


The Globally Harmonized System for Classification & Labeling of Chemicals (GHS)



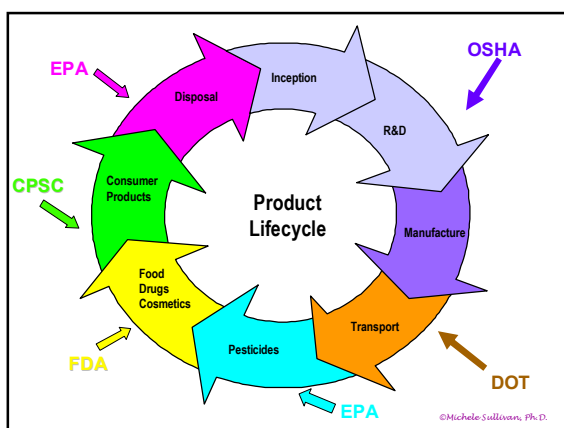
GHS Purple Book

©Michele Sullivan, Ph.D., MRS Associates
703-527-2596, Sullivan1@aol.com

GHS: Key USA Agencies Impacted

- **Occupational Safety & Health Admin (29 CFR)**
 - Hazard Communication Standard (1910.1200)
 - Hazard classification, MSDSs, & labels
 - Others
- **Department Of Transportation (49 CFR)**
 - Hazardous Materials Regulations
 - Hazard classification of dangerous goods
 - Acute Toxicity alignment with GHS
 - Flammable/combustible liquid alignment with GHS
- **EPA Pesticides (40 CFR)**
 - Federal Insecticide Fungicide & Rodenticide Act
 - Pesticide hazard classification & labels
 - EPCRA
- **Consumer Product Safety Commission (16 CFR 1500)**
 - Federal Hazardous Substance Act
 - Consumer product hazard classification & labels

2 ©Michele Sullivan, Ph.D.



GHS Impact

- Impact on OSHA Standards
 - Consistency with GHS , not change in scope
 - General Industry, Construction, etc.
 - **Hazard Communication - 1910.1200**
 - Maintain scope, framework, application
 - Change *technical* details
 - Flammable/Combustible Liquids - 1910.106
 - Process Safety Management - 1910.119
 - e.g., align flammable liquid definition, keep scope
 - Subpart Z Substance Specific Standards (EO, VC, asbestos, etc.)
 - Explosives - 1910.109: GHS definitions proposed
 - Etc.

4 ©Michele Sullivan, Ph.D.

ANPR: Consistency in OSHA Standards

- Most commenters suggested that OSHA's standards need to be internally consistent, and that those impacted by GHS changes should also be modified.
- **Flammability** was the definition of most concern. Reference to the HCS flammability definition in **Process Safety Management** is one example of a standard that would be greatly impacted by a GHS change.
- OSHA is in the process of reviewing all standards potentially impacted to determine the appropriate course of action.
- Coordination with other Federal agencies was also cited.

5 ©Michele Sullivan, Ph.D.

Control Banding/GHS

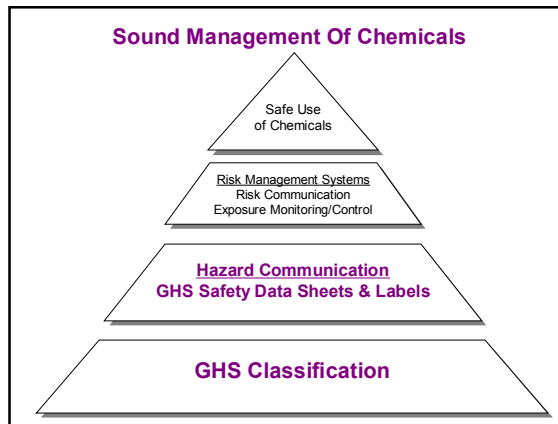
- Control Banding
 - approach to protecting worker health by focusing resources on exposure controls.
 - It is not possible to assign a specific OEL/WEL to every chemical in use
 - qualitative approach to risk assessment & management grouping **workplace hazards** into hazard "control bands" based on **hazard classification**, task performed, and, in the case of chemicals, the quantity of the chemical .
- The GHS will provide consistent hazard classifications to be used in Control Banding

6 ©Michele Sullivan, Ph.D.

