DSPS-SCC
Safety
Competence
Center

Series « What should I know »

Generally Harmonized System of classification and labelling of chemicals

***Volume 1** – Hazard classes and categories*

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Table of contents

GHS/CLP regulations

The classification of a chemical may differ from one country to another, or even from one region to another. Some substances can be considered toxic in one country and harmless in another. The intention to introduce a **Globally Harmonized System** of Classification and Labeling of Chemicals (**GHS**) was concluded by the UN in 2002. Ultimately, harmonized criteria for assessing the hazardous properties of chemicals will impose a uniform classification worldwide. This will lead to better protection of humans and the environment, and will also facilitate international trade of these substances.

The **CLP** (**Classification, Labelling and Packaging**) regulation is the European (Switzerland included) version of the GHS. It sets the rules relative to:

- Classification
- Labelling
- Packaging of chemicals in Europe

Hence, it modifies the Directive 67/548/EEC on the classification and labelling of Dangerous Substances (DSD) and the Directive 1999/45/EC on the classification and labelling of Dangerous Preparations (DPD).

These regulations concern almost all chemicals, except the following ones:

- Radioactive substances and mixtures
- Chemical waste
- Drugs (pharmaceutical)
- Cosmetics
- Food (additives, flavoring and food for animals).

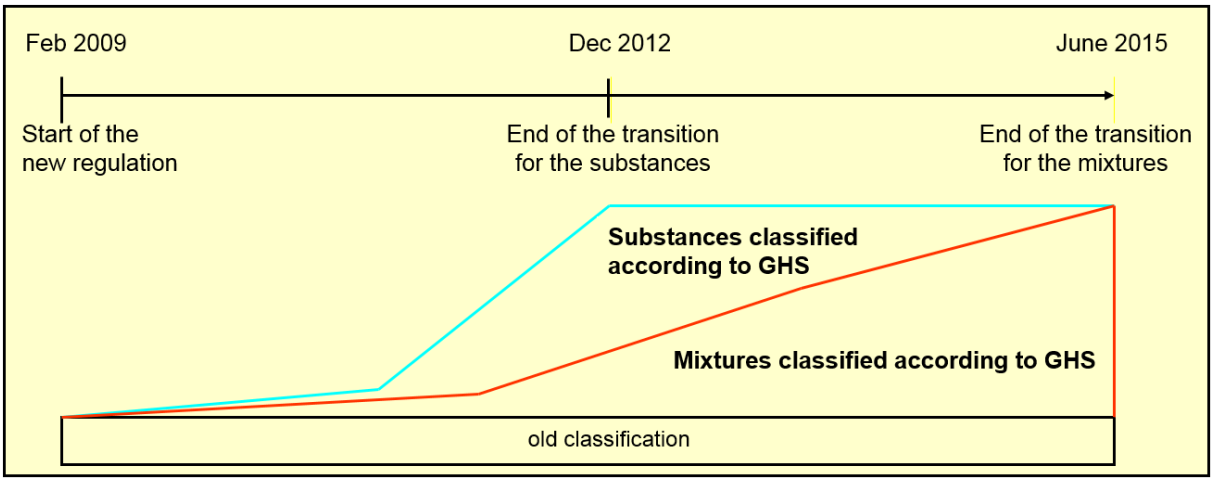
Regarding the *Transportation of chemicals,* the harmonized rules are already set by the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR; ECE/TRANS/275).

The physical, health and environmental hazards, their respective categories as well as the signal word and hazard statements (H statements) are presented and tabulated in the following pages. General classification principles, decision trees and precautionary statements (P statements) are discussed in **Volume 2**[1].

[1] Available at https://www.epfl.ch/campus/security-safety/en/lab-safety/hazards/chemical-hazards/

The following tables summarize the implications of these two regulations. Since February 2009, Switzerland has started the classification and labelling of chemicals on the basis of the European GHS regulation equivalent (CLP). Substances shall be classified and labelled accordingly from December 2012, mixtures from June 2015:

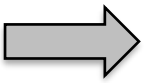
regulation	GHS	CLP
signification	**G**lobally **H**armonised **S**ystem of classification and labelling of chemicals	**C**lassification, **L**abelling and **P**ackaging of substances and mixtures (GHS' European version)
EC regulation n°		1272/2008
aim	Harmonise the description of chemicals' hazards	
sets out criteria and rules about	Notification, classification and labelling	
applies to	World	Europe and Switzerland
	all substances irrespective of the annual tonnage	
concerns	- producers, importers, exporters or distributers of substances or preparations - downstream users.	



Changes with GHS/CLP

GHS/CLP regulations involve **six major changes** closely related to the regulations already in effect in Europe.

1. GHS introduces **new hazard classes and categories** (CLP annexes I, VI and VII). According to the DSD directive 67/548/EEC, the physico-chemical hazards were five; with the GHS they are seventeen. The health hazards are now ten and the environment hazards remain two.

