Modification of the Hazard Communication Standard (HCS) to conform with the United Nations' (UN) Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

What is the Globally Harmonized System?

The Globally Harmonized System (GHS) is an international approach to hazard communication, providing agreed criteria for classification of chemical hazards, and a standardized approach to label elements and safety data sheets.

Source: https://www.osha.gov

What is the phase-in period in the revised Hazard Communication Standard?

Effective Completion Date	Requirement(s)	Who
December 1, 2013	Train employees on the new label elements and safety data sheet (SDS) format.	Employers
June 1, 2015 December 1, 2015	Compliance with all modified provisions of this final rule, except: The Distributor shall not ship containers labeled by the chemical manufacturer or importer unless it is a GHS label	Chemical manufacturers, importers, distributors and employers
June 1, 2016	Update alternative workplace labeling and hazard communication program as necessary, and provide additional employee training for newly identified physical or health hazards.	Employers
Transition Period to the effective completion dates noted above	May comply with either 29 CFR 1910.1200 (the final standard), or the current standard, or both	Chemical manufacturers, importers, distributors, and employers

Source: https://www.osha.gov

Hazard Communication Changes

- **Due to regulatory changes, on June 1, 2015:**
  - Material Safety Data Sheets (MSDS) will become Safety Data Sheets (SDS)
    - SDS serve the same purpose as MSDS
    - SDS will be in a uniform format and easier to read
  - Labels on hazardous chemicals will include:
    - Pictograms which visually identify the main hazards
    - Signal words: “warning” (less serious risk) or “danger” (more serious risk)
    - Hazard statements (what is the hazard?)
    - Precautionary statements (what should you do to protect yourself from the hazard?)

How is the Safety Data Sheet (SDS) changing under the revised Hazard Communication Standard?

The information required on the safety data sheet (SDS) will remain essentially the same as that in the current standard (HazCom 1994). HazCom 1994 indicates what information has to be included on an MSDS, but does not specify a format for presentation or order of information. The revised Hazard Communication Standard (HazCom 2012) requires that the information on the SDS be presented using specific headings in a specified sequence.

Source: https://www.osha.gov

Globally Harmonized System Safety Data Sheets (SDS)

GHS: Safety Data Sheets (SDS)

- **Section 1, Identification -** includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use
- **Section 2, Hazard(s) identification -** includes all hazards regarding the chemical; required label elements
- **Section 3, Composition -** information on ingredients includes information on chemical ingredients; trade secret claims
- **Section 4, First-aid measures -** includes important symptoms/ effects, acute, delayed; required treatment
- **Section 5, Fire-fighting measures -** lists suitable extinguishing techniques, equipment; chemical hazards from fire

Source: https://www.osha.gov

GHS: Safety Data Sheets (SDS)

- **Section 6, Accidental release measures -** lists emergency procedures; protective equipment; proper methods of containment and cleanup
- **Section 7, Handling and storage -** lists precautions for safe handling and storage, including incompatibilities
- **Section 8, Exposure controls/personal protection -** lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE)
- **Section 9, Physical and chemical properties** lists the chemical's characteristics
- **Section 10, Stability and reactivity -** lists chemical stability and possibility of hazardous reactions

Source: https://www.osha.gov

GHS: Safety Data Sheets (SDS)

- **Section 11, Toxicological information -** includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.
- **Section 12, Ecological information -** provides information to evaluate the environmental impact of the chemical(s) if it were released to the environment.
- **Section 13, Disposal considerations -** provides guidance on proper disposal practices, recycling or reclamation of the chemical(s) or its container, and safe handling practices.
- **Section 14, Transport information -** provides guidance on classification information for shipping and transporting of hazardous chemical(s) by road, air, rail, or sea
- **Section 15, Regulatory information -** identifies the safety, health, and environmental regulations specific for the product that is not indicated anywhere else on the SDS.
- **Section 16, Other information -** includes the date of preparation or last revision.

Source: https://www.osha.gov

Globally Harmonized System Chemical Label Format

Source: blog.weberpackaging.com

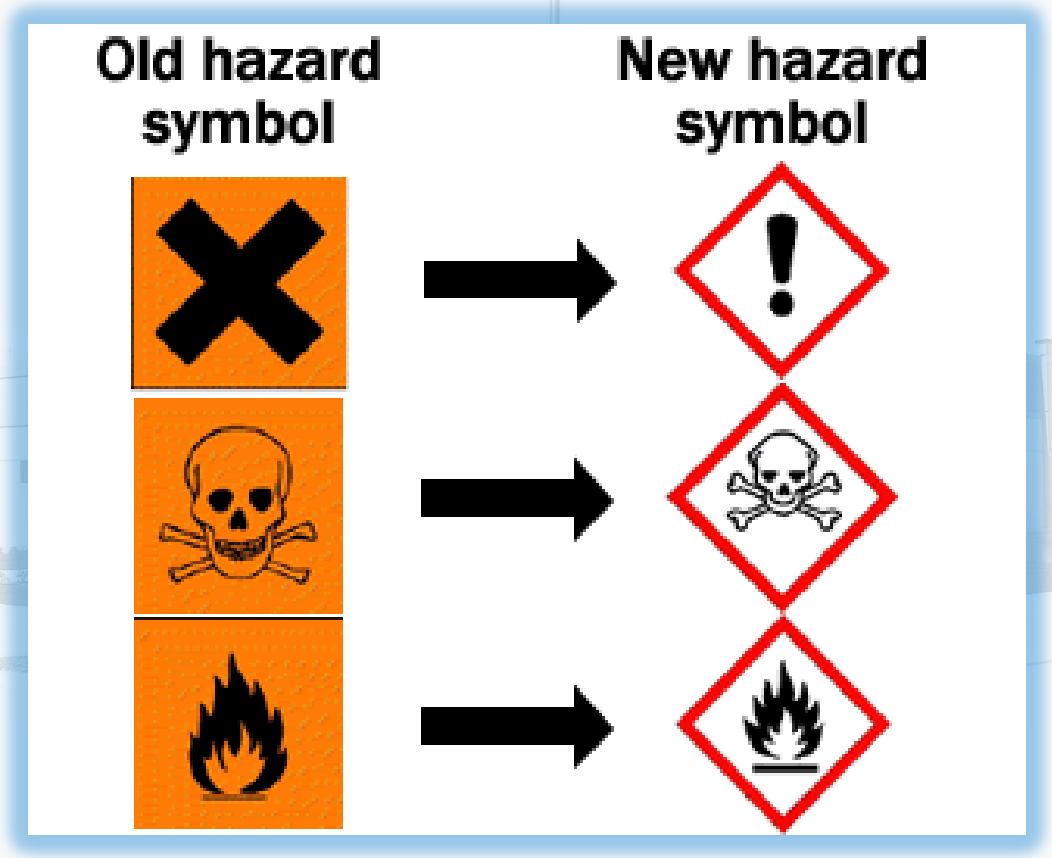
GHS Label Format

Source: blog.weberpackaging.com

GHS Pictograms

	E	Explosive		GHS 01 Explosive
	F+	Extremely flammable		GHS 02 Flammable
	F	Highly flammable		GHS 02 Flammable
	O	Oxidizing		GHS 03 Oxidizing
No symbol				GHS 04 pressurized gases
	C	Corrosive		GHS 05 Corrosive
	T+	Very toxic		GHS 06 Toxic
	T	Toxic		GHS 06 Toxic
	Xi	Irritant		GHS 07 Irritant
	Xn	Harmful		GHS 08 Harmful
	N	Harmful to the environment		GHS 09 Harmful to the environment

Pictogram Changes



GHS Labeling

Flammable Gases

Hazard Statement	Pictogram	Signal Word
1. Extremely flammable gas		Danger
2. Flammable gas		Warning

Flammable Aerosols

Hazard Statement	Pictogram	Signal Word
1. Extremely flammable aerosol		Danger
2. Flammable aerosol		Warning

Flammable Solids

Hazard Statement	Pictogram	Signal Word
1. Flammable solid (Category 1)		Danger
2. Flammable solid (Category 2)		Warning

GHS Labeling

Acute Toxicity – Oral

Hazard Statement	Pictogram	Signal Word
1. Fatal if swallowed		Danger
2. Toxic if swallowed		Danger
3. Harmful if swallowed		Warning

Acute Toxicity – Skin Contact

Hazard Statement	Pictogram	Signal Word
1. Fatal in contact with skin		Danger
2. Toxic in contact with skin		Danger
3. Harmful in contact with skin		Warning

GHS Labeling

Flammable Liquids

Hazard Statement	Pictogram	Signal Word
1. Extremely flammable liquid and vapor		Danger
2. Highly flammable liquid and vapor		Danger
3. Flammable liquid and vapor		Warning

