PDHonline Course G376 (3 PDH)

Globally Harmonized Systems – A Brave New OSHA HazComm

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A Brave New HazComm…

Globally Harmonized System

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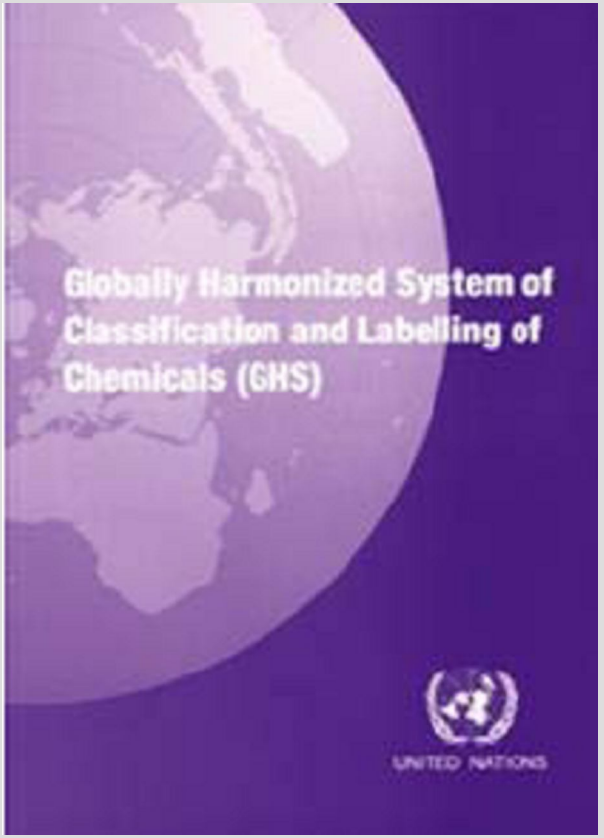
Introduction

- What is Globally Harmonized System or GHS?
  - A system for standardizing and harmonizing the classification and labeling of chemicals



What is Global Harmonized System?

- It is a logical and comprehensive approach to:
  - Defining health, physical and environmental hazards of chemicals;
  - Creating classification processes that use available data on chemicals for comparison with the defined hazard criteria; and
  - Communicating hazard information, as well as protective measures, on labels and Safety Data Sheets (SDS)

Why Do We Care?

- OSHA published a proposed rulemaking on September 30, 2009 to align OSHA's Hazard Communication standard (HCS) with the GHS
- The proposed rule is intended to be consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS), Revision 3

Why is OSHA Proposing to Modify the Hazard Communication System?

- To help ensure improved quality and more consistency in the classification and labeling of all chemicals
- To enhance worker comprehension, resulting in appropriate handling and use of chemicals
- Through the harmonized format of the safety data sheets, to enable workers to access the information more efficiently
- To reduce the financial burden of preparing several labeling formats

Other Reasons

- No country has the capability to identify and specifically regulate all chemical products
- Many countries have their own systems which address classification and communications issues differently in many cases.
- With the extensive global trading in chemicals being a reality there was a need to have a recognized internationally developed approach to classification and labeling that would provide protection for all workers