Directive 67/548/CEE		GHS
5 physico-chemical hazards		17 physico-chemical hazards
9 health hazards		10 health hazards
2 environmental hazards		2 environmental hazards

2. GHS subdivides the hazard classes into categories, which can range up to 7. A **Signal word** associated to a category assesses its severity within the corresponding hazard class:

DANGER for the most severe categories
WARNING for the less severe categories

As CLP shall remain close to the old regulations, it has been established that the following GHS categories will not be included:

Flammable liquids - category 4

Acute toxicity - category 5

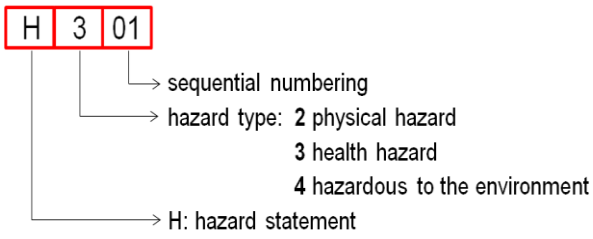
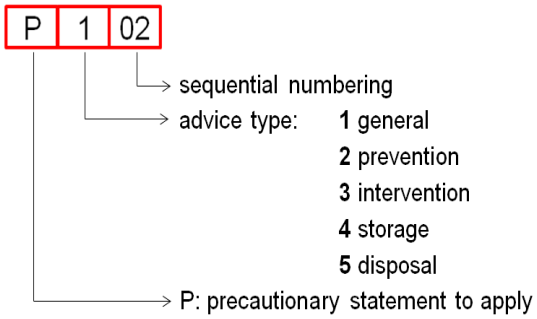
Skin corrosion/irritation - category 3

Aspiration hazard - category 2

Acute aquatic toxicity - categories 2 and 3

These categories, reported in the GHS classification summary tables, will be highlighted with an asterisk (*).

3. Replacing the **R phrases** (Risk) and the **S phrases** (Security), the new GHS introduces the **H statements** (Hazards) and the **P statements** (Precautionary).

GHS	**H statements** (instead of R phrases)	**P statements** (instead of S phrases)
Code	**H** + 3 numbers	**P** + 3 numbers
		
Examples	H200: unstable explosive H350: may cause cancer	P102: keep out of reach of children P231: handle under inert gas
Miscel-laneous	If specific hazards are involved, the CLP regulation recommends adding extra code (ex: EUH 001: explosive when dry[1])	Per substance, a maximum of 6 statements shall be reported. It can be more if specific hazards require it.

1) The hazard statements carried through from the DSD and DPD, which are not yet included in the GHS, are codified as 'EUH' (check complementary information in Vol. 2).

4. GHS introduces **9 new pictograms** which are red diamonds filled with black figures. They are shown below with their meanings reported as catch phrases. The hazard class and respective code are reported in the right column:

Meaning	**Hazard class** (GHS code)
It explodes: 	Explosive (GHS01)
It burns: 	Flammable (GHS02)
It helps burning: 	Oxidizer (GHS03)
It explodes: 	Gases under pressure (GHS04)
It corrodes: 	Corrosive (GHS05)
It kills: 	Acute toxicity (GHS06)
It harms: 	Harmful, irritant, sensitizer and/or harmful to the ozone layer (GHS07)
It poisons: 	Chronic toxicity (GHS08)
It harms the environment: 	Hazardous to the environment (GHS09)

5. The GHS also affects the containers' labelling. A substance or mixture contained in a packaging should be labelled accordingly if:

- the substance or mixture is classified as being hazardous.
- the mixture contains at least one substance classified as hazardous whose concentration exceeds a defined threshold (this part will be described in volume 2 of this series).
- it is an explosive product.

Thus, we will read on the label:

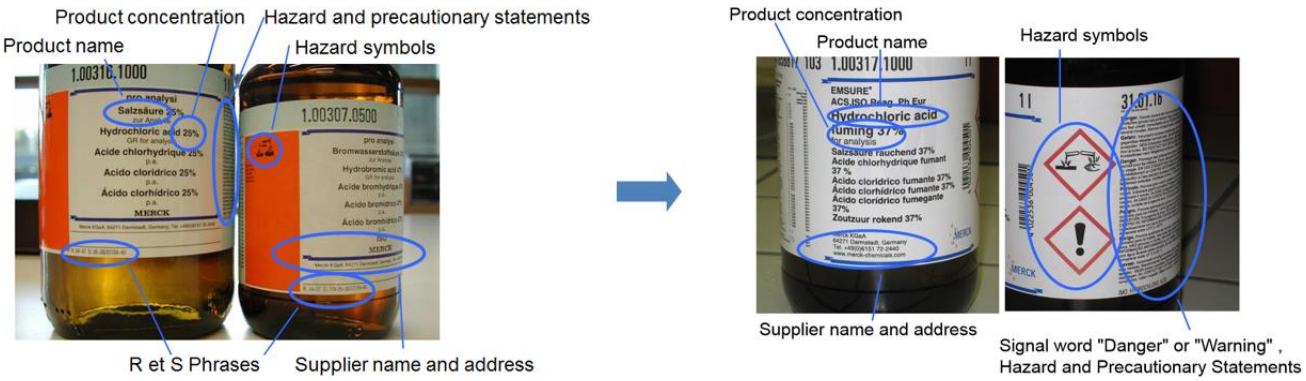
- Identity of the supplier
- Quantity of the content
- Substance's/products' composition
- Hazard pictograms
- Signal word
- Hazard statements H
- Precautionary statements P
- Complementary information EUH

NEW

The pictograms reflecting the most severe category of each hazard class must appear on the label. Up to 5 pictograms may be used but, in some cases, some pictograms can become optional:

Hazard	If label carries following mandatory pictogram	Then	Remarks
Physical		 is optional  is optional	except in cases where more than one pictogram is compulsory, *e.g.* for substances and mixtures classified as self-reactive Type B or as organic peroxide Type B.
Physical or health	 or 	 is optional	/
Health		 should not be used	/
		 should not be used	if it is relative to skin or eye irritation.
	 for respiratory sensitization	 should not be used	if it is relative to skin or eye irritation. If the hazard statement EUH071 has been assigned, the pictogram *corrosive* can be added.