GHS Labeling

Oxidizing Liquids & Oxidizing Solids

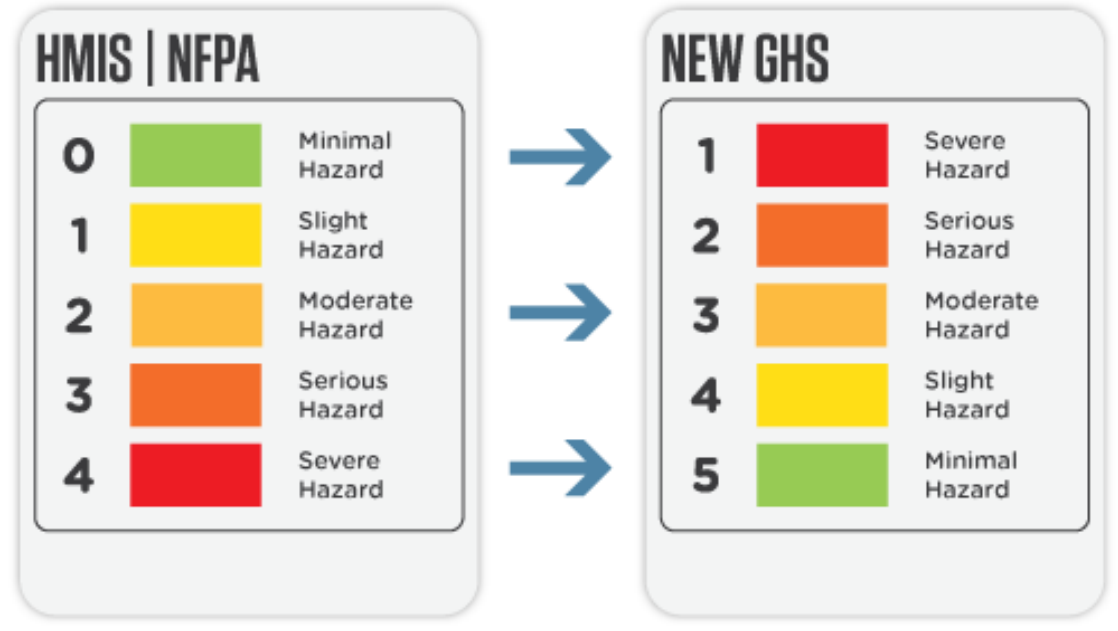
Hazard Statement	Pictogram	Signal Word
1. May cause fire or explosion; strong oxidizer		Danger
2. May intensify fire; oxidizer (Category 2)		Danger
3. May intensify fire; oxidizer (Category 3)		Warning

How will workplace labeling provisions be changing under the revised Hazard Communication Standard?

The current standard provides employers with flexibility regarding the type of system to be used in their workplaces and OSHA has retained that flexibility in the revised Hazard Communication Standard (HCS). Employers may choose to label workplace containers either with the same label that would be on shipped containers for the chemical under the revised rule, or with label alternatives that meet the requirements for the standard. **Alternative labeling systems such as the National Fire Protection Association (NFPA) 704 Hazard Rating and the Hazardous Material Identification System (HMIS) are permitted for workplace containers. However, the information supplied on these labels must be consistent with the revised HCS, e.g., no conflicting hazard warnings or pictograms.**