What is the GHS?

- Common and coherent approach
 - to **defining** and **classifying** hazards, and
 - to **communicating** information on labels and MSDS
- It provides the informational framework as a basis for the sound management of chemicals
- The GHS is not a model regulation or legislation.
- It consists of harmonized and standardized elements which are **specified** and assigned.
- It permits self-classification
- The system is structured so that appropriate elements for classification and communication, which address the target audiences, can be selected (building blocks).

7 ©Michele Sullivan, Ph.D.



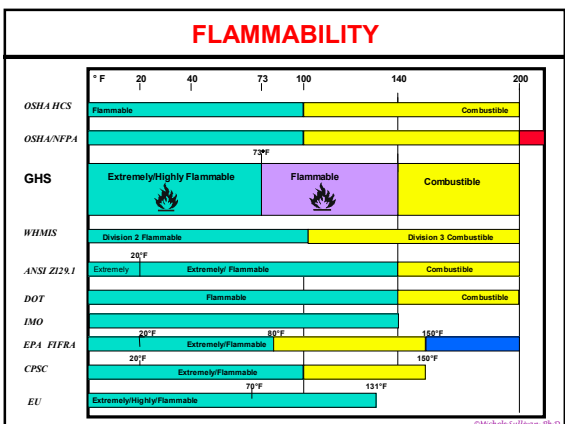
The GHS Harmonized Elements (Building Blocks)

- **Classification Criteria**
 - A** Physical Hazards
 - B** Health Hazards
 - C** Environmental Hazards
 - D** Mixtures
- **Hazard Communication**
 - E** Labels
 - Symbols/pictograms
 - Signal Words
 - Hazard Statements (e.g., H200)
 - [Precautionary information (e.g., P201)]
 - Product identifier/ingredient disclosure
 - F** MSDS / Safety Data Sheets
 - G** Risk-based labeling for chronics in consumer uses

9 ©Michele Sullivan, Ph.D.

GHS – Physical Hazards

Hazard Class	Hazard Category					
	Explosive	Div 1.1	Div 1.2	Div 1.3	Div 1.4	Div 1.5
Explosives	1	2				
Flammable Gases	1	2				
Flammable Aerosols	1	2				
Oxidising Gases	1					
Pressurised Gases	1					
Compressed Gases	1					
Liquefied Gases	1					
Refrigerated Liquefied Gases	1					
Dissolved Gases	1					
Flammable Liquids	1	2	3	4		
Flammable Solids	1	2				
Self-reactive Substances	Type A	Type B	Type C	Type D	Type E	Type G
Pyrophoric Liquids	1					
Pyrophoric Solids	1					
Self-heating Substances	1	2				
Water Reactive → Flammable Gases	1	2	3			
Oxidising Liquids	1	2	3			
Oxidising Solids	1	2	3			
Organic Peroxides	Type A	Type B	Type C	Type D	Type E	Type G
Corrosive to Metals	1					



GHS – Health Hazards

Hazard Class	Hazard Category				
Acute Toxicity, Oral	1	2	3	4	5
Acute Toxicity, Dermal	1	2	3	4	5
Acute Toxicity, Inhalation	1	2	3	4	5
Aspiration hazard	1	2			
Skin Corrosion/Irritation (Dermal)	1 (Corrosion)		Irritation		
Corrosion = Eye Corrosion)	1A	1B	1C	2	3
Eye Irritation	1	2(A)	2(B)		
Respiratory Sensitisation	1				
Skin Sensitisation	1				
Germ Cell Mutagenicity	1A	1B	2		
Carcinogenicity	1A	1B	2		
Reproductive Toxicity - Fertility	1A	1B	2	Lactation	
Reproductive Toxicity - Development	1A	1B	2		
Target Organ ST – Single Dose	1	2	3		
Target Organ ST – Repeat Dose	1	2			