Illustration of the changes in labelling:



6. The Safety Data Sheet (SDS) provides all the information in terms of health, safety and environmental protection of the corresponding substance or preparation to the users. The SDS is composed of sixteen sections that can be combined into four categories.

Properties of the chemical	**Measures in case of an accident**
Measures for users	**Other information**

SDS' 16 sections	
1. Identification	9. Physical & chemical properties
2. Hazards' identification	10. Stability & Reactivity
3. Composition/information on ingredients	11. Toxicological information
4. First aid measures	12. Ecological information
5. Firefighting measures	13. Disposal considerations
6. Accidental release measures	14. Transport information
7. Handling & Storage	15. Regulatory information
8. Exposure controls & personal protection	16. Other information

1) Identification of the substance/ mixture and of the company

Product's GHS identifiers.	Other identification information.
Recommendations and restrictions of use.	Supplier's details (name, address, phone number, *etc.*).
Emergency phone number.	

2) Hazards' identification

GHS classification of the chemical (hazard class and category) and any other regional or national data.	GHS label elements (pictograms, signal words, hazard statements, and precautionary statements).
Other hazards are not subject to classification (*e.g.* "dust explosion hazard") or which are not covered by the GHS.	

3) Composition/information on ingredients

Substance:	Mixture:
Chemical identification.	The chemical identity and the (range of) concentrations of all components that are defined as hazardous according to GHS criteria and present above the defined threshold values.
Common name, synonyms, *etc.*	
CAS number and other unique identifiers.	
Impurity and stabilizing additive contributing to the substance's classification.	

4) First aid measures

Description of the necessary measures, classified according to the different routes of exposure (inhalation, ingestion, skin and eye).
Most important symptoms/ effects, both acute and delayed.
Indication of possible need for any immediate medical attention or special treatment.

5) Firefighting measures

Suitable (and non-suitable) extinguishing media.
Specific risks (*e.g.* hazardous substances arising from the substance or mixture's combustion).
Special protective equipment and precautions for firefighters.

6) Accidental release measures

Personal precautions, protective equipment and emergency procedures.
Environmental precautions.
Methods and materials for containment and cleaning up.

7) Handling and storage

Precautions for safe handling.
Conditions for safe storage, including any incompatibilities.

8) Exposure controls/personal protection

Control parameters and components with workplace control parameters (threshold limit values; TLV).
Exposure controls/appropriate engineering controls.
Measures for personal protection: personal protective equipment (PPE).

9) Physical and chemical properties

Appearance (physical state, color, etc.).	Vapor pressure.
Odor.	Vapor density.
Odor threshold.	Relative density.
pH.	Water solubility.
Melting point/ freezing point.	Partition coefficient: n-octane/ water.
Initial boiling point and boiling range.	Auto-ignition temperature.
Flash point.	Decomposition temperature.
Evaporation rate.	Viscosity.
Flammability (solid, gas).	Explosive properties.
Upper/ lower flammability or explosive limits.	Oxidizing properties.

10) Stability and reactivity

Reactivity.	Conditions to avoid (static discharges, impacts, vibrations).
Chemical stability.	Incompatible materials.
Possibility of hazardous reactions.	Hazardous decomposition products.

11) Toxicological information

Comprehensive but concise and understandable description of the various toxic effects on human health and of the available data used to identify those effects description, including:	
The likely routes of exposure (inhalation, ingestion, skin and eye).	The delayed and immediate effects including the chronic effects due to exposure on short and long-term basis.
Symptoms related to the physical, chemical and toxicological characteristics.	The toxicity values such as acute toxicity estimates.

12) Ecological information

Ecotoxicology (aquatic and terrestrial, where available).	Mobility in soil.
Persistence and degradability.	Other adverse effects.
Bioaccumulative potential.	

13) Disposal considerations

Description of waste residues and information on their safe handling and disposal methods including disposal of contaminated containers.

14) Transport information

UN number.	Environmental hazards, *e.g.* Marine pollutant (yes/ no).
UN proper shipping name.	Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code.
Transport hazard class(es).	Special precautions to be brought to the attention of the user on the conveyance or transfer in or out of business.
Packaging group (if applicable).	

15) Regulatory information

Regulations related to the safety, health and the environment and applicable to the concerned product.

16) Other information

Indicates any other information which the supplier considers to be important for the user's safety and health user and for the environmental protection.

GHS/ CLP hazard categories

In order to visualize on a common scale the classification of the various categories of GHS hazards, it has been decided to propose a ranking based on two of the three GHS classification criteria, namely the presence of a hazard pictogram accompanied, or not, by a signal word. The table below summarizes the resulting color-coded classification according to the importance of the categories for a same hazard. The resulting two limits are:

1) Substances for which GHS assigns a **hazard symbol** and a signal word ***Danger*** will be color-coded in **dark red** and classified as **very dangerous**.
2) At the other extreme, substances for which GHS assigns neither a hazard pictogram nor a signal word will be color-coded in **pale yellow** and classified as **weakly hazardous**.