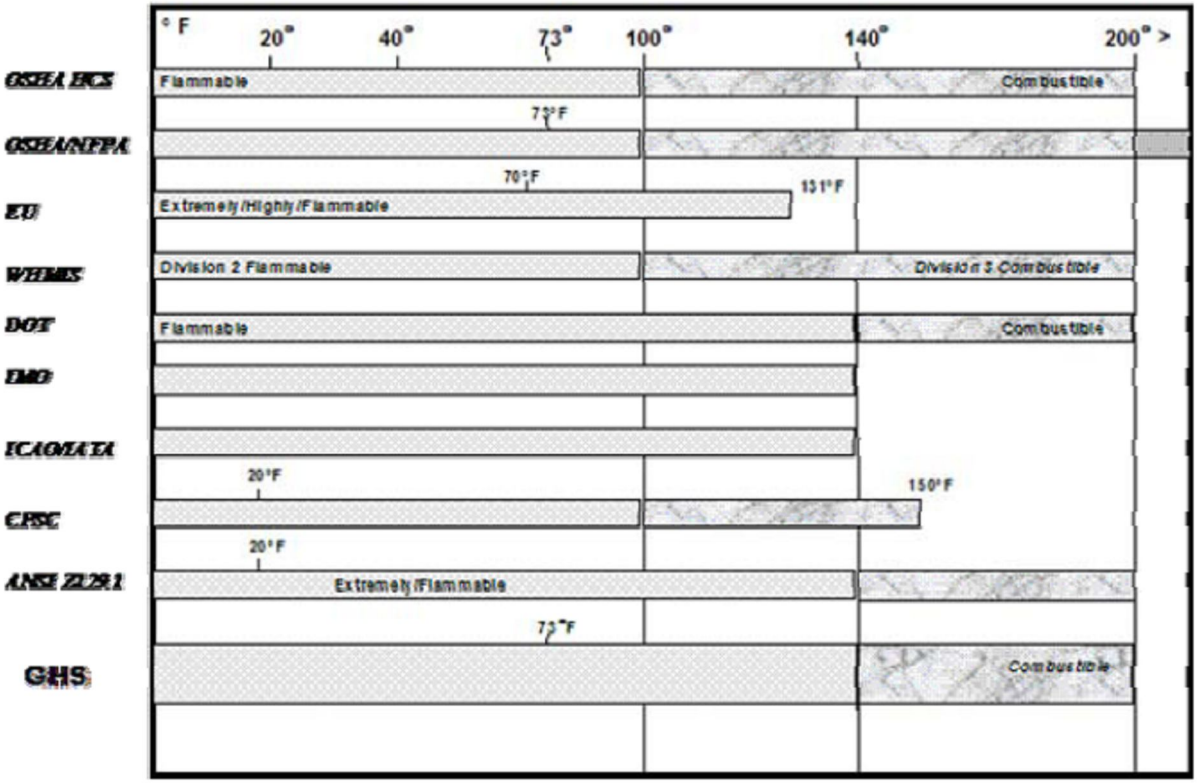
Why Do We Care?

Acute oral toxicity LD_{50} (mg/kg)					
Organization/Country/ Regulation or Standard	**High**		**Hazard**		**Low**
	0		< 50	< 500	< 5000 .....
OSHA/US/HCS	< 50 Highly Toxic		> 50 < 500 Toxic		
EU	< 25 Very Toxic	> 25 > 200 Toxic		> 200 < 2000 Harmful	
WHMIS/Canada	≤ 50 Very Toxic WHMIS Class D, Division 1, Subdivision A		> 50 ≤ 500 Toxic WHMIS Class D, Division 1, Subdivision B		
Australia/NOHSC	< 25 Very Toxic	> 25 < 200 Toxic		> 200 < 2000 Harmful	
Japan	< 30 Poisonous			300 to 3000 Powerful	
Korea	< 25 Very Toxic	> 50 < 200 Toxic		> 200 < 2000 Harmful	

Why Do We Care?

Figure 1.3

FLAMMABILITY



History

- Commitment in the preamble to the final standard in 1983
- Years of bilateral trade negotiations
- International mandate adopted in 1992
- Negotiations to complete the GHS in several international organizations for the next 10 years
- System now available for adoption

Major Changes

- Go to OSHA's Webpage
  - http://www.osha.gov/dsg/hazcom/global.html
  - Proposed HCS regulatory text (redline strikeout)
  - Side-by-side comparison of the current HCS to the Proposed Rule

Major Changes

- Numerous replacements (e.g., MSDS / SDS)
- Several definitions deleted in text
  - e.g., combustible liquid, compressed gas, flammable, health warning, etc.
- Several definitions changed in text
  - e.g., health hazard, physical hazard
- Several definitions added

Major Changes

- Key New Definitions
  - Hazard Category
  - Hazard Class
  - Label Element
  - Pictogram
  - Precautionary Statement
  - Signal Word

Major Changes

- **Hazard classification**
  - Provides specific criteria for classification of health and physical hazards, as well as classification of mixtures.
- **Labels**
  - Chemical manufacturers and importers will be required to provide a label that includes a harmonized signal word, pictogram, and hazard statement for each hazard class and category. Precautionary statements must also be provided.
- **Safety Data Sheets**
  - Will now have a specified 16-section format.
- **Information and training**
  - The GHS does not address training. However, the proposed HCS will require that workers are trained within two years of the publication of the final rule to facilitate recognition and understanding of the new labels and safety data sheets.

GHS

- **The GHS covers all hazardous chemical substances and mixtures**
  - **Exceptions:**
    - Pharmaceuticals
    - Food additives
    - Cosmetics
    - Pesticide residues in food
    - at the point of intentional intake or use but will be covered where workers may be exposed and in transport
    - Articles as defined by OSHA

Hazard Classification

- Used to indicate that only the intrinsic hazardous properties of substances and mixtures are considered and involves the following 3 steps:
  1. Identification of relevant data regarding the hazards of a substance or mixture;
  2. Subsequent review of those data to ascertain the hazards associated with the substance or mixture; and
  3. A decision on whether the substance or mixture will be classified as a hazardous substance or mixture and the degree of hazard, where appropriate, by comparison of the data with agreed hazard classification criteria.

Hazard Classification

- Physical Hazards
- Health Hazard
- Environmental Hazards

Physical Hazards

- Explosives
- Flammable Gases
- Flammable Aerosols
- Oxidizing Gases
- Gases Under Pressure
- Flammable Liquids
- Flammable Solids
- Self-Reactive Substances
- Pyrophoric Liquids
- Pyrophoric Solids
- Self-Heating Substances
- Substances which, in contact with water, emit flammable gases
- Oxidizing Liquids
- Oxidizing Solids
- Organic Peroxides
- Corrosive to Metals

Physical Hazards

- See Appendix B of Proposed Rule
- Largely based on the existing criteria used by the UN Model Regulation on the Transport of Dangerous Goods. Therefore, many of the criteria are already being used on a worldwide basis.
- Some additions and changes were necessary since the scope of the GHS includes all target audiences.
- The physical hazards classification process provides specific references to approved test methods and criteria for classification.

Physical Hazards

- Physical hazard criteria apply to mixtures. It is assumed that mixtures will be tested for physical hazards.
- In general, the criteria for physical hazards are quantitative or semi-quantitative with multiple hazard levels within an endpoint. This is different from several of the existing systems that currently have qualitative criteria for various physical hazards (e.g., organic peroxide criteria).
- In developing GHS criteria for physical hazards it was necessary to define physical states.

Physical Hazards

Table B.2.1: Criteria for flammable gases

Category	Criteria
1	Gases, which at 20°C (68°F) and a standard pressure of 101.3 kPa (14.7 psi): (a) are ignitable when in a mixture of 13% or less by volume in air; or (b) have a flammable range with air of at least 12 percentage points regardless of the lower flammable limit.
2	Gases, other than those of Category 1, which, at 20°C (68°F) and a standard pressure of 101.3 kPa (14.7 psi), have a flammable range while mixed in air.

Table B.16.1: Criteria for chemicals corrosive to metal

Category	Criteria
1	Corrosion rate on either steel or aluminium surfaces exceeding 6.25 mm per year at a test temperature of 55°C (131°F) when tested on both materials.

Health Hazards

- Acute Toxicity
- Skin Corrosion/Irritation
- Serous Eye Damage/Eye Irritation
- Respiratory or Skin Sensitization
- Germ Cell Mutagenicity
- Carcinogenicity
- Reproductive Toxicology
- Target Organ Systemic Toxicity – Single Exposure
- Target Organ Systemic Toxicity – Repeated Exposure
- Aspiration Toxicity

Hazard Classification

- See Appendix A of proposed rule
- For many hazard classes, the criteria are semi-quantitative or qualitative and expert judgment is required to interpret the data for classification purposes.
- There is no requirement for testing chemicals.
- The criteria for determining health hazards are test method neutral, i.e., they do not specify particular test methods, as long as the methods are scientifically validated procedures.
  - "Scientifically validated" refers to the process by which the reliability and the relevance of a procedure are established for a particular purpose.
- Existing test data are acceptable for classifying chemicals, although expert judgment also may be needed for classification purposes.

Hazard Classification

Table A.1.1: Acute toxicity hazard categories and acute toxicity estimate (ATE) values defining the respective categories

Exposure route	Category 1	Category 2	Category 3	Category 4
Oral (mg/kg bodyweight) *see: Notes (a)(b)*	≤ 5	>5 and ≤ 50	>50 and ≤ 300	>300 and ≤ 2000
Dermal (mg/kg bodyweight) *see: Notes (a)(b)*	≤ 50	>50 and ≤ 200	>200 and ≤ 1000	> 1000 and ≤ 2000
Inhalation - Gases (ppmV) *see: Note (a) Note (b) Note (c)*	≤ 100	>100 and ≤ 500	>500 and ≤ 2500	>2500 and ≤ 20000
Inhalation - Vapors (mg/l) *see: Note (a) Note (b) Note (c) Note (d)*	≤ 0.5	>0.5 and ≤ 2.0	>2.0 and ≤ 10.0	>10.0 and ≤ 20.0
Inhalation – Dusts and Mists (mg/l) *see: Note (a) Note (b) Note (c)*	≤ 0.05	>0.05 and ≤ 0.5	>0.5 and ≤ 1.0	>1.0 and ≤ 5.0

Note: Gases concentration are expressed in parts per million per volume (ppmV).

Hazard Classification

Table A.3.1: Irreversible eye effects [a]

An eye irritant Category 1 (irreversible effects on the eye) is a substance that produces:

(a) at least in one animal effects on the cornea, iris or conjunctiva that are not expected to reverse or have not fully reversed within an observation period of normally 21 days; and/or

(b) at least in 2 of 3 tested animals, a positive response of:

(i) corneal opacity ≥ 3; and/or

(ii) iritis > 1.5;

calculated as the mean scores following grading at 24, 48 and 72 hours after installation of the substance.

[a] *The use of human data is discussed in paragraph A.0.2.6.*

Classifying Mixtures and Bridging Principles

- Use test data if available for complete mixture
- Where test data are not available for the mixture itself, the bridging principles designated in each health hazard shall be considered for classification of the mixture
- For health hazards
  - If test data are not available for the mixture itself, and the available information is not sufficient to allow application of the above-mentioned bridging principles, then the method(s) described in each chapter for estimating the hazards based on the information known will be applied to classify the mixture (e.g., application of concentration limits)/
- Exceptions - Carcinogenicity, Germ Cell Mutagenicity, and Reproductive Toxicity

Classifying Mixtures and Bridging Principles

- Bridging Principles
  - Dilution
  - Batching
  - Concentration of mixtures
  - Interpolation within one toxicity category
  - Substantially similar mixtures
  - Aerosols

Labeling

- See Appendix C of proposed rule
- Labels on Shipped Containers
  - The product identifier used on the safety data sheet
  - The name, address, and telephone number of the manufacturer, importer, or responsible party.
  - The signal word
  - Hazard statement(s)
  - Pictogram(s),
  - Precautionary statement(s)

Labeling

- The standardized label elements included in the GHS are:
  - **Symbols (hazard pictograms)**: Convey health, physical and environmental hazard information, assigned to a GHS hazard class and category.
  - OSHA has 8 pictograms plus exclamation point

GHS Pictograms

Flame over circle  • Oxidizers	**Flame**  • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self Reactives • Organic Peroxides	**Exploding bomb**  • Explosives • Self Reactives • Organic Peroxides
Skull and crossbones  • Acute toxicity (severe)	**Corrosion**  • Corrosives	**Gas cylinder**  • Gases under pressure
Health Hazard  • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	**Environment**  • Aquatic Toxicity	**Exclamation mark**  • Irritant • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic effects • Respiratory Tract Irritation • Hazardous to Ozone Layer