Source: https://www.osha.gov

NFPA vs GHS Hazard Ratings

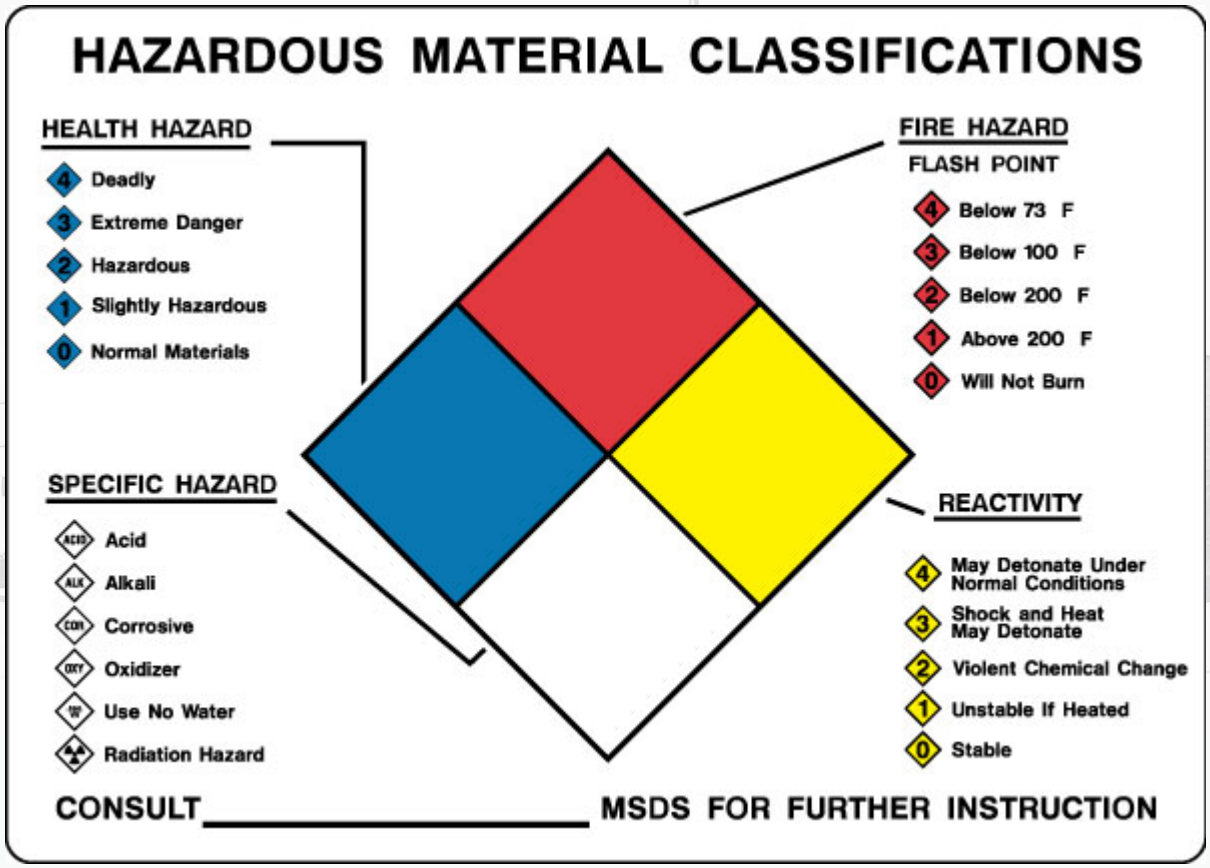


What about other agencies?

The Department of Transportation (DOT), Environmental Protection Agency (EPA) and the Consumer Product Safety Commission all took part in developing the GHS. The DOT has modified its classification and labelling requirements to be in line with the new system.

The National Fire Protection Agency (NFPA) has a separate system for classifying chemical hazards. This system will NOT be changing. As GHS reaches full implementation there may come a need to slightly modify the NFPA system but it will not go away. The agencies are depending on individuals being trained and made aware of the differences in order to prevent confusion. As an individual working in a laboratory, the most important thing to remember is that the numeric hazard classifications used in the two systems are opposite one another.

NFPA Diamond



Chemical Storage

Chemical Storage Guidelines

General Rules of Storage:

Do

- Make certain all chemicals are labeled clearly to identify contents.
- Physically separate incompatible chemicals.
- Segregate by hazard class:
  - Health Hazards (Toxins, Poisons, Carcinogens, etc. 
  - Corrosives 
  - Reactives/Oxidizers 
  - Flammables 
  - General Storage (e.g. salts and other routine dry chemicals - relatively modest hazards).

Source: https://ehsd.tamu.edu

Chemical Storage Guidelines

General Rules of Storage:

Do

- Date when received and again when opened. (Dating containers is especially important for chemicals with a short shelf life like ethyl ether which, because of its explosion hazard, should not be kept for more than 6 months after being opened and must never be kept past its expiration date)
- Keep exits, passageways, areas under benches and desks, and emergency equipment free of stored equipment and materials.

Source: https://ehsd.tamu.edu

Chemical Storage Guidelines

Do not:

- Store chemicals on benches.
- Store chemicals in fume hoods or under sinks.
- Expose to heat or direct sunlight.
- Store hazardous materials above shoulder height of shortest person in lab.

Source: https://ehsd.tamu.edu

Chemical Storage

Chemical manufacturers include storage information on the label. This may be done with a color code or pictogram to indicate hazards.

Source: https://ehsd.tamu.edu

Hazard specific storage rules

Health Hazards:

- Separate toxins and poisons from other chemicals in a location labeled Toxins or Poisons.

Source: https://ehsd.tamu.edu

Hazard specific storage rules

Corrosives:

- Store large bottles on a low shelf or in a corrosives cabinet.
- Segregate acid oxidizers from organic acids, flammable and combustible materials.
- Segregate acids from bases and active metals.
- Segregate acids from chemicals which can generate toxic gases on contact (e.g. sodium cyanide)
- Segregate perchloric acid from reducing agents and organics.
- Store in chemical resistant trays.