Hazard pictogram			✓				
Signal word	*danger*	✓			✓		
	warning		✓			✓	
Hazard level and colour code		HIGH	HAZARD			low	

1. Physical hazards

The **seventeen types of physico-chemical hazards** of the GHS system are presented and, as depicted below, regrouped according to their pictograms.

Hazard classes	Hazard categories and pictograms			
Explosives	Unstable explosive 1.1 to 1.3	1.4	1.5	1.6
Deactivated explosives	1, 2	3, 4		
Self-reactive substances/ mixtures	A B C, D	E, F		G
Pyrophoric liquids & solids	1			
Self-heating substances/ mixtures	1	2		
Substances/ mixtures which, in contact with water, emit flammable gases	1, 2	3		
Flammable/ chemically unstable gases	1		2	
Flammable liquids	1, 2	3	4*	
Flammable solids	1	2		
Flammable aerosols	1	2		3
Oxidizing gases	1			
Oxidizing liquids/ solids	1, 2	3		
Gases under pressure		compressed/ liquefied/ dissolved gas refrigerated/ liquefied gas		
Corrosive to metals		1		

*not included in CLP.

1.1. Explosives and desensitized explosives

This class includes explosive substances and mixtures, explosive articles, and substances as well as mixtures and articles manufactured to produce a practical explosive or pyrotechnic effect. Category 1.6 was excluded from the table below because it has no signal word, no hazard statement and no precautionary statement. Desensitized explosives are substances or mixtures that have been phlegmatized to suppress their explosive properties in such a manner that they do not mass explode and do not burn too rapidly.

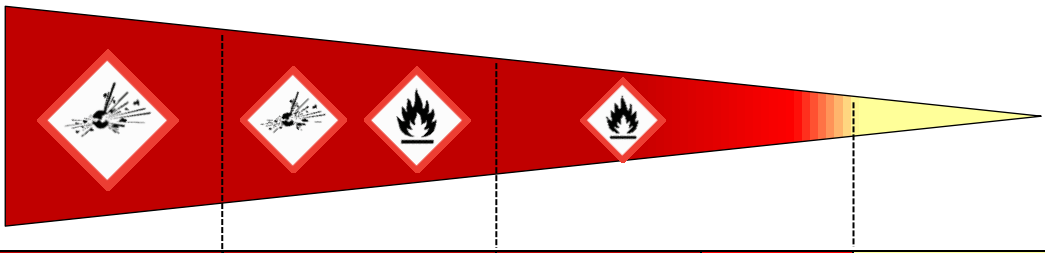
Explosives						
Hazard pictogram						/
Hazard categories	**Unstable explosive**	**1.1**	**1.2**	**1.3**	**1.4**	**1.5**
Signal words	***Danger***				***Warning***	***Danger***
Hazard statements	**H200:** Unstable explosive.	**H201:** Explosive; mass explosion hazard.	**H202:** Explosive; severe projection hazard.	**H203:** Explosive; fire, blast or projection hazard.	**H204:** Fire or projection hazard.	**H205:** May mass explode in fire.
desensitized explosives						
Hazard pictogram						
Hazard categories	**Cat. 1**		**Cat. 2**	**Cat. 3**		**Cat. 4**
Signal words	***Danger***			***Warning***		
Hazard statements	**H206:** Fire, blast or projection hazard; increased risk of explosion if desensitizing agent is reduced.		**H207:** Fire or projection hazard; increased risk of explosion if desensitizing agent is reduced.			**H208:** Fire hazard; increased risk of explosion if desensitizing agent is reduced.

1.2. Self-reactive chemicals and organic peroxides

Self-reactive chemicals (**SRC**) are thermally unstable liquid or solid substances or mixtures liable to undergo a strongly exothermic decomposition even without participation of oxygen (air).

Organic peroxides (**OP**) are compounds containing an oxygen-oxygen single bond. The substituents on the oxygen atoms can be hydrogen atoms and/or organic radicals. They are thermally unstable and may undergo exothermic self-accelerating decomposition, be liable to explosive decomposition, burn rapidly, be sensitive to impact, friction, or react dangerously with other substances.

As for SRC, OP are classified in one of the seven categories of “types A to G”.

Self-reactive substances and mixtures / Organic peroxides (two separate hazard classes have the same categories (and are therefore grouped).					
Hazard pictograms					
Hazard categories	**Type A**	**Type B**	**Type C+D**	**Type E+F**	**Type G**
Signal words	***Danger***			***Warning***	/
Hazard statements	**H240:** Heating may cause an explosion.	**H241:** Heating may cause a fire or explosion.	**H242:** Heating may cause a fire.	/	/

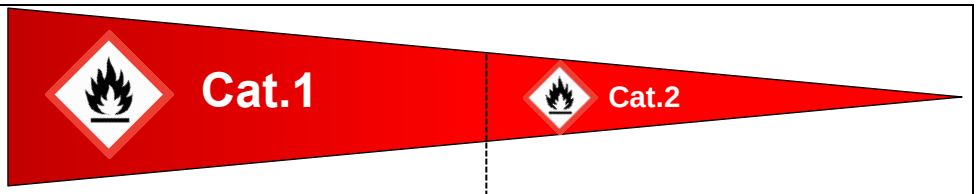
1.3. Pyrophoric liquids and solids

Substances or mixtures liable to ignite within five minutes after coming into contact with air. They are classified under one unique category.

Hazard pictogram	
Hazard categorY	**Cat. 1**
Signal word	***Danger***
Hazard statement	**H250:** Catches fire spontaneously if exposed to air.