Labeling – Symbols

Transport "Pictograms"		
 Flammable Liquid Flammable Gas Flammable Aerosol	 Flammable solid Self-Reactive Substances	 Pyrophorics (Spontaneously Combustible) Self-Heating Substances
 Substances, which in contact with water, emit flammable gases (Dangerous When Wet)	 Oxidizing Gases Oxidizing Liquids Oxidizing Solids	 Explosive Divisions 1.1, 1.2, 1.3

Labeling – Symbols

Example:

Sulfuric Acid

GHS Pictogram

Transportation Pictogram

Acetone

GHS Pictogram

Transportation Pictogram

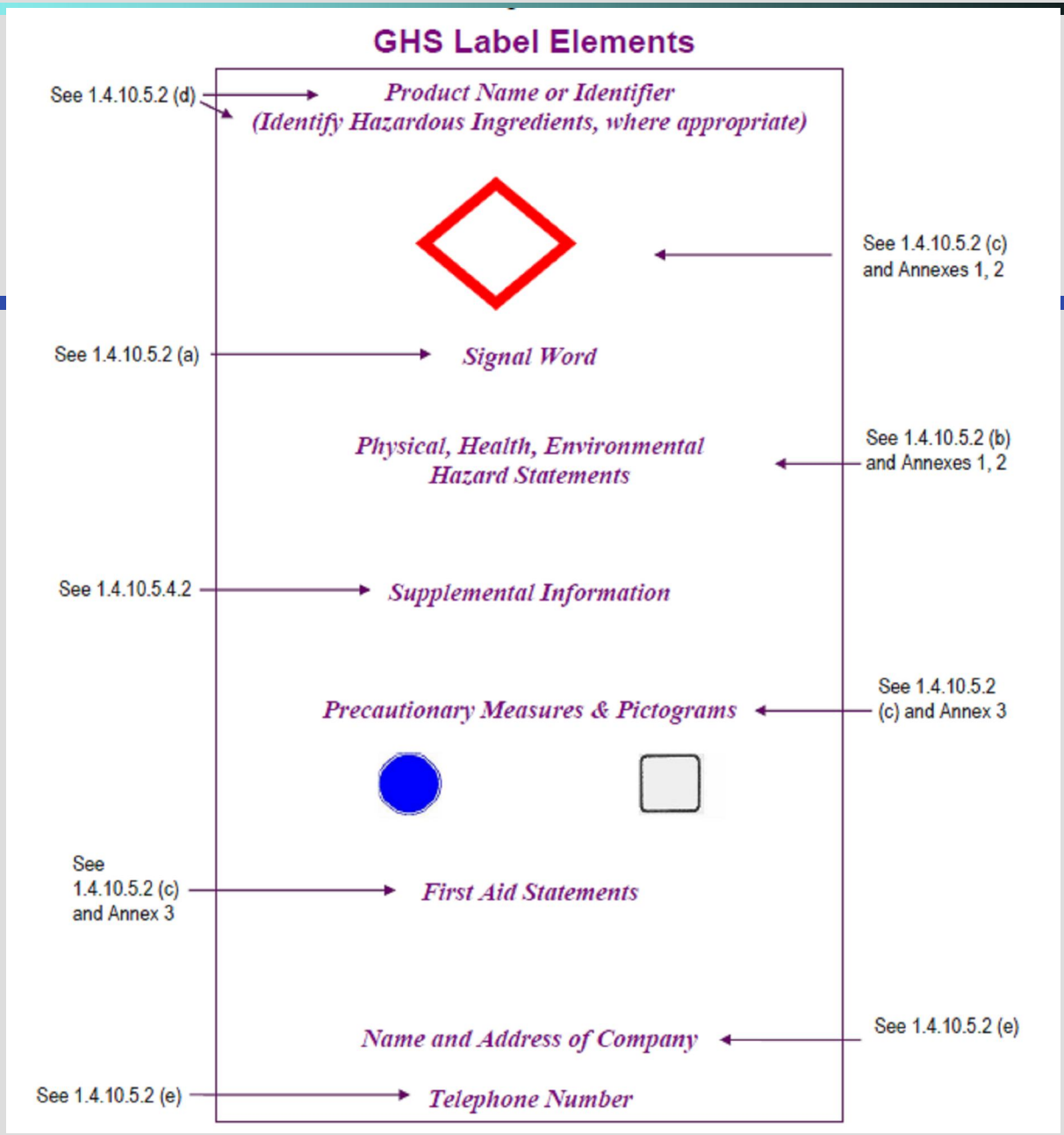
Labeling – Signal Words and Hazard Statements

- **Signal Words**
  - The signal word indicates the relative degree of severity a hazard. The signal words used in the
  - **"Danger"** for the more severe hazards, and
  - **"Warning"** for the less severe hazards.
- **Hazard Statements**
  - Hazard statements are standardized and assigned phrases that describe the hazard(s) as determined by hazard classification. An appropriate statement for each GHS hazard should be included on the label for products possessing more than one hazard.

Labeling – Example Signal Words and Hazard Statements

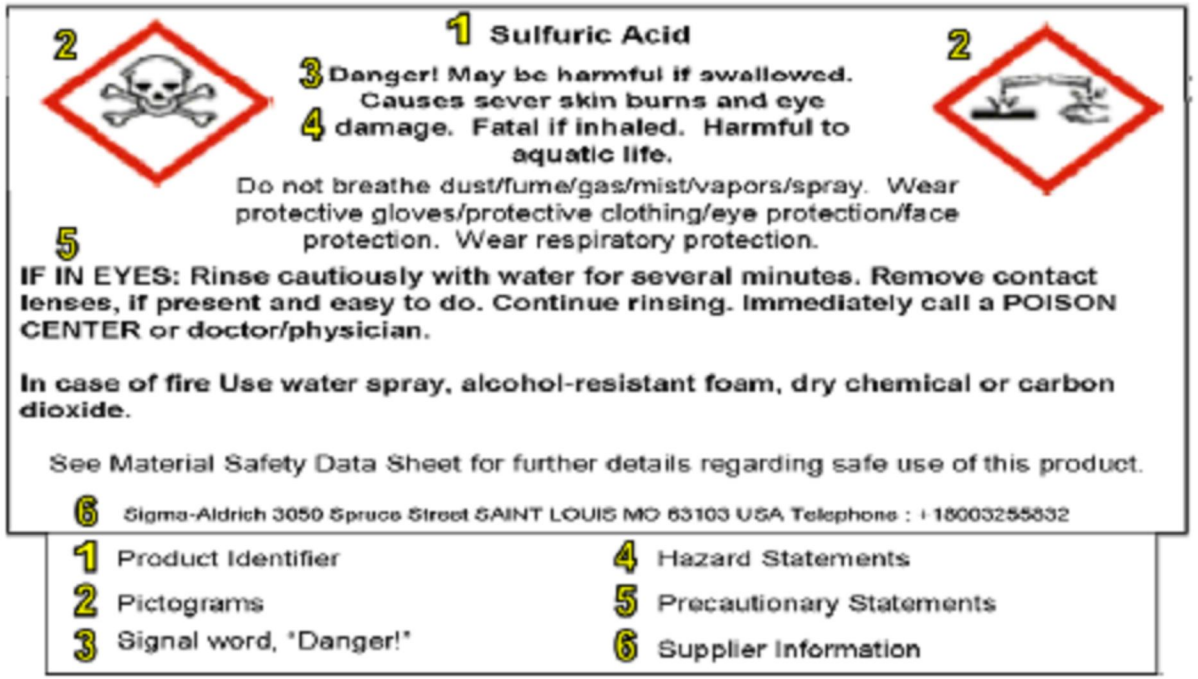
ACUTE ORAL TOXICITY – Annex 1					
	Category 1	Category 2	Category 3	Category 4	Category 5
LD_{50}	≤ 5 mg/kg	> 5 < 50 mg/kg	≥ 50 < 300 mg/kg	≥ 300 < 2000 mg/kg	≥ 2000 < 5000 mg/kg
Pictogram					No symbol
Signal word	Danger	Danger	Danger	Warning	Warning
Hazard statement	Fatal if swallowed	Fatal if swallowed	Toxic if swallowed	Harmful if swallowed	May be harmful if swallowed

Example Labeling Scheme



Labeling – Example

Below is an example of the GHS labeling format.



Workplace Labeling

- Information on shipped container

  OR

- Product identifier and words, symbols and combination thereof
  - Which provides general information regarding the hazardous of the chemical

Labeling – Example

Below is an example of a secondary container now filled with Acetone

Safety Data Sheets (SDSs)

- The SDS should contain 16 headings
- The GHS MSDS headings, sequence and content are similar to the ISO, EU and ANSI MSDS/SDS requirements, except that the order of sections 2 and 3 have been reversed

Safety Data Sheets (SDSs)

1. Identification of substance or mixture
2. Hazard ingredients
3. Composition
4. First aid measures
5. Fire fighting measures
6. Accidental release measures
7. Handling and storage
8. Engineering controls / personal protection
9. Chemical and physical properties
10. Stability and reactivity
11. Toxicological information
12. Ecological information
13. Disposal considerations
14. Transportation information
15. Regulatory information
16. Other

Safety Data Sheets (SDSs)

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Flammable liquid, Target Organ Effect, Irritant

Target Organs

Liver, Kidney

GHS Classification
Flammable liquids (Category 2)
Skin irritation (Category 3)
Eye irritation (Category 2A)
Specific target organ toxicity - single exposure (Category 3)

GHS Label elements, including precautionary statements

Pictogram

Signal word — Danger

Hazard statement(s)

H225	Highly flammable liquid and vapour.
H316	Causes mild skin irritation.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

HMIS Classification

Training

- **The GHS does not address training**
  - **However, the proposed HCS will require that workers are trained within two years of the publication of the final rule to facilitate recognition and understanding of the new labels and safety data sheets**

GHS Impacts

- **Number of workers affected by the proposed HCS**
  - Over 40 million workers
- **Affected Industries**
  - Over 5 million workplaces
- **Impact of the proposed HCS**
  - The costs associated with compliance with the proposed revisions to the HCS would generally be incurred by the affected industries as one-time transition costs over the phase-in period of three years.

GHS Impacts

- **Annualized compliance costs of the proposed standard**
  - Approximately $97 million per year
- **Other costs**
  - The cost of classifying chemical hazards in accordance with the GHS criteria and revising safety data sheets and labels to meet new format and content requirements would be $11 million a year on an annualized basis for an estimated 90,000 establishments.
  - Training for workers to become familiar with new warning symbols and the revised safety data sheet format under GHS would cost $44 million a year on an annualized basis for all affected workplaces.
- **Although not a requirement in the proposed rule, OSHA estimated annualized costs of $42 million a year for management to become familiar with the new GHS system and to engage in other management-related activities as may be necessary for industry's adoption of GHS**

GHS Status

- **Supposed to be Finalized – August 2011…September 2011**
- **Passed through OBM in late October, 2011**
- **Comment Period**: White House is allowing 90 days for the comment period
- **Anticipated Promulgation Date: Late January, 2012**

Anticipated Deadlines Once Passed

- Employers must provide training on SDS and labelling
  - 2 years after publication of final rule
- Chemical manufacturers, importers, distributers and employers shall be in compliance with all modified provisions
  - 3 years after publication of final rule
- Chemical manufacturers, importers, distributers and employers may comply with either 29 CFR 1910.1200 revised as of October 1, 2009, or the modified version of this standard or both during the 3 year transition period

Key Challenges to Adopting GHS

- Ensuring that MSDSs are updated to the new SDS format (Need solid relationships with your chemical suppliers)
- Labeling secondary containers
- Effectively training employees

Remember this is a performance based standard

Final Thoughts

- Have you estimated how much you will need to comply?
- What is your plan?
- Can you use this change to improve safety and health?

THANK YOU!

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