Source: https://ehsd.tamu.edu

Hazard specific storage rules

Reactives/Oxidizers:

- Store water-reactive chemicals in a cool and dry place.
- Store oxidizers away from flammables, combustibles, and reducing agents (zinc, alkaline metals, etc.).
- Store peroxide forming chemicals in an airtight container in a cool, dry, dark place.
- Peroxide forming chemicals should be disposed of within 12 months of opening, or by expiration date.
- Shock sensitive and detonable materials should be stored in a secondary container, large enough to hold entire contents in case of breakage
- Store liquid organic peroxides at the lowest possible temperature consistent with solubility and/or freezing points.

Source: https://ehsd.tamu.edu

Hazard specific storage rules

Flammables/Combustibles:

- Store flammable liquids in flammable storage cabinet.
- Do not store flammable liquids in domestic refrigerators or freezers.
- Store away from ignition and heat sources.
- Stay within NFPA rules for volume of flammables:
  - Maximum for any lab is 120 gallons.
  - With flammable safety cabinet - 10 gal/100 sq. ft. un-sprinkled or 20 gal/100 sq ft of sprinkled area.
  - Without flammable safety cabinet - 10 gallons in original container & 25 gallons in 2.5 gallon or smaller safety cans.

Source: https://ehsd.tamu.edu

Hazard specific storage rules

Gas Cylinders:

- Strap or chain individual cylinders securely to bench top or wall.
- Cap cylinders not in use.
- Separate incompatibles.
- Segregate empty cylinders from full ones.

Source: https://ehsd.tamu.edu

Chemical Expiration

- **Expiration Dates**
  - **All chemicals received at the Office of the Texas State Chemist are recorded in the ICN database and receive an ICN label which identifies the chemical with a unique number, a received date and expiration date. When assigning the expiration date to chemicals received, there are three basic groups: Expiration dates according to EHSD, according to manufacturer and NA (Not Applicable).**

  EHSD has stated that the following chemicals must be used within one year of purchase or 6 months after opening and must be disposed of before the expiration date:

  - **Chloroform**
  - **Perchloric Acid**
  - **Ethyl Ether**
  - **Tetrahydrofuran (THF)**
  - **Cyclohexane**
  - **Butadiene**
  - **Isopropyl Ether**
  - **Dioxanes**

  Note: When multiple bottles of the chemicals listed above are received in one order each bottle must be given a unique ICN number to ensure the inventory is properly monitored. Once the chemical is opened, the chemist responsible for the chemical will inform one of the lab attendants to change the expiration date in the ICN database, to reflect expiration 6 months after opening. The inventory of the chemicals listed above will be monitored by a program that checks the ICN database and sends an email to the responsible chemist, the lab manager and the safety chair when one of these chemicals expire.

Source: S0001 Safety Manual Revision 5

Chemical Expiration

- **If the chemical has a manufacturer suggested expiration date this is the date that should be recorded in the ICN database and on the ICN label.**

- **If a chemical has a retest date listed on the container this date will be used as the expiration date.**

- **If the chemical is not in the EHSD list mentioned above and does not have a manufacturer expiration date then the expiration date is Not Applicable (NA).**

Source: S0001 Safety Manual Revision 5

Chemical Expiration

- **If the chemical has a manufacturer suggested expiration date this is the date that should be recorded in the ICN database and on the ICN label.**

- **If a chemical has a retest date listed on the container this date will be used as the expiration date.**

- **If the chemical is not in the EHSD list mentioned above and does not have a manufacturer expiration date then the expiration date is Not Applicable (NA).**

Source: S0001 Safety Manual Revision 5

Chemical Expiration

- **If the chemical has a manufacturer suggested expiration date this is the date that should be recorded in the ICN database and on the ICN label.**

If a chemical has a retest date listed on the container this date will be used as the expiration date.

If the chemical is not in the EHSD list mentioned above and does not have a manufacturer expiration date then the expiration date will be 5 years from the date received.

- **If a chemical reaches the 5 year expiration date and the chemist does not wish to dispose of it, he/she can extend the expiration date up to 5 years, initial and date.**

Spill Response

- **The current maximum volume to be cleaned up in-house for:**
  - Quinoline – 500ml
  - Carbon Disulfide – 500ml
  - Chloroform – 4L

EHSD Response

“There is no set volume for which a minor spill becomes a major spill. Circumstances will dictate whether the laboratory feels comfortable in handling a specific situation or if they would prefer to leave it to those with appropriate personal protective equipment and respiratory protection. I believe the quantities identified below are appropriate (except that I would go to 1 L on the chloroform, nitric acid, and perchloric acid) as general guidance.”

EHSD Response

EHSD Spill Team – 845-2132

24 Hour Spill Response (Communication Center) – 845-4311