1.4. Self-heating substances

Solid or liquid, other than a pyrophoric, which, by reaction with air and without energy supply, is liable to self-heat. They differ from a pyrophoric chemical in that they will ignite only when in large amounts (kg) and after long periods of time (hours or days).

Hazard pictogram and categories		
Signal words	***Danger***	***Warning***
Hazard statements	**H251:** Self-heating; may catch fire.	**H252:** Self-heating in large quantities; may catch fire.

1.5. Substances which, in contact with water, emit flammable gases

Solid or liquid substances or mixtures, which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

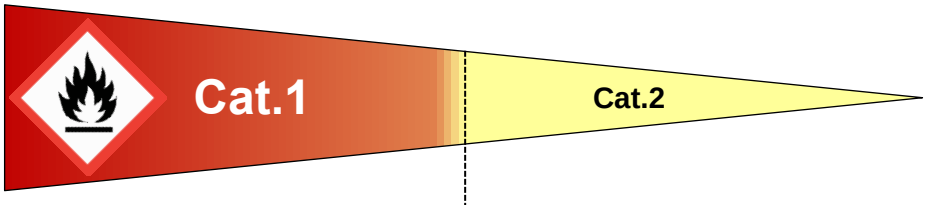
Hazard pictogram and categories			
Reacts with water at room temperature	- vigorously. - gas produced ignite spontaneously, or produces flammable gas > 10L/ kg per minute.	- readily. - flammable gas produced ≥ 20 L/kg per hour, and which does not meet the criteria for cat. 1.	- slowly. - flammable gas produced ≥ 1 L/kg per hour, and which does not meet the criteria for cat. 1 and 2.
Signal words	***Danger***		***Warning***
Hazard statements	**H260:** In contact with water releases flammable gases, which may ignite spontaneously.	**H261:** In contact with water releases flammable gas.	

1.6. Flammable and chemically unstable gases

Gas with a flammable range mixed with air at 20°C and at a pressure of 1 bar.

The **Flammable Range** (Explosive Range) is the range of a concentration of a gas or vapor that will burn (or explode) if an ignition source is introduced:

- The **lower flammable limit** (LFL) (lower explosive limit) is the minimum concentration of flammable liquid vapor or gas in air that will allow the propagation of flame.
- The **upper flammable limit** (UFL) (upper explosive limit) is the maximum concentration of vapor/gas in air that will allow the propagation of flame.
- Increasing the fraction of inert gas in a mixture increases the LFL and decreases the UFL.

Hazard pictogram and hazard categories		
Ignites if % in air	≤ 13 %	/
Flammable range in air	at least 12 points wide, regardless of the LFL.	/
Signal words	***Danger***	***Warning***
Hazard statements	**H220:** Extremely flammable gas.	**H221:** Flammable gas.

A **chemically unstable gas** is a flammable gas that is able to react explosively even in the absence of air or oxygen. Thus, a flammable and chemically unstable gas is classified in one of the following two categories.

GHS classification	**Category A:** flammable gases which are chemically unstable at 20°C and a standard pressure of 1 bar.	**Category B:** flammable gases which are chemically unstable at a temperature >20°C and/or a pressure > 1bar.
GHS pictogram	No additional pictogram	
Signal word	No additional signal word	
Hazard statements	**H230:** May react explosively even in the absence of air.	**H231:** May react explosively even in the absence of air at elevated pressure and/ or temperature.

1.7. Flammable liquids

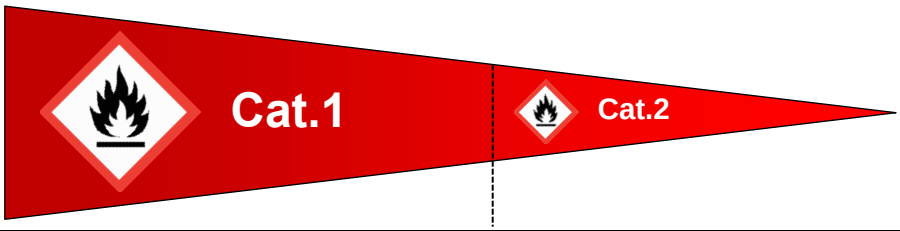
Liquids having a flash point (FP) not exceeding 93°C. They are classified under one of the 4 categories according to the following criteria:

Hazard pictogram				/
Hazard categories	**Cat. 1**	**Cat. 2**	**Cat. 3**	**Cat. 4***
Flash point (FP)	< 23°C	< 23°C	23°C ≤ FP ≤ 60°C	60°C ≤ FP ≤ 93°C
Boiling point	≤ 35°C	> 35°C		
Signal words	***Danger***		***Warning***	
Hazard statements	**H224:** Extremely flammable liquid and vapor.	**H225:** Highly flammable liquid and vapor.	**H226:** Flammable liquid and vapor.	**H227:** Combustible liquid.

*not included in CLP.

1.8. Flammable solids

Flammable solids are readily combustible, or may cause or contribute to fire through friction. Readily combustible solids are powdered, granular, or pasty substances which are dangerous if they can be easily ignited by brief contact with an ignition source and if the flame spreads rapidly. Flammable solids are classified in one of the two categories for this class according to the results of the burning rate test (see Volume 2).

Hazard pictogram and hazard categories				
Solid type	Substances or mixtures other than metal powders	Metal powders	Substances or mixtures other than metal powders	Metal powders
Wetted zone	does not stop fire	n/a	stops the fire for at least 4 min	n/a
Signal words	***Danger***		***Warning***	
Hazard statements	**H228:** Flammable solid.			

1.9. Aerosols (dispensers)

These devices are non-refillable receptacles made of metal, glass or plastics and contain a compressed, liquefied or dissolved under pressure gas, with or without a liquid, paste of powder, and fitted with a release device allowing the content to be ejected as solid or liquid particles in suspension, as a foam, paste or powder or in a liquid state or in a gaseous state.

Hazard pictogram and hazard categories			
Signal words	***Danger***	***Warning***	
Hazard statements	**H222:** Extremely flammable aerosol.	**H223: F**lammable aerosol	/
	H229: Pressurized container. May burst if heated.		

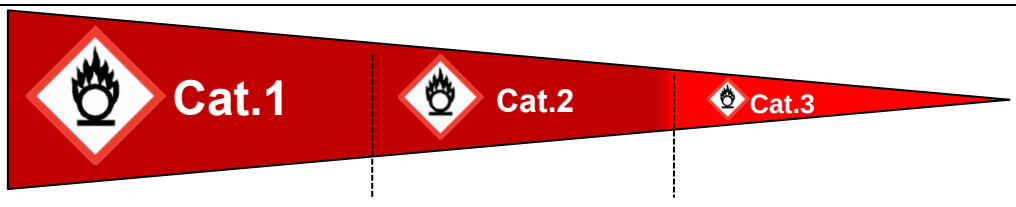
1.10. Oxidizing gases

Gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does. “Gases which cause or contribute to the combustion of other material more than air does” means pure gases or gas mixtures with an oxidizing power greater than 23.5%.

Hazard pictogram	
Hazard category	**Cat. 1**
Signal word	***Danger***
Hazard statement	**H270:** May cause or intensify fire; oxidizer.

1.11. Oxidizing liquids and solids

An oxidizing liquid or solid is a substance that while in itself not necessarily combustible, may, generally by yielding oxygen, cause or contribute to the combustion of other material.

Hazard pictogram and hazard categories			
Signal words	***Danger***		***Warning***
Hazard statements	**H271:** May cause fire or explosion; strong oxidizer.	**H272:** May intensify fire; oxidizer.	

1.12. Gases under pressure

Gases contained in a receptacle at a pressure of 200 kPa or more, or which are liquefied or liquefied and refrigerated.

Hazard pictogram				
GHS classification *(hazard class divided into 'Groups' not 'Categories')*	**Compressed** (entirely gaseous @ -50°C: includes gases with a critical temp. (T_c) ≤ -50°C).	**Liquefied** (partially liquid at T > -50°C: high pressure liquefied gas: -50°C <T_c ≤ 65°C and gas with T_c > 65°C).	**Dissolved** (dissolved in a liquid phase solvent).	**Refrigerated liquefied** (partially liquid because of its low temperature).
Signal word	***Warning***			
Hazard statements	**H280:** Contains gas under pressure; may explode if heated.			**H281:** Contains refrigerated gas; may cause cryogenic burns or injury.

1.13. Corrosive to metals

Substance or mixture, which can attack and severely damage metals through chemical action.

Hazard pictogram	
Hazard category	**Cat. 1**
Signal word	***Warning***
Hazard statement	**H290:** May be corrosive to metals.

2. Health hazards

The **ten classes of health hazards** of the GHS system are presented and, as depicted below, regrouped according to their pictograms.

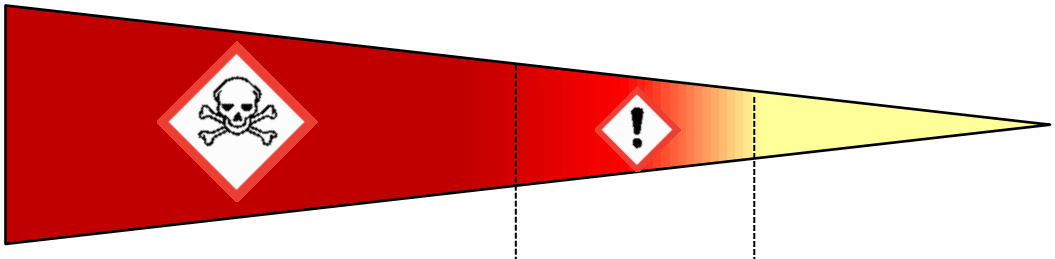
Hazard classes			Hazard categories				
Short term toxicity	Acute toxicity		1 to 3	4			5*
	Skin	Corrosion/ irritation	1A, B & C	2			3*
		Sensitization		1			
	Serious eye damage/ eye irritation		1	2A			2B*
	Respiratory tract	Sensitization	1				
		Irritation		STOT-SE 3			
Long term toxicity	Mutagenicity		1A & 1B	2			
	Carcinogenicity		1A & 1B	2			
	Reprotoxicity		1A & 1B	2	effects on lactation		
	Specific Target Oriented Toxicity (STOT)	Single exposure (SE)	1	2			
				3			
		Repeated exposure (RE)	1	2			
	Aspiration hazard		1	2*			

*not included in CLP.

2.1. Acute (short term) toxicity

Acute toxicity refers to those adverse effects (including death) occurring through oral or dermal administration of a single dose of a substance, or multiple doses given within 24 hours, or an inhalation exposure of 4 hours.

Substances can be allocated to one of five toxicity categories based on acute toxicity by the oral, dermal or inhalation route according to the numeric cut-off criteria as shown in the next table.

Hazard pictograms					
Hazard categories	**Cat. 1**	**Cat. 2**	**Cat. 3**	**Cat. 4**	**Cat. 5***
Signal words	***Danger***			***Warning***	
Hazard statements	**H300:** Fatal if swallowed. **H310:** Fatal in contact with skin. **H330:** Fatal if inhaled.		**H301:** Toxic if swallowed. **H311:** Toxic in contact with skin. **H331:** Toxic if inhaled.	**H302:** Harmful if swallowed. **H312:** Harmful in contact with skin. **H332:** Harmful if inhaled.	**H303:** May be harmful if swallowed. **H313:** May be harmful in contact with skin. **H333:** May be harmful if inhaled.

*not included in CLP.

2.2. Biological tissue corrosion, irritation, sensitization and damages

a) Skin corrosion is the production of irreversible damage to the skin; namely, visible necrosis through the epidermis and into the dermis.

b) Skin irritation is the production of reversible damage to the skin.

c) A skin sensitizer is a substance leading to an allergic response following skin contact.

d) A respiratory sensitizer is a substance leading to hypersensitivity of the airways following inhalation of the substance.

e) Serious eye damage is the production of tissue damage in the eye, or serious physical decay of the vision.

f) Eye irritation is the production of changes in the eye, fully reversible within a 21 days observation period.

Hazard pictograms									
Effets	Corrosion	Irritation		Sensitization		Irritation **	Se-rious dama-ge	Irritation	
Targets	**Skin**				**Respiratory tract**		**Eye**		
Hazard categories	**Cat. 1** (**1A** / **1B** / **1C**)	**Cat. 2**	**Cat. 3***	**Cat. 1**	**Cat. 1**	**STOT–EU Cat. 3**	**Cat. 1**	**Cat 2A**	**Cat 2B***
Signal words	***Danger***	***Warning***			***Danger***	***Warning***	***Danger***	***Warning***	
Hazard statements	Hazard statements for these classes and categories will be presented in Vol. 2.								

*not included in CLP.

** this category only includes irritation effects on the respiratory tract as well as narcotic effects.

2.3. Chronic (long term) toxicities

CMR substances (Carcinogenic, Mutagenic and/ or toxic for reproduction (Reprotoxic)) and substances which have **Specific Target Organ Toxicity (STOT)** belong to this class of long term toxicities.

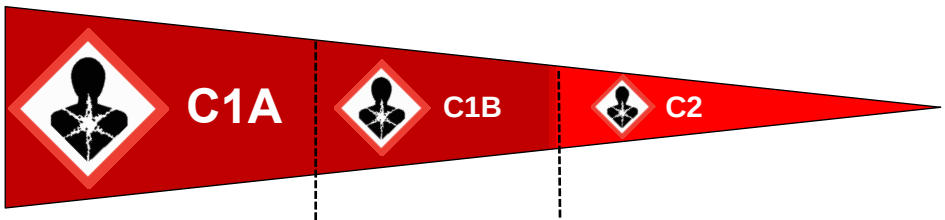
- Category **1A** means the effect on human beings has been proven
- Category **1B** means the effect on human beings is supposed (based on animal evidence).
- Category **2** means the effect on human beings is suspected (limited evidence).

Example:

- **C**1A substance is Carcinogenic for human beings
- **M**1B substance may induce human cell germ Mutations
- **R**2 compound is suspected to be Reprotoxic

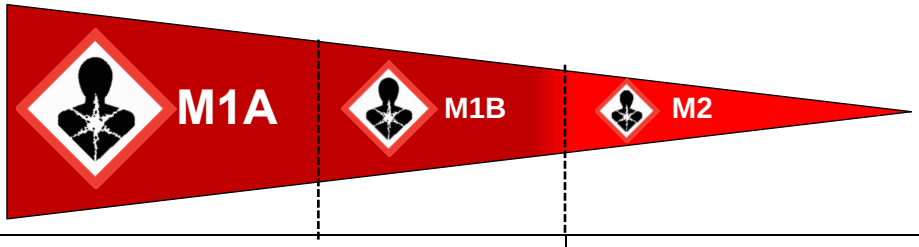
2.3.1. Carcinogenicity

Carcinogenic chemical substance or mixture of chemical substances that induce cancer or increase its incidence:

Hazard pictogram and categories		
Signal words	***Danger***	***Warning***
Hazard statements	**H350:** May cause cancer (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard).	**H351:** Suspected of causing cancer (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard).

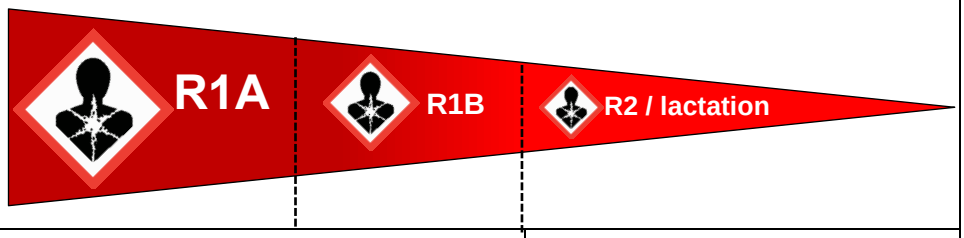
2.3.2. Mutagenicity

Germ cell mutagenicity means an agent giving rise to an increased occurrence of mutations in populations of cells and/or organisms:

Hazard pictogram and categories		
Signal words	***Danger***	***Warning***
Hazard statements	**H340:** May cause genetic defects (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard).	**H341:** Suspected of causing genetic defects (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard).

2.3.3. Reprotoxicity

Reproductive toxicity includes adverse effects on sexual function and fertility in adult males and females, as well as developmental toxicity in offspring:

Hazard pictogram and categories			
Signal words	***Danger***	***Warning***	
Hazard statements	**H360:** May damage fertility or the unborn child (state specific effect if known) (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard).	**H361:** Suspected of damaging fertility or the unborn child (state specific effect if known) (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard).	**H362:** May cause harm to breast-fed children

2.3.4. Specific Target Organ Toxicity (STOT)

The STOT category distinguishes between single and repeated exposure for Target Organ Effects.

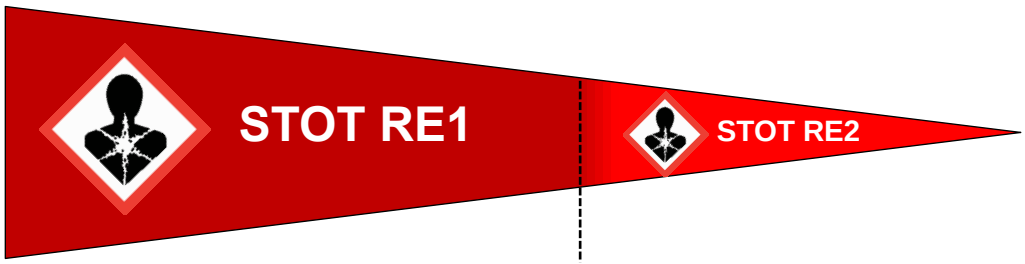
- **STOT - Single Exposure (SE)** is defined as non-lethal target organ toxicity. The effects are significant and specific and they occur after only one exposure to the chemical. Both reversible and irreversible effects are included in this definition.

- **STOT - Repeated Exposure (RE)** is similar to the STOT - SE except that for the repeated exposure the effects will only appear after two or more exposures.

STOT – Single exposure (SE):

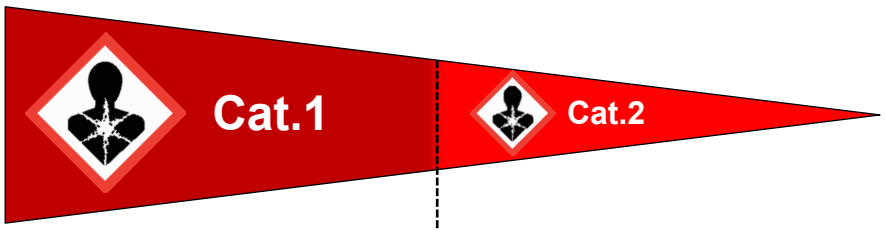
Hazard pictogram and categories			
Signal words	***Danger***		***Warning***
Hazard statements	**H370:** Causes damage to organs (or state all organs affected if known) (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard).	**H371:** May cause damage to organs (or state all organs affected if known) (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard).	**H335:** May cause respiratory irritation; or **H336:** May cause drowsiness or dizziness.

STOT – Repeated exposures (RE):

Hazard pictogram and categories		
Signal words	***Danger***	***Warning***
Hazard statements	**H372:** Causes damage to organs (state all organs affected if known) through prolonged or repeated exposure (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard).	**H373:** May cause damage to organs (state all organs affected if known) through prolonged or repeated exposure (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard).

2.4. Aspiration hazard

This class includes severe acute effects such as chemical pneumonia, varying degrees of pulmonary injury or death following aspiration. Aspiration is the entry of a liquid or solid chemical directly through the oral or nasal cavity, or indirectly from vomiting, into the trachea and lower respiratory system.

Hazard pictogram and categories		
Signal words	***Danger***	***Warning***
Hazard statements	**H304:** May be fatal if swallowed and enters airways.	**H305:** May be harmful if swallowed and enters airways.

3. Environmental hazards

The **two types of environmental hazards** of the GHS system are presented and, as depicted below, regrouped according to their pictograms.

Hazard classes	**Hazard categories**		
Acute toxicity	**1** 		2 & 3*
Chronic toxicity	**1** 	**2** 	3 & 4*
Hazardous to the ozone layer	**1** 		

3.1. Hazardous to the aquatic life

Hazard pictogram		/			/
GHS classification	**Acute**		**Chronic**		
	Cat. 1	**Cat. 2 & 3***	**Cat. 1**	**Cat. 2**	**Cat. 3 & 4***
Signal words	***Warning***	/	***Warning***	/	
Hazard statements	**H400:** Very toxic to aquatic life.	**H401:** Toxic to aquatic life. **H402:** Harmful to aquatic life.	**H410:** Very toxic to aquatic life with long lasting effects.	**H411:** Toxic to aquatic life with long lasting effects.	**H412:** Harmful to aquatic life with long lasting effects. **H413:** May cause long lasting harmful effects to aquatic life.

*not included in CLP.

3.2. Hazardous to the ozone layer

Substances with ozone depleting potential (ODP), as defined by the Montreal Protocol, are included in this hazard class. Mixtures containing ≥ 0.1 % of a substance listed in the Montreal Protocol are also included in this class.

Hazard pictogram	
GHