specific target organ toxicity (STOT-SE) means specific, non-lethal target organ toxicity arising from a single or repeated exposure to a chemical. **Single Dose: Appendix A.8/ Figure A.8.1, Table A.8.1. Repeated or Prolonged Exposure: Appendix A.9/ Figure A.9.1, Table A.9.1**
- **Aspiration Hazard:** An aspiration hazard refers to the entry of a liquid or solid directly through the oral or nasal cavity, or indirectly from vomiting, into the trachea and lower respiratory systems. **Appendix A.10/ Table A.10.1**

Mixtures:

Chemical manufacturers, importers, or employers evaluating chemicals shall follow the procedures described in Appendices A and B to §1910.1200 to classify the hazards of the chemicals, including determinations regarding when mixtures of the classified chemicals are covered by this section.

When classifying produced or imported mixtures, chemical manufacturers and importers of mixtures may rely on the information provided on the current SDS of the individual ingredients, except where the chemical manufacturer or importer knows, or in the exercise of reasonable diligence should know, that the SDS misstates or omits required information.

HNOC (Hazards Not Otherwise Classified):

An adverse physical or health effect identified through the evaluation of scientific evidence during the classification process

that does not meet the specified criteria for the physical and health hazard classes addressed above is considered to be a "Hazard Not Otherwise Classified," also known as a "HNOC."

This does not extend coverage to adverse physical and health effects for which there is a hazard class addressed in this section; rather, hazards in this category have effects that either fall below the cut-off value/concentration limit of the hazard class or are under a GHS hazard category that has not been adopted by OSHA.

For additional information on chemical classification, please view Labelmaster's two-part overview of chemical classification and the 2012 Hazcom Standard: [Chemical Classifications and the 2012 Hazcom Standard - Part I](#) and [Chemical Classifications and the 2012 Hazcom Standard - Part II](#), which can be viewed at labelmaster.com/ghs.

IV - LABELING

The 2012 HCS and GHS labeling largely reflect pictograms currently in use by the U.S. Department of Transportation (DOT), International Civil Aviation Organization (ICAO) and International Maritime Organization (IMO). These internationally recognized pictograms are designed to limit the need for language conversion in our culturally diverse global trade.

While both the old and 2012 versions of the HCS include a requirement to label, the features that will be required on such labels have undergone a radical change in the new HCS.

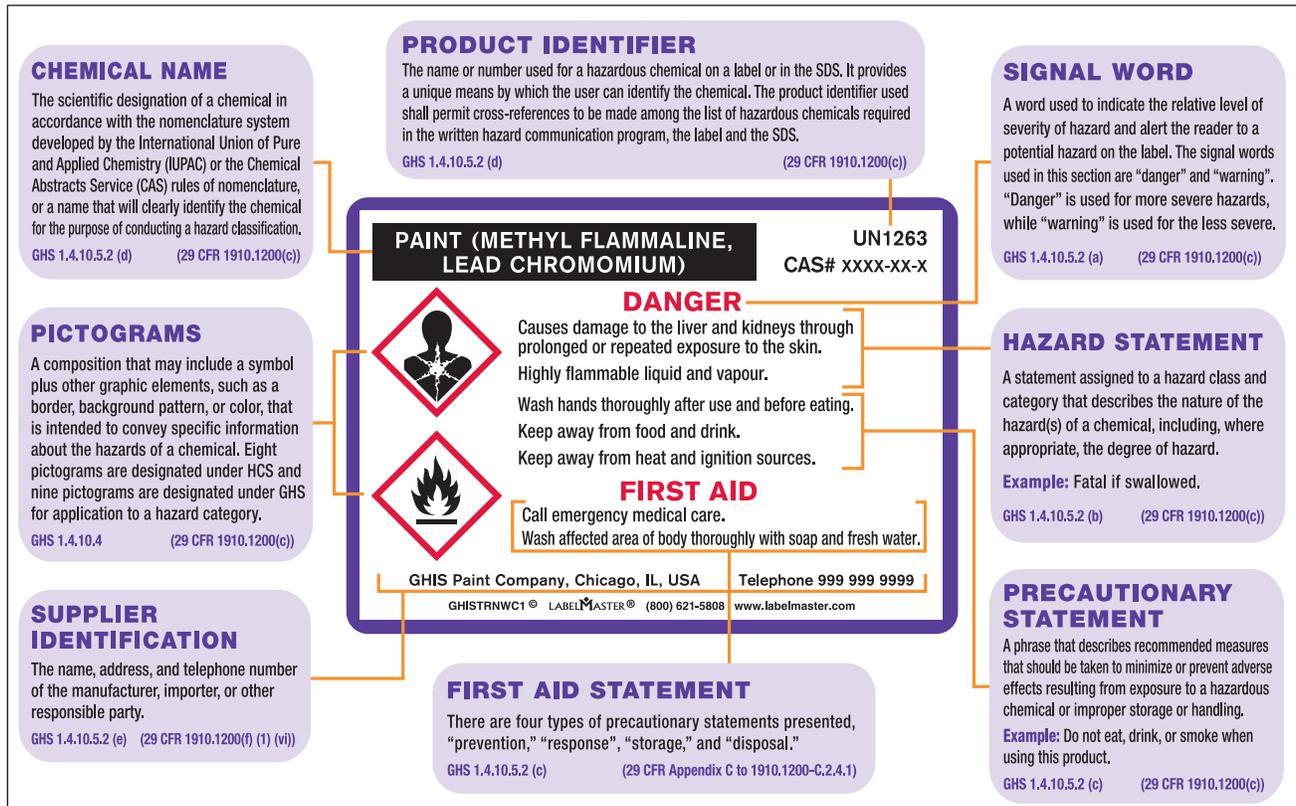
- Labeling is required to follow on to classification
- Visual pictographic symbols are required