ACUTE ORAL TOXICITY				
LD50		Toxic		
Highly Toxic LD ₅₀ < 50 mg/kg Appropriate Hazard Statement		Toxic LD ₅₀ > 50 - 500 mg/kg Appropriate Hazard Statement		
Slightly Toxic LD ₅₀ > 500 mg/kg DANGER May be Harmful if swallowed		Harmful LD ₅₀ > 500 - 2000 mg/kg WARNING Harmful if swallowed CAUTION May be harmful if swallowed		
LD ₅₀ > 2000 mg/kg DANGER Fatal if swallowed		LD ₅₀ > 500 - 5000 mg/kg No hazard WARNING Harmful if swallowed CAUTION Harmful if swallowed		
LD ₅₀ > 5000 mg/kg DANGER Fatal if swallowed		LD ₅₀ > 5000 mg/kg No hazard CAUTION No statements		
GHS				
Pictogram		Signal Word		
LD ₅₀ < 5 DANGER		LD ₅₀ > 5 - 50 DANGER		
LD ₅₀ > 50 - 500 DANGER		LD ₅₀ > 500 - 2000 WARNING		
LD ₅₀ > 2000 DANGER		LD ₅₀ > 2000 - 5000 WARNING		
LD ₅₀ > 5000 DANGER		LD ₅₀ > 5000 CAUTION		

©Michele Sullivan, Ph.D.

GHS Label Elements

PRODUCT NAME OR IDENTIFIER
(Identify of Hazardous Ingredients, Where Appropriate)

Hazard Pictogram(s)*

Signal Word*

Physical, Health, Environmental Hazard Statements*

Supplemental Information

Precautionary Measures[*] & Pictograms

First Aid Statements[*]

Name and Address of Company

Telephone Number

14 *Standardized ©Michele Sullivan, Ph.D.

GHS Pictograms

 <ul style="list-style-type: none"> • Oxidizers 	 <ul style="list-style-type: none"> • Flammables • Self Reactives • Pyrophorics • Self-Heating • Emits Flammable Gas • Organic Peroxides 	 <ul style="list-style-type: none"> • Explosives • Self Reactives • Organic Peroxides
 <ul style="list-style-type: none"> • Acute toxicity (severe) 	 <ul style="list-style-type: none"> • Corrosives 	 <ul style="list-style-type: none"> • Gases under pressure
 <ul style="list-style-type: none"> • Carcinogen • Respiratory Sensitizer • Reproductive Toxicity • Target Organ Toxicity • Mutagenicity • Aspiration Toxicity 	 <ul style="list-style-type: none"> • Environmental Toxicity 	 <ul style="list-style-type: none"> • Irritant • Dermal Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritation

GHS Signal Words

GHS Definition:
word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label.

- 2 Signal words used in the GHS to emphasize hazard and distinguish levels of hazard :
 - **“Danger”** (more severe hazards);
 - **“Warning”** (less severe hazards).
- Not all GHS hazards have signal words assigned

16 ©Michele Sullivan, Ph.D.



GHS Inner Container Label: ToxiFlam

ToxiFlam (Contains: XYZ)

Danger! Toxic if swallowed. Flammable liquid and vapor

Keep container tightly closed. Keep away from ignition sources such as heat/sparks/open flame—No smoking. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Wear protective gloves and eye/face protection. Ground/Bond container and receiving equipment. Use explosion-proof electrical/ventilating/ lighting/equipment. Take precautionary measures against static discharge. Use only non-sparking tools. Store in cool/well-ventilated place. Store locked up. Dispose of contents/container to in accordance with local/regional/national/international regulation.

FIRST AID
 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Rinse mouth.
 IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower.
 In case of fire, use water fog, dry chemical, CO2, or "alcohol" foam.

Read Safety Data Sheet Before Use

My Company, MyStreet, MyTown, NJ 00000 Tel: 444.999.9999

©Michele Sullivan, Ph.D.

Label Configuration For a Combination Package

The transport label would be shown on the outer packaging

The GHS label would be on the inner package

Label Configuration For a Single Package

Example GHS Outer Container Label

ToxiFlam

Danger! Toxic If Swallowed
Flammable Liquid and Vapor

Keep container tightly closed. Keep away from ignition sources such as heat/sparks/open flame—No smoking. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Wear protective gloves and eye/face protection. Ground/Bond container and receiving equipment. Use explosion-proof electrical/ventilating/ lighting/equipment. Take precautionary measures against static discharge. Use only non-sparking tools. Store in cool/well-ventilated place. Store locked up. Dispose of contents/container to in accordance with local/regional/national/international regulation.

FIRST AID
 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Rinse mouth.
 IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower.
 In case of fire, use water fog, dry chemical, CO2, or "alcohol" foam.

Read Safety Data Sheet Before Use

My Company, MyStreet, MyTown, NJ 00000 Tel: 444.999.9999

UN 1992
Flammable Liquids,
Toxic, N.O.S.
(Contains XYZ)

©Michele Sullivan, Ph.D.

Workplace Labeling

Example of a GHS label with the transport label included. This could be used for an outer packaging or single packaging.

- OSHA HCS will retain flexible approach to in-plant labeling
 - Appropriate hazard warnings, or words, pictures, symbols, or combination thereof, The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers (29CFR 1910.1200)
 - Use GHS labels or label elements for workplace containers
 - GHS **symbols** w/wo **product identifier** and **signal words, precautionary pictograms**
 - Common misconception per OSHA
 - That the GHS is a numerical ranking system that conflicts with current systems (HMIS/NFPA)
 - GHS HMIS
 - NPCA ?
- ©Michele Sullivan, Ph.D.

Role of the (M)SDS in the GHS

- The (M)SDS should provide comprehensive information about a chemical substance or mixture
- Employers, workers and others use the (M)SDS as a source of information about hazards and to obtain advice on safety precautions.
- Primary Use: The Workplace
- Standardized 16 section GHS format
 - GHS Sections 2 and 3 are now reversed
 - From ILO, EU, ISO-1994 MSDS formats
 - Similar to ANSI Z400.1-2004
 - Besides health and safety information, GHS SDS contains environmental and transport information.
- OSHA plans to present all 16 GHS SDS Sections for consistency & harmonization while making it clear which sections OSHA enforces & has jurisdiction over

25 ©Michele Sullivan, Ph.D.

GHS Safety Data Sheets Format

Use the 16 Section headings as follows:

1. Identification
2. **Hazard(s) Identification**
3. **Composition/information on ingredients**
4. First-aid measures
5. Fire-fighting measures
6. Accidental release measures
7. Handling and storage
8. Exposure controls/personal protection
9. Physical and chemical properties
10. Stability and reactivity
11. Toxicological information
12. Ecological information
13. Disposal considerations
14. Transport information
15. Regulatory information
16. Other information

26 ©Michele Sullivan, Ph.D.

MATERIAL SAFETY DATA SHEET

SECTION 2 - HAZARDOUS IDENTIFICATION

Classification: Flammable Liquid, Category 2
Acute Toxicity, Category 3

Labeling:

Hazard	Signal	Pictogram
Flammable liquid	Danger	
Acute Toxicity	Danger	
Flammable liquid and Acute Toxicity	Danger	

27 ©Michele Sullivan, Ph.D.

The Verics® Material Safety Data Sheet

2. HAZARD IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANION INFORMATION

Hazard Identification

Signal Word: Danger
Skin Corrosion/Irritation Category 1 Subcategory 'A'

28 ©Michele Sullivan, Ph.D.

