

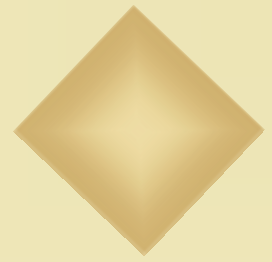


Hazcom and GHS: Big Changes Coming to Hazard Communication

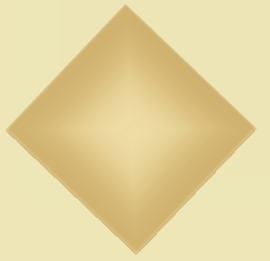
Outline

- ◇ GHS overview
- ◇ Hazard Determination vs. Hazard Classification
- ◇ Labeling
- ◇ *Material* Safety Data Sheets

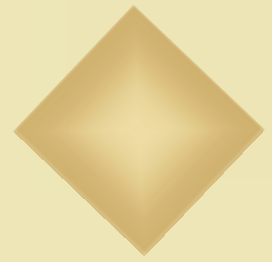
**It's all about hazard
communication**

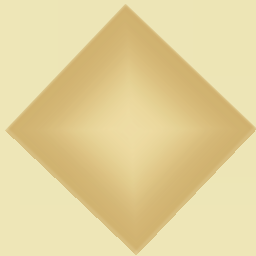


DANGER / WARNING



WARNING / CAUTION

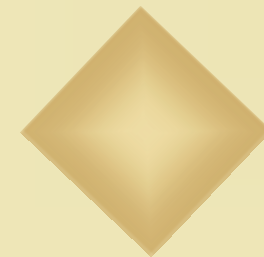




WARNING

FLAMMABLE LIQUID AND VAPOR

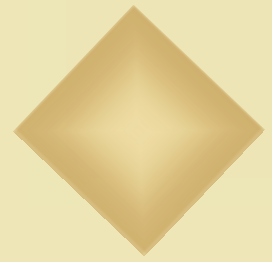




Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

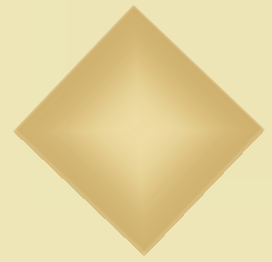
An Overview

GHS: Overview



- ◇ 1983 - OSHA discussed in final HazCom rule
- ◇ 1990 – OSHA issued a RFI
- ◇ 1992 –United Nations mandate for GHS
- ◇ 2002 – GHS Issued
- ◇ 2003 – UN officially adopted the GHS

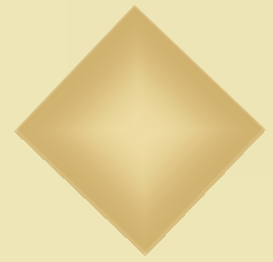
GHS: Overview



◇ Purpose of GHS

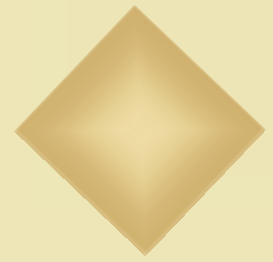
- ◇ Comprehensive, international system for hazard communication
- ◇ Provide a system for countries without one
- ◇ Minimize the need for chemical testing
- ◇ To facilitate international trade

GHS: An Overview

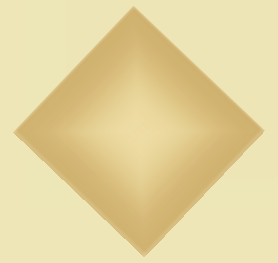


- ◇ The players...
 - ◇ A UN coordinating group
 - chaired by OSHA
 - charged with managing the development of the GHS.
 - ◇ Three subcommittees developed the GHS
 - Health and environmental hazards
 - Physical hazards
 - Hazard communication
 - ◇ Many countries and NGO's were also involved
 - ◇ Groups representing the US included OSHA, EPA, DOT and the CPSC

GHS: An Overview



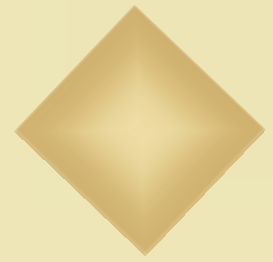
- ◇ 2006 – OSHA published NPRM
- ◇ 2009 – Proposed rule published by OSHA
- ◇ **2011 – Final rule expected in August**
- ◇ **2013 – Effective date for employee training**
- ◇ **2014 – Effective date for remainder of rule**