Label Elements:

The following infographic outlines an example of the major elements of a GHS/HCS label.

The symbols, signal words and hazard statements have all been standardized and assigned to specific hazard categories and classes. This makes it easier for companies to comply with the GHS/HCS regulations.



Definitions below as defined in 29 CFR 1910.1200(c)

Chemical Name	Product Identifier	Pictograms	Signal Word
<p>The scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name that will clearly identify the chemical for the purpose of conducting a hazard classification.</p> <p>GHS 1.4.10.5.2(d) 29 CFR 1910.1200(c)</p>	<p>The name or number used for a hazardous chemical on a label or in the SDS. It provides a unique means by which the user can identify the chemical. The product identifier used shall permit cross-references to be made among the list of hazardous chemicals required in the written hazard communication program, the label and the SDS.</p> <p>GHS 1.4.10.5.2(d) 29 CFR 1910.1200(c)</p>	<p>A composition that may include a symbol plus other graphic elements, such as a border, background pattern, or color, that is intended to convey specific information about the hazards of a chemical. Eight pictograms are designated under HCS and nine pictograms are designated under GHS for application to a hazard category.</p> <p>GHS 1.4.10.4 29 CFR 1910.1200(c)</p>	<p>A word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used in this section are "danger" and "warning." "Danger" is used for more severe hazards, while "warning" is used for the less severe.</p> <p>GHS 1.4.10.5.2(a) 29 CFR 1910.1200(c)</p>

Definitions below as defined in 29 CFR 1910.1200(c)

Hazard Statement	Precautionary Statement	First Aid Statement	Supplier Identification
<p>A statement assigned to a hazard class and category that describes the nature of the hazard(s) of the chemical, including, where appropriate, the degree of hazard. Example: Fatal if swallowed.</p> <p>GHS 1.4.10.5.2(b) 29 CFR 1910.1200(c)</p>	<p>A phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical or improper storage or handling. Example: Do not eat, drink, or smoke when using this product.</p> <p>GHS 1.4.10.5.2(c) 29 CFR 1910.1200(c)</p>	<p>There are four types of precautionary statements presented, “prevention,” “response,” “storage,” and “disposal.”</p> <p>GHS 1.4.10.5.2(d) 29 CFR Appendix C to 1910.1200-C.2.4.1</p>	<p>The name, address, and telephone number of the manufacturer, importer, or other responsible party.</p> <p>GHS 1.4.10.5.2(e) 29 CFR 1910.1200(f)(1)(vi)</p>

DOT/Transport Interactions With the 2012 HCS and GHS:

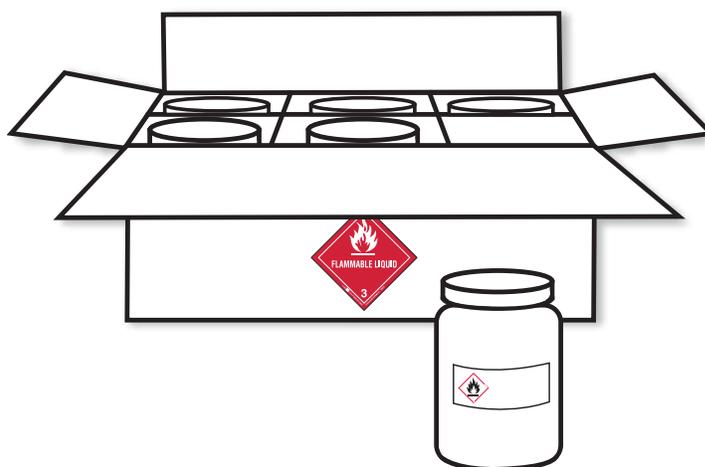
Industry has expressed concerns that GHS pictograms might be confused with a transport pictogram or DOT diamond-shaped hazard class labels. The 2012 HCS defines pictogram under section 1910.1200(c) as “a composition that may include a symbol plus other graphic elements, such as a border, background pattern, or color, that is intended to convey specific information about the hazardous chemical.” DOT requires diamond-shaped labels containing hazard symbols for the transport of chemicals. Therefore, because DOT labels contain symbols, they are considered pictograms under the 2012 HCS.

Several types of containers, most notably drums, chemical totes and tanks, also serve as the hazardous chemical immediate container. Therefore, both a DOT and an HCS label are required in these situations. Paragraph (f)(5) of 1910.1200 provides that each container of a hazardous chemical leaving the workplace must be labeled in a way that does not conflict with the requirements of the Hazardous Materials Transportation Act, 49 U.S.C 1801 et seq.

As previously noted, Appendix C.2.3.3 of the 2012 HCS states “where a pictogram required by the Department of Transportation under Title 49 of the Code of Federal Regulations appears on a shipped container, the pictogram specified on C.4 for the same hazard shall not appear.” However, DOT does not view the 2012 HCS pictograms as a conflict with the requirements of the Hazardous Materials Transportation Act, and for some international trade, both the DOT and the 2012 HCS pictograms may need to be present on the label. Therefore, OSHA intends to revise Appendix C.2.3.3. In the meantime, OSHA will allow both the DOT and the 2012 HCS pictograms for the same hazard to appear on the label, according to OSHA Brief from 12/20/2012.

Combination Packaging (Outer Box With Inner Bottles)

Under paragraph (f)(1) of 1910.1200, each container of hazardous chemical leaving the workplace must be labeled, tagged, or marked with the information specified in section 1910.1200(f)(1)(i)-(vi). While the requirement to label a shipped container has not changed under the 2012 HCS, the information required on the label has been modified. Under the 2012 HCS, an employer is required to label a hazardous chemical’s immediate container; however, the standard does not require labels on the outside shipping containers. Accordingly, OSHA does not require an outside box or overpack to have an HCS label because they are not immediate containers.

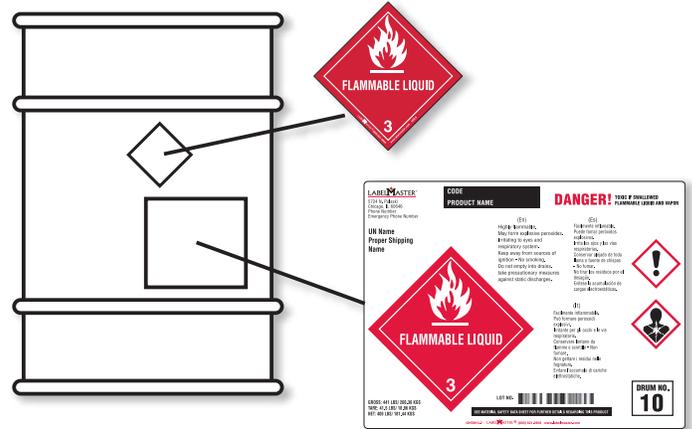


WEDNESDAY, MAY 29, 2013

Drums

For a container such as a 55-gallon drum, the DOT-required hazard class labels may be combined with the GHS label elements or presented separately. A label example for a single packaging (such as a 55-gallon drum) is shown in the image to the right. Represented on the drum are hazard class labels required by transport regulations as well as a GHS label and a non-duplicative GHS pictogram.

A label merging the transportation requirements and the GHS requirements into one label shown below.



Example GHS Outer Container Label (55-gallon/200-liter drum)

<p>LABELMASTER® 5724 N. Pulaski Chicago, IL 60646 Phone Number Emergency Phone Number</p>	<p>CODE PRODUCT NAME</p>	<p>DANGER! TOXIC IF SWALLOWED FLAMMABLE LIQUID AND VAPOR</p>	
<p>UN Name Proper Shipping Name</p>	<p>(En) Highly flammable. May form explosive peroxides. Irritating to eyes and respiratory system. Keep away from sources of ignition - No smoking. Do not empty into drains. take precautionary measures against static discharges.</p>	<p>(Es) Fácilmente inflamable. Puede formar peróxidos explosivos. Irrita los ojos y las vías respiratorias. Conservar alejado de toda llama o fuente de chispas - No fumar. No tirar los residuos por el desagüe. Evítese la acumulación de cargas electrostáticas.</p>	
	<p>(It) Facilmente infiammabile. Puó formare perossidi esplosivi. Irritante per gli occhi e le vie respiratorie. Conservare lontano da fiamme e scintille - Non fumare. Non gettare i residui nelle fognature. Evitare l'accumulo di cariche elettrostatiche.</p>		<p>DRUM NO. 10</p>
<p>GROSS: 441 LBS/ 200.30 KGS TARE: 41.5 LBS/ 18.86 KGS NET: 400 LBS/ 181.44 KGS</p>	<p>LOT NO. </p>	<p>SEE MATERIAL SAFETY DATA SHEET FOR FURTHER DETAILS REGARDING THIS PRODUCT</p>	
<p>GHS810-2 LABELMASTER® (800) 621-5808 www.labelmaster.com</p>			

For Custom Drum Labels see: <http://www.labelmaster.com/Shop/safety/ghs-hazcom-products/ghs-drum-labels>

For more details on 2012 HCS labeling and GHS, visit: <http://www.osha.gov/dsg/hazcom/ghs.html#4.0>

V - CONVERSION FROM MSDS TO SDS

The 2012 HCS requires the conversion of current Material Safety Data Sheets (MSDS) to Safety Data Sheets (SDS). The requirement is more intensive than simply crossing out the “M.” Sections are harmonized with the United Nations’ international requirements and the SDS’s 16 sections provide details on hazards and protocols.

SDS are defined in 29 CFR 1910.1200:

Safety Data Sheets (SDS) are written or printed material concerning a hazardous chemical that is prepared in accordance with paragraph (g) of this section.

- **1910.1200(g)(1):** Chemical manufacturers and importers shall obtain or develop a safety data sheet for each hazardous chemical they produce or import. Employers shall have a safety data sheet in the workplace for each hazardous chemical which they use.
- **1910.1200(g)(2):** The chemical manufacturer or importer preparing the safety data sheet shall ensure that it is in English (although the employer may maintain copies in other languages as well), and includes at least the following section numbers and headings, and associated information under each heading, in the order listed (**See Appendix D to § 1910.1200—Safety Data Sheets, for the specific content of each section of the safety data sheet**)

Here is a list of the 16 sections and guidance on required information:

Section 1: Identification
<p>This section identifies the chemical on the SDS as well as the recommended uses. It also provides the essential contact information of the supplier. The required information consists of:</p> <ul style="list-style-type: none"> • Product identifier used on the label and any other common names or synonyms by which the substance is known. • Name, address, phone number of the manufacturer, importer, or other responsible party, and emergency phone number. • Recommended use of the chemical (e.g., a brief description of what it actually does, such as flame retardant) and any restrictions on use (including recommendations given by the supplier).¹

Section 2: Hazard(s) Identification
<p>This section identifies the hazards of the chemical presented on the SDS and the appropriate warning information associated with those hazards. The required information consists of:</p> <ul style="list-style-type: none"> • The hazard classification of the chemical (e.g., flammable liquid, category¹). • Signal word. • Hazard statement(s). • Pictograms (the pictograms or hazard symbols may be presented as graphical reproductions of the symbols in black and white or be a description of the name of the symbol [e.g., skull and crossbones, flame]). • Precautionary statement(s). • Description of any hazards not otherwise classified. • For a mixture that contains an ingredient(s) with unknown toxicity, a statement describing how much (percentage) of the mixture consists of ingredient(s) with unknown acute toxicity. Please note that this is a total percentage of the mixture and not tied to the individual ingredient(s).

Section 3: Composition/Information on Ingredients
<p>This section identifies the ingredient(s) contained in the product indicated on the SDS, including impurities and stabilizing additives. This section includes information on substances, mixtures, and all chemicals where a trade secret is claimed. The required information consists of:</p> <p>Substances</p> <ul style="list-style-type: none"> • Chemical name. • Common name and synonyms. • Chemical Abstracts Service (CAS) number and other unique identifiers. • Impurities and stabilizing additives, which are themselves classified and which contribute to the classification of the chemical. <p>Mixtures</p> <ul style="list-style-type: none"> • Same information required for substances. • The chemical name and concentration (i.e., exact percentage) of all ingredients which are classified as health hazards and are: <ul style="list-style-type: none"> • <i>Present above their cut-off/concentration limits or</i> • <i>Present a health risk below the cut-off/concentration limits.</i> • The concentration (exact percentages) of each ingredient must be specified except concentration ranges may be used in the following situations: <ul style="list-style-type: none"> • <i>A trade secret claim is made,</i> • <i>There is batch-to-batch variation, or</i> • <i>The SDS is used for a group of substantially similar mixtures</i> <p>Chemicals where a trade secret is claimed</p> <ul style="list-style-type: none"> • A statement that the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret is required.

Section 4: First-Aid Measures

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

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

Section 5: Firefighting Measures

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

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

Section 6: Accidental Release Measures

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

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

Section 7: Handling and Storage

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

- Precautions for safe handling, including recommendations for handling incompatible chemicals, minimizing the release of the

chemical into the environment, and providing advice on general hygiene practices (e.g., eating, drinking, and smoking in work areas is prohibited).

- Recommendations on the conditions for safe storage, including any incompatibilities. Provide advice on specific storage requirements (e.g., ventilation requirements)

Section 8: Exposure Controls/Personal Protection

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

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

Section 9: Physical and Chemical Properties

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

- Appearance (physical state, color, etc.);
- Upper/lower flammability or explosive limits;
- Odor;
- Vapor pressure;
- Odor threshold;
- Vapor density;
- pH;
- Relative density;
- Melting point/freezing point;
- Solubility(ies);
- Initial boiling point and boiling range;
- Flash point;
- Evaporation rate;
- Flammability (solid, gas);
- Upper/lower flammability or explosive limits;
- Vapor pressure;
- Vapor density;
- Relative density;
- Solubility(ies);
- Partition coefficient: n-octanol/water;

- Auto-ignition temperature;
- Decomposition temperature; and
- Viscosity.

The SDS may not contain every item on the above list because information may not be relevant or is not available. When this occurs, a notation to that effect must be made for that chemical property. Manufacturers may also add other relevant properties, such as the dust deflagration index (Kst) for combustible dust, used to evaluate a dust's explosive potential

Section 10: Stability and Reactivity

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

Reactivity

- Description of the specific test data for the chemical(s). This data can be for a class or family of the chemical if such data adequately represent the anticipated hazard of the chemical(s), where available.

Chemical stability

- Indication of whether the chemical is stable or unstable under normal ambient temperature and conditions while in storage and being handled.
- Description of any stabilizers that may be needed to maintain chemical stability.
- Indication of any safety issues that may arise should the product change in physical appearance.

Other

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

Section 11: Toxicological Information

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

- Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact). The SDS should indicate if the information is unknown.

- Description of the delayed, immediate, or chronic effects from short- and long-term exposure.
- The numerical measures of toxicity (e.g., the acute toxicity estimates such as the LD50 [median lethal dose] - the estimated amount (of a substance) expected to kill 50% of test animals in a single dose.
- Description of the symptoms. This description includes the symptoms associated with exposure to the chemical including symptoms from the lowest to the most severe exposure.
- Indication of whether the chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions) or found to be a potential carcinogen by OSHA

Section 12: Ecological Information (non-mandatory)

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

- Data from toxicity tests performed on aquatic and/or terrestrial organisms, where available (e.g., acute or chronic aquatic toxicity data for fish, algae, crustaceans, and other plants; toxicity data on birds, bees, plants).
- Whether there is a potential for the chemical to persist and degrade in the environment either through biodegradation or other processes, such as oxidation or hydrolysis.
- Results of tests of bioaccumulation potential, making reference to the octanol-water partition coefficient (Kow) and the bioconcentration factor (BCF), where available.
- The potential for a substance to move from the soil to the groundwater (indicate results from adsorption studies or leaching studies).
- Other adverse effects (e.g., environmental fate, ozone layer depletion potential, photochemical ozone creation potential, endocrine disrupting potential, and/or global warming potential).

Section 13: Disposal Considerations (non-mandatory)

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

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

Section 14: Transport Information (non-mandatory)

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

- UN number (i.e., four-figure identification number of the substance)¹.
- UN proper shipping name¹.
- Transport hazard class(es)¹.
- Packing group number, if applicable, based on the degree of hazard².
- Environmental hazards (e.g., identify if it is a marine pollutant according to the International Maritime Dangerous Goods Code [IMDG Code]).
- Guidance on transport in bulk (according to Annex II of MARPOL 73/783 and the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk [International Bulk Chemical Code {IBC Code}]).
- Any special precautions which an employee should be aware of or needs to comply with, in connection with transport or conveyance either within or outside their premises (indicate when information is not available).

Section 15: Regulatory Information (non-mandatory)

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

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

Section 16: Other Information

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

Note: Since other Agencies regulate this information, OSHA will not be enforcing Sections 12 through 15 (29 CFR 1910.1200[g][2]).

¹ Chemical, as defined in the HCS, is any substance, or mixture of substances.

² Found in the most recent edition of the United Nations Recommendations on the Transport of Dangerous Goods.

³ MARPOL 73/78 means the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, as amended.

Employers must ensure that SDS are readily accessible to employees.

See Appendix D of 1910.1200 for a detailed description of SDS contents.

For more detailed information on SDS and their requirements under the 2012 HCS, visit: OSHA.gov

VI - SUMMARY

- Global commerce and cross-cultural communication are at the heart of the 2012 HCS and GHS.
- Chemical manufacturers must classify chemicals and provide appropriate hazard information to downstream transporters and end-users.
- The spirit of the 2012 HCS and GHS is summed up as workers' "Right to Understand."
- By end of 2013, employers must have employees trained on the 2012 HCS.
- Labeling is vastly different but leverages familiar pictographic symbols to relate hazards across cultures.
- MSDS are converting to SDS. (This change is a little more involved than just doing this: MSDS).
- Every organization involved in, or responsible for, communicating chemical workplace hazards have to be in full compliance by June 1, 2016.

ABOUT THE AUTHOR

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Paul Burgess is a Staff Regulatory Specialist at Labelmaster and the company's expert on OSHA's Hazard Communication Standard. Paul's training includes degrees from the University of Washington and Governors State University, professional certification as a Dangerous Goods Safety Advisor (DGSA), an EPA Hazardous Waste Operations and Emergency Response (HAZWOPER) Specialist and training in the federal Transportation Worker Identification Credential (TWIC) program. Paul has more than 30 years of experience in the hazard communication, dangerous goods, and environmental, health and safety sectors, including the U.S. Navy and the trucking, heavy manufacturing and railroad industries.

ABOUT LABELMASTER®

The Labelmaster Regulatory Team is dedicated to staying current with industry updates and new regulations. We constantly write about our findings on our blog, post them to our Facebook page and tweet about them to our followers. We encourage you to join our social channels to stay informed.



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For an overview of GHS, product information and to view our classification webinars specifically designed to provide chemical manufacturers detailed information about adopting the 2012 HCS/GHS protocols, please visit: labelmaster.com/GHS.

For solutions on 2012 HCS compliance, please visit: labelmaster.com/shop/safety/ghs-hazcom-products.

ⁱThe U.N. GHS adoption country listing is available at: <http://www.unece.org/?id=25735>

ⁱⁱOSHA, <http://www.osha.gov/dsg/hazcom/ghs.html#1.7>

ⁱⁱⁱOSHA, <http://www.osha.gov/dsg/hazcom/ghs.html#1.7>

^{iv}OSHA, <http://www.osha.gov/dsg/hazcom/GHSfinal-rule.pdf>