MSDS Section 2: ToxiFlam

2. HAZARD(S) IDENTIFICATION

Classification: Flammable liquid, Category 3
Acute Toxicity, Category 3

Labeling:

Symbol(s): Flame, Skull & crossbones

Signal word: Danger

Hazard statement(s): Flammable liquid and vapor.
Toxic if swallowed

Precautionary statements:
Keep container tightly closed. Keep away from ignition sources such as heat/sparks/open flame- No smoking. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Wear protective gloves and eye/face protection. Ground/Bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Take precautionary measures against static discharge. Use only non-sparking tools. Store in cool/well-ventilated place. Store locked up. Dispose of contents/container in accordance with local/regional/national/international regulation. In case of fire, use water fog, dry chemical, CO2, or "alcohol" foam.
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Rinse mouth.
IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower.

29 ©Michele Sullivan, Ph.D.

What Will Change

- All chemical products will require re-evaluation / reclassification
- All MSDSs will change
- All labels will change
- Training
 - MSDS/label writers (UNITAR)
 - Workplace MSDS/label users (symbols/NIOSH)


30 ©Michele Sullivan, Ph.D.

GHS Benefits for MSDS/label users

- Improved safety through consistent and simplified communications on chemical hazards and safe handling and use
 - One global hazard classification
 - Consistent & standardized MSDSs/hazard labels
- Greater awareness & understanding of hazards, resulting in safer use of chemicals in the workplace
 - Availability of translated hazard information for workers
 - Standardized hazard symbols, labels and MSDSs for workers
- Expanded global use of HazCom training programs
- Increased efficiency and enhanced compliance with hazard communication regulations

31 ©Michele Sullivan, Ph.D.

OSHA GHS Implementation



- Advance Notice of Proposed Rulemaking: 9-12-2006 Federal Register
 - changing criteria for classifying health & physical hazards,
 - adopting standardized labeling requirements, and
 - requiring a standardized order of information for MSDSs
 - OSHA GHS Guide
- Pursuing a notice of proposed rulemaking (NPRM)
 - Current activities are internal, e.g., preparing necessary analyses, drafting text of rule/ preamble
 - Commitment in the regulatory agenda to peer review the economic analysis by November 2007 - accomplished
- Final Rule: end of 2008 ambitious timing
 - Expected to include all health hazards and all physical hazards but not environmental hazards
 - Categories to be covered not finally determined
 - Possibly may not cover Acute Toxicity Category 5
- Timing of implementation
 - Comments ranged from 3 yrs to timeframe similar to the EU (2010-2015).
 - Three years was most often cited
 - Will the NPR propose a three-year phase-in?
 - 2008 Budget Appropriations Bill requires OSHA to report back to Congress on GHS progress

32 ©Michele Sullivan, Ph.D.

OSHA's ANPR

- Over 100 comments were received and are accessible on the OSHA website
- Overall most commenters supported adoption of the GHS
- Wide range of responses to questions about hazard determination, & "floor" of hazardous chemicals.
 - Some supported the current approach.
 - Others felt to be consistent with GHS, there should be no floor.
 - Some argued about the legality of referring to certain sources in the standard.

33 ©Michele Sullivan, Ph.D.

OSHA's ANPR

- Range of responses about exposure limits to be included on the SDS.
 - Some argued that only OSHA PELs should be required.
 - Others indicated that ACGIH TLVs should continue to be required, particularly since the PELs are outdated in many situations.
 - Other suggestions for inclusion: NIOSH RELs, AIHA WEEELS.

34 ©Michele Sullivan, Ph.D.

Global GHS implementation

- Japan has mostly implemented the GHS
 - ~1500 GHS chemical classifications in Japanese
- NZ and Korea have July 2008 implementation
 - Asia Pacific region is a GHS driver
- Expected EU implementation 2010-2015
 - GHS chemical classifications
- Canada has 2008 goal - ambitious
- IPCS International Chemical Safety Cards will have GHS classifications for chemicals
- Etc.

35 ©Michele Sullivan, Ph.D.

Country	Implementation Status	Notes
USA	2008	OSHA GHS rulemaking process initiated in 2006. Final rule expected in 2008. OSHA GHS rulemaking process initiated in 2006. Final rule expected in 2008. OSHA GHS rulemaking process initiated in 2006. Final rule expected in 2008.
Canada	2008	Canada has announced its intention to implement GHS in 2008. The implementation will be done in two phases. The first phase will be for physical hazards and the second phase will be for health hazards.
EU	2010-2015	The EU has announced its intention to implement GHS in 2010-2015. The implementation will be done in two phases. The first phase will be for physical hazards and the second phase will be for health hazards.
Japan	2008	Japan has mostly implemented GHS. It has approximately 1500 GHS chemical classifications in Japanese.
NZ	2008	New Zealand has implemented GHS in July 2008.
Korea	2008	South Korea has implemented GHS in July 2008.
China	2008	China has announced its intention to implement GHS in 2008.
India	2008	India has announced its intention to implement GHS in 2008.
South Africa	2008	South Africa has announced its intention to implement GHS in 2008.
Colombia	2008	Colombia has announced its intention to implement GHS in 2008.
Chile	2008	Chile has announced its intention to implement GHS in 2008.
Peru	2008	Peru has announced its intention to implement GHS in 2008.
Argentina	2008	Argentina has announced its intention to implement GHS in 2008.
Brazil	2008	Brazil has announced its intention to implement GHS in 2008.
Mexico	2008	Mexico has announced its intention to implement GHS in 2008.
Vietnam	2008	Vietnam has announced its intention to implement GHS in 2008.
Philippines	2008	Philippines has announced its intention to implement GHS in 2008.
Indonesia	2008	Indonesia has announced its intention to implement GHS in 2008.
Malaysia	2008	Malaysia has announced its intention to implement GHS in 2008.
Singapore	2008	Singapore has announced its intention to implement GHS in 2008.
Thailand	2008	Thailand has announced its intention to implement GHS in 2008.
China	2008	China has announced its intention to implement GHS in 2008.
India	2008	India has announced its intention to implement GHS in 2008.
South Africa	2008	South Africa has announced its intention to implement GHS in 2008.
Colombia	2008	Colombia has announced its intention to implement GHS in 2008.
Chile	2008	Chile has announced its intention to implement GHS in 2008.
Peru	2008	Peru has announced its intention to implement GHS in 2008.
Argentina	2008	Argentina has announced its intention to implement GHS in 2008.
Brazil	2008	Brazil has announced its intention to implement GHS in 2008.
Mexico	2008	Mexico has announced its intention to implement GHS in 2008.
Vietnam	2008	Vietnam has announced its intention to implement GHS in 2008.
Philippines	2008	Philippines has announced its intention to implement GHS in 2008.
Indonesia	2008	Indonesia has announced its intention to implement GHS in 2008.
Malaysia	2008	Malaysia has announced its intention to implement GHS in 2008.
Singapore	2008	Singapore has announced its intention to implement GHS in 2008.
Thailand	2008	Thailand has announced its intention to implement GHS in 2008.

GHS Information

UN GHS Purple Book
www.unece.org/trans/danger/publi/ghs/ghs_rev01/01files_e.html

UN GHS Implementation Status of Countries/Regions
www.unece.org/trans/danger/publi/ghs/implementation_e.html

GHS Guide
www.osha.gov/dsg/hazcom/GHSGuideOct05.pdf

USA
DOT: <http://hazmat.dot.gov/regs/intl/globharm.htm>
EPA: www.epa.gov/opplead1/international/globalharmon.htm
OSHA: www.osha.gov/SLTC/hazardcommunications/global.html
www.osha.gov/pls/oshaweb/owadispl.show_document?p_table=FEDERAL_REGISTER&p_id=18890

Canada
www.hc-sc.gc.ca/ahc-asc/intactiv/ghs-sgh/index_e.html

EU
http://europa.eu.int/comm/enterprise/reach/ghs_en.htm
http://ec.europa.eu/enterprise/reach/ghs_consultation_en.htm

37 ©Michele Sullivan, Ph.D.