GHS Implementation

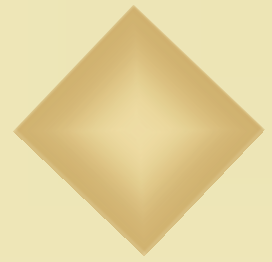
The Building Block Approach

GHS: Building Blocks



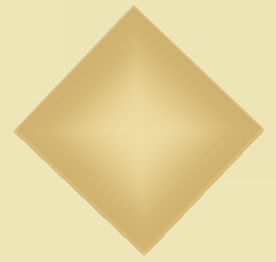
- ◇ The GHS is a United Nation's document which covers
 - ◇ Classification of health, physical and environmental hazards
 - ◇ Hazard communication
 - Workplace
 - Transportation
 - Pesticides
 - Consumer products

GHS: Building Blocks



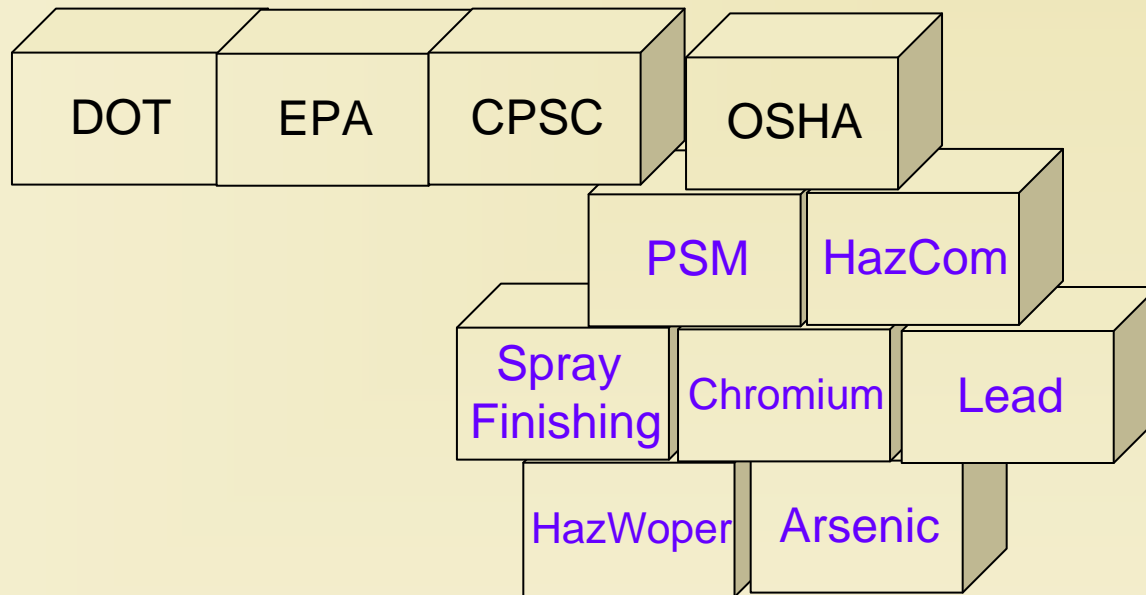
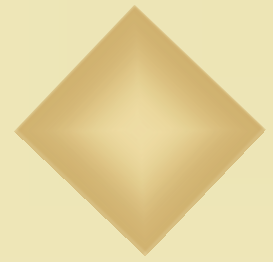
- ◇ The building block approach allows federal agencies to implement only those elements that are in their scope
 - ◇ DOT need not implement the *carcinogen* classification into its regulatory framework
 - ◇ Likewise OSHA need not implement any environmental classifications (e.g. *Acute Aquatic Toxicity*)

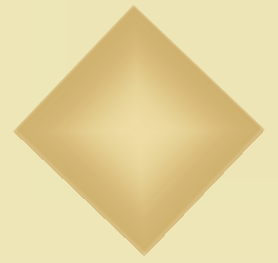
GHS: Building Blocks



- ◇ Even within a classification, a regulatory agency does not have to adopt all the categories provided in the GHS.
 - ◇ Ex. OSHA did not adopt category 5 of the Acute Toxicity class.

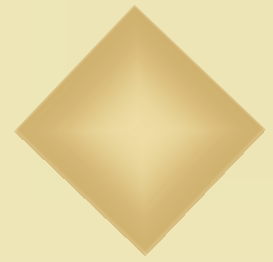
GHS: Building Blocks





GHS Means Big Changes to the HazCom Standard

Hazard *Determination*



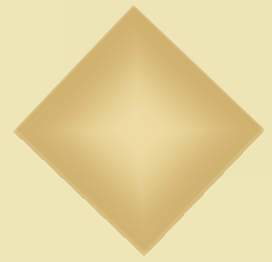
◇ Hazard Determination

- ◇ Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to determine if they are hazardous.

◇ Hazard Classification

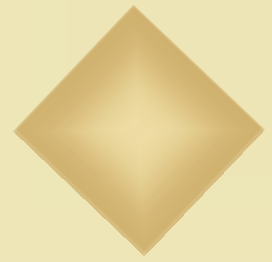
- ◇ Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to classify their health and physical hazards...

Hazard *Determination*



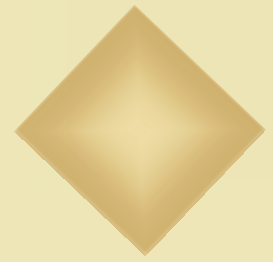
- ◇ Process described in Appendix B
 - ◇ No specific process
 - ◇ Performance oriented
 - ◇ Relies heavily on profession judgment of evaluator
 - Good, adequate human or animal studies
 - OSHA, NTP or IARC carcinogen or potential carcinogen

Hazard Classification



- ◇ Process is no longer *performance oriented*, but *prescribed* in Appendix A or B **for each hazard class**.
 - ◇ Appendix B (physical hazards) provides mostly test criteria
- ◇ Appendix A/B will give a chemical its hazard *class*, as well as its *category*.

Hazard Classification



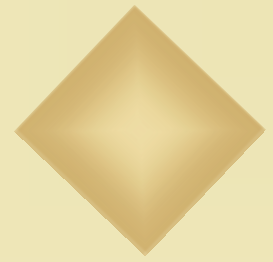
◇ *Health Hazard Classes*

- ◇ Acute toxicity
- ◇ Skin corrosion/irritation
- ◇ Serious eye damage or irritation
- ◇ Respiratory/skin irritant
- ◇ Germ cell mutagenicity
- ◇ Carcinogenicity

- ◇ Reproductive toxicity
- ◇ Target organ – single exposure
- ◇ Target organ – repeated exposure
- ◇ Aspiration

◇ **... based on Criteria in Appendix A.**

Hazard Classification



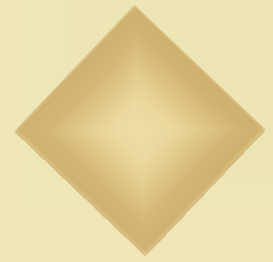
◇ *Health Hazards (Old)*

- ◇ Toxic
- ◇ Highly toxic
- ◇ Corrosive
- ◇ Sensitizer
- ◇ Target organs (kidney, liver, CNS, etc.)

◇ *Health Hazard Classes (GHS)*

- ◇ Acute toxicity
- ◇ Skin corrosion/irritation
- ◇ Serious eye damage or irritation
- ◇ Respiratory/skin irritant
- ◇ Germ cell mutagenicity
- ◇ Carcinogenicity
- ◇ Reproductive toxicity
- ◇ Target organ – single exposure
- ◇ Target organ – repeated exposure
- ◇ Aspiration

Hazard Classification

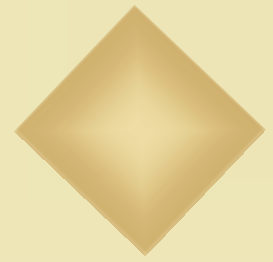


◇ *Physical Hazard Classes*

- ◇ Explosives
- ◇ Flammable gases
- ◇ Flammable aerosols
- ◇ Oxidizing gases
- ◇ Gases under pressure
- ◇ Flammable liquids
- ◇ Flammable solids
- ◇ Self reacting chemicals
- ◇ Pyrophoric solids
- ◇ Self heating chemicals
- ◇ Chemicals which, in contact with water, emit flammable gases
- ◇ Oxidizing liquids
- ◇ Oxidizing solids
- ◇ Organic peroxides
- ◇ Corrosive to metals

◇ **... based on Criteria in Appendix B.**

Hazard Classification



◇ *Physical hazards (old)*

- ◇ Explosive
- ◇ Oxidizer
- ◇ Compressed gas
- ◇ Combustible liquid
- ◇ Flammable liquid
- ◇ Flammable gas
- ◇ Flammable solid
- ◇ Organic peroxide
- ◇ Pyrophoric
- ◇ Unstable
- ◇ Water reactive

◇ *Physical Hazard Classes (GHS)*

- ◇ Explosives
- ◇ Flammable gases
- ◇ Flammable aerosols
- ◇ Oxidizing gases
- ◇ Gases under pressure
- ◇ Flammable liquids
- ◇ Flammable solids
- ◇ Self reacting chemicals
- ◇ Pyrophoric solids
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- ◇ Corrosive to metals

HazCom: Hazard Classification



◇ *Hazard Class*

- ◇ The nature of the physical or health hazard

◇ *Hazard Category*

- ◇ The division criteria within each class

HazCom: Hazard Classification

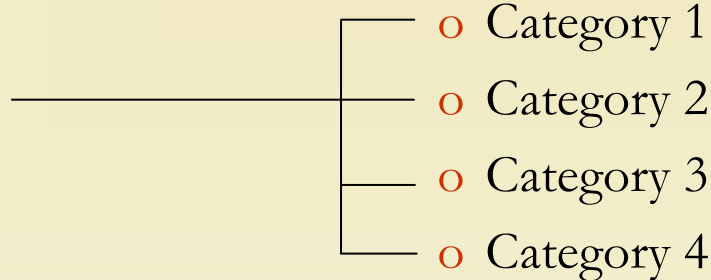
◇ *Hazard Class*

- ◇ The nature of the physical or health hazard

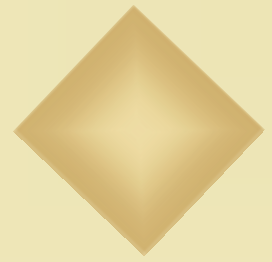
◇ *Hazard Category*

- ◇ The division criteria within each class

○ Flammable Liquid



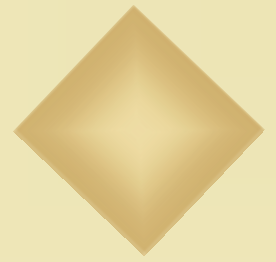
Hazard Classification



- ◇ For mixtures, under GHS, no more 1% (0.1% for carcinogens) and in when determining health hazards

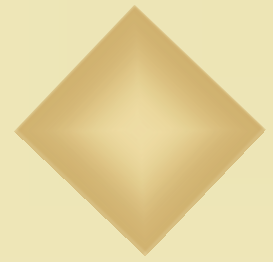
- ◇ Health hazard classification for mixtures
 - ◇ Test data
 - ◇ Bridging Principles
 - ◇ Concentration limits (chapter specific)

Hazard Classification



- ◇ Bridging Principles
 - ◇ Dilution
 - ◇ Batching
 - ◇ Concentration of Mixtures
 - ◇ Interpolation
 - ◇ Substantially similar mixtures
 - ◇ Aerosols
 - ◇ Chapter specific criteria

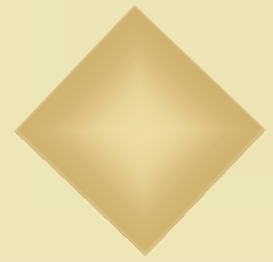
Hazard Classification



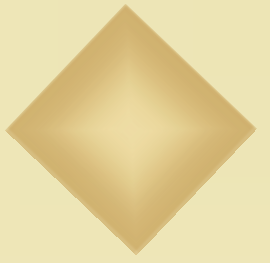
- ◇ Chapter specific concentration limits

Class: Skin Corrosion/Irritant	Concentration triggering classification of a mixture	
	Corrosive <i>Category 1</i>	Irritant <i>Category 2</i>
Skin Category 1	$\geq 5\%$	$\geq 1\%$, $< 5\%$
Skin Category 2		$\geq 10\%$
(10 x Skin Category 1) + Skin Category 2		$\geq 10\%$

Hazard Classification

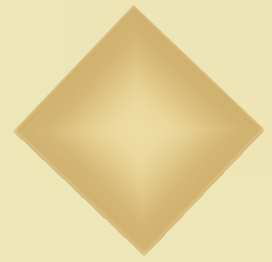


- ◇ All current chemicals will need to be newly classified according to the new classes and categories
- ◇ Some chemicals formerly not classified as hazard may now be hazardous (rare)
- ◇ Some chemicals formerly hazardous may not be hazardous under the new criteria (more likely)



Labeling

Labeling



◇ *Label*

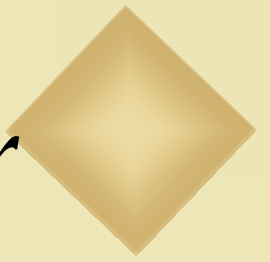
- ◇ an appropriate group of written, printed or graphic information **elements** concerning a hazardous chemicals, that is affixed to, printed on or attached to the **immediate container** of a hazardous chemical **or to the outside packaging.**

Label Contents: *Manufacturer*



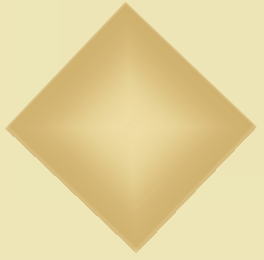
- ◇ Product identifier
- ◇ Name, address and phone number of manufacturer, importer or responsible party.
- ◇ **Label elements**
 - ◇ The specified pictogram
 - ◇ Signal word
 - ◇ Hazard statement
 - ◇ Precautionary statements

Label Contents: *Manufacturer*



◇ *Pictogram*

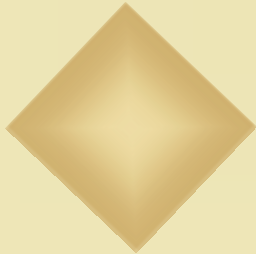
- ◇ A composition that may include a symbol plus other graphic elements...intended to convey specific information about the hazards of a chemical.
 - 8 are included in this rulemaking



Explosives
Self-reactives
Organic peroxides



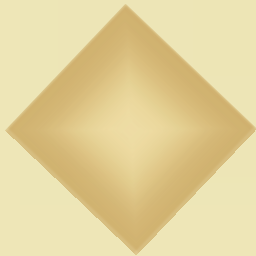
Flammables
Self reactives
Pyrophorics
Self-heating
Emits flammable gas
Organic peroxide



Oxidizers



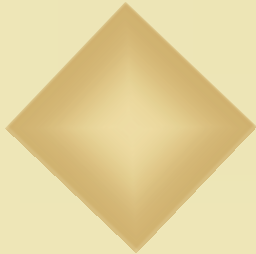
Gases under pressure



Corrosives



Acute Toxicity (severe)



Irritant

Dermal Sensitizer

Acute Toxicity (harmful)

Narcotic effects

Respiratory tract irritation



Carcinogen

Respiratory sensitizer

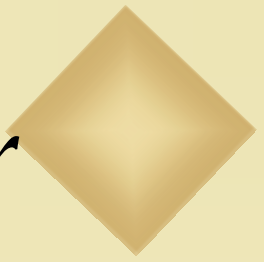
Reproductive toxicity

Target organ toxicity

Mutagenicity

Aspiration toxicity

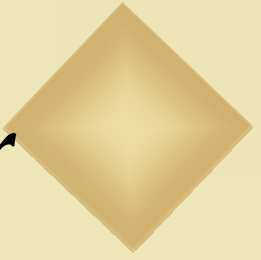
Label Contents: *Manufacturer*



◇ *Signal Word*

- ◇ A word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label.
 - **Danger**
 - **Warning**

Label Contents: *Manufacturer*



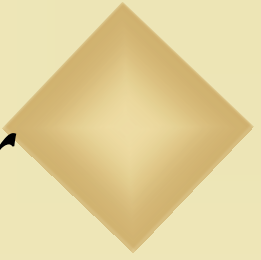
◇ *Hazard Statements*

- ◇ A statement **assigned** to a hazard class and category that describes the nature of the hazard(s) of a chemical [and] the degree of hazard.

◇ *Examples*

- ◇ May cause cancer
- ◇ May cause respiratory irritation
- ◇ Extremely flammable liquid and vapor
- ◇ Heating may cause fire and explosion

Label Contents: *Manufacturer*



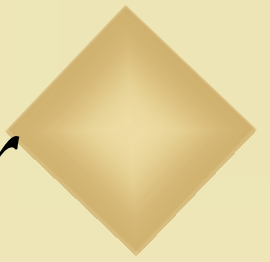
◇ *Precautionary Statements*

- ◇ 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.

◇ Examples

- ◇ Do not breath dust/fume/gas/mist/vapors/spray
- ◇ Store in a well ventilated space
- ◇ Protect from sunlight

Label Contents: *Manufacturer*



- ◇ *Label information is prescribed in **Appendix C***
 - ◇ Pictogram
 - ◇ Signal word
 - ◇ Hazard statement
 - ◇ Precautionary statement

**C.4.19 FLAMMABLE LIQUIDS
(CLASSIFIED IN ACCORDANCE with Appendix B.6)**

Pictogram
Flame



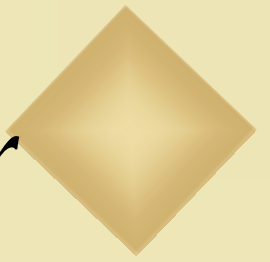
Hazard category	Signal word	Hazard statement
1	Danger	Extremely flammable liquid and vapor
2	Danger	Highly flammable liquid and vapor
3	Warning	Flammable liquid and vapor

Precautionary statements			
Prevention	Response	Storage	Disposal
<p>Keep away from heat/sparks/open flames/hot surfaces.– No smoking. Manufacturer, importer, or distributor to specify applicable ignition source(s).</p> <p>Keep container tightly closed.</p> <p>Ground/Bond container and receiving equipment</p> <ul style="list-style-type: none"> - <i>if electrostatically sensitive material is for reloading.</i> - <i>if product is volatile so as to generate hazardous atmosphere.</i> <p>Use explosion-proof electrical/ventilating/lighting/.../equipment. ... Manufacturer, importer, or distributor to specify other equipment.</p> <p>Use only non-sparking tools.</p> <p>Take precautionary measures against static discharge.</p> <p>Wear protective gloves/eye protection/face protection Manufacturer, importer, or distributor to specify type of equipment.</p>	<p>If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.</p> <p>In case of fire: Use ... for extinction. ... Manufacturer, importer, or distributor to specify appropriate media. <i>- if water increases risk.</i></p>	<p>Store in a well-ventilated place. Keep cool.</p>	<p>Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).</p>

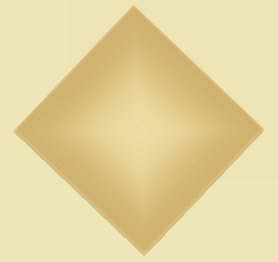
August 17, 2011

HzW Environmental Consultants, LLC

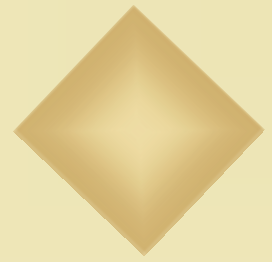
Label Contents: *Manufacturer*



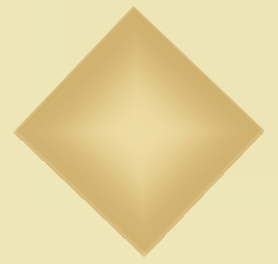
- ◇ No exemption for small packaging
- ◇ After transition, changes to product labels must be made within 3 months



Labeling: Workplace

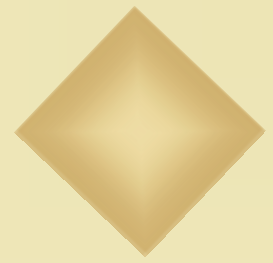


- ◇ Use same GHS label as provide by manufacturer, or
- ◇ Another alternative (e.g. NFPA, HMIS)
 - ◇ Labeling method must be consistent with the revised HazCom standard (i.e. classifications, categories, etc.)



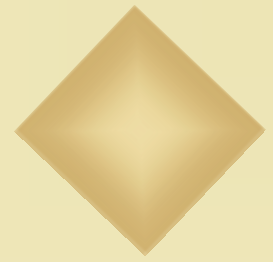
Safety Data Sheets (SDSs)

Safety Data Sheets



- ◇ 16 section ANSI format has been adopted
 - ◇ Section 1. Identification
 - ◇ Section 2. Hazard(s) identification.
 - ◇ Section 3. Composition/Information on ingredients.
 - ◇ Section 4. First-aid measures.
 - ◇ Section 5. Fire-fighting measures.
 - ◇ Section 6. Accidental release measures.
 - ◇ Section 7. Handling and storage.
 - ◇ Section 8. Exposure controls/personal protection.

Safety Data Sheets



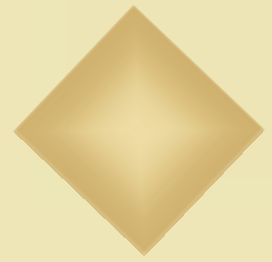
◇ ANSI format (cont)

- ◇ Section 9. Physical and chemical properties.
- ◇ Section 10. Stability and reactivity.
- ◇ Section 11. Toxicological information.
- ◇ Section 16. Other information, including date of preparation of the last revision.

◇ Non-mandatory sections for OSHA

- ◇ Section 12. Ecological information.
- ◇ Section 13. Disposal considerations.
- ◇ Section 14. Transport information.
- ◇ Section 15. Regulatory information.

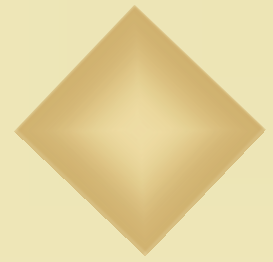
Safety Data Sheets



◇ Appendix D to § 1910.1200—Safety Data Sheets (Mandatory)

- ◇ A safety data sheet (SDS) shall include
 - the information specified in Table D.1
 - If no relevant information is found for any given subheading, the SDS shall **clearly indicate that no applicable information is available.**
 - Sections 12–15 may be included but are not mandatory

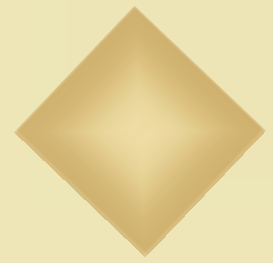
Safety Data Sheets



◇ 1. Identification

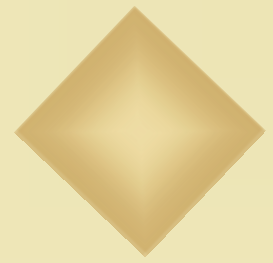
- ◇ (a) Product identifier used on the label;
- ◇ (b) Other means of identification;
- ◇ (c) Recommended use of the chemical and restrictions on use;
- ◇ (d) Name, address, and telephone number of the manufacturer, importer, or other responsible party;
- ◇ (e) Emergency phone number.

Safety Data Sheets



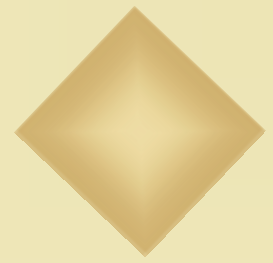
- ◇ 2. Hazard(s) identification
 - ◇ (a) Classification of the chemical in accordance with paragraph (d) of this section;
 - ◇ (b) **Signal word, hazard statement(s), symbol(s) and precautionary statement(s)** in accordance with paragraph (f) of this section. (Hazard symbols may be provided as graphical reproductions or the name of the symbol, *e.g.*, flame, skull and crossbones);
 - ◇ (c) **Unclassified hazards** (*e.g.*, combustible dust or dust explosion hazard);
 - ◇ (d) Where an ingredient with unknown acute toxicity is used in a mixture at a concentration $\geq 1\%$, a statement that . percent of the mixture consists of ingredient(s) of unknown toxicity is required.

Safety Data Sheets



- ◇ 3. Composition/information on ingredients
 - ◇ Except as provided for in paragraph (i) of this section on trade secrets:
 - ◇ *For Substances*
 - (a) Chemical name;
 - (b) Common name and synonyms;
 - (c) CAS number and other unique identifiers;
 - (d) Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance.
 - ◇ *For Mixtures*
 - The **chemical name and concentration or concentration ranges** of all ingredients which are classified as health hazards in accordance with paragraph (d) of this section.

Safety Data Sheets



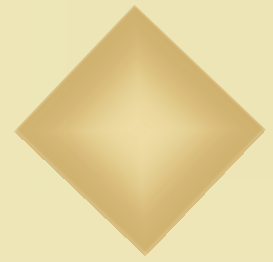
◇ 4. First-aid measures

- ◇ (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

- ◇ (a) Suitable (and unsuitable) 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.

Safety Data Sheets

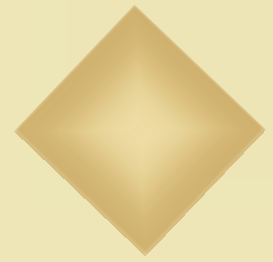


- ◇ 6. Accidental release measures
 - ◇ (a) Personal precautions, protective equipment, and emergency procedures.
 - ◇ (b) Methods and materials for containment and cleaning up.

- ◇ 7. Handling and storage
 - ◇ (a) Precautions for safe handling.
 - ◇ (b) Conditions for safe storage, including any incompatibilities.

- ◇ 8. Exposure controls/personal protection
 - ◇ (a) OSHA permissible exposure limit (PEL) and **any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet.**
 - ◇ (b) Appropriate engineering controls.
 - ◇ (c) Individual protection measures, such as personal protective equipment.

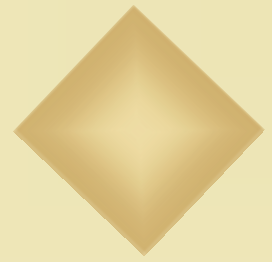
Safety Data Sheets



◇ 9. Physical and chemical properties

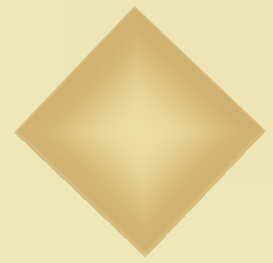
- ◇ (a) Appearance (physical state, color, *etc.*);
- ◇ (b) Odor;
- ◇ (c) Odor threshold;
- ◇ (d) pH;
- ◇ (e) Melting point/freezing point;
- ◇ (f) Initial boiling point and boiling range;
- ◇ (g) Flash point;
- ◇ (h) Evaporation rate;
- ◇ (i) Flammability (solid, gas);
- ◇ (j) Upper/lower flammability or explosive limits;
- ◇ (k) Vapor pressure;
- ◇ (l) Vapor density;
- ◇ (m) Relative density;
- ◇ (n) Solubility(ies);
- ◇ (o) Partition coefficient: n-octanol/water;
- ◇ (p) Auto-ignition temperature;
- ◇ (q) Decomposition temperature;
- ◇ (r) Viscosity.

Safety Data Sheets



- ◇ 10. Stability and reactivity
 - ◇ (a) Reactivity;
 - ◇ (b) Chemical stability;
 - ◇ (c) Possibility of hazardous reactions;
 - ◇ (d) Conditions to avoid (*e.g.*, static discharge, shock, or vibration);
 - ◇ (e) Incompatible materials;
 - ◇ (f) Hazardous decomposition products.

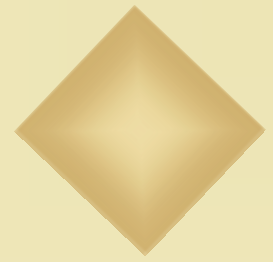
Safety Data Sheets



◇ 11. Toxicological information

- ◇ Description of the various toxicological (health) effects and the available data used to identify those effects, including:
 - (a) information on the likely routes of exposure (inhalation, ingestion, skin and eye contact);
 - (b) Symptoms related to the physical, chemical and toxicological characteristics;
 - (c) Delayed and immediate effects and also chronic effects from short and long term exposure;
 - (d) Numerical measures of toxicity (such as acute toxicity estimates).

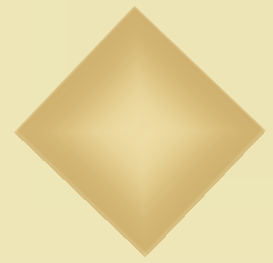
Safety Data Sheets



- ◇ 12. Ecological information (Non-mandatory).
 - ◇ (a) Ecotoxicity (aquatic and terrestrial, where available);
 - ◇ (b) Persistence and degradability;
 - ◇ (c) Bioaccumulative potential;
 - ◇ (d) Mobility in soil;
 - ◇ (e) Other adverse effects (such as hazardous to the ozone layer).

- ◇ 13. Disposal considerations (Non-mandatory)
 - ◇ Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.

Safety Data Sheets

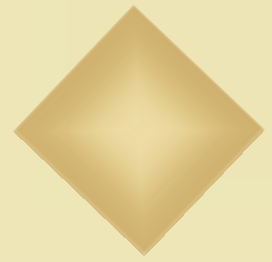


- ◇ 14. Transport information (Non-mandatory)
 - ◇ (a) UN number;
 - ◇ (b) UN proper shipping name;
 - ◇ (c) Transport hazard class(es);
 - ◇ (d) Packing group, if applicable;
 - ◇ (e) Environmental hazards (e.g., Marine pollutant (Yes/No));
 - ◇ (f) Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code);
 - ◇ (g) Special precautions which a user needs to be aware of, or needs to comply with, in connection with transport or conveyance either within or outside their premises.

- ◇ 15. Regulatory information (Non-mandatory)
 - ◇ Safety, health and environmental regulations specific for the product in question.

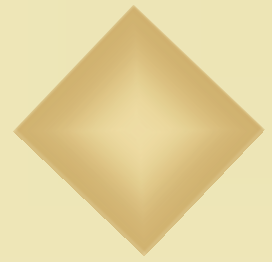
- ◇ 16. Other information, including date of preparation or last revision.
 - ◇ The date of preparation of the SDS or the last change to it.

Other changes



- ◇ Employee Information and Training
 - ◇ Must train/retrain employees on new labels and Safety data sheets within 2 years from final rule.
- ◇ Trade Secrets
 - ◇ If trade secret, must claim for the chemical component's concentration as well as its identity.
- ◇ Written program
 - ◇ No significant changes

Conclusions



- ◇ Consistent classification
- ◇ Improved labeling
- ◇ More informative, concise safety data sheets
- ◇ Better overall hazard communication...

...but it will take a lot of work to get there!



THANK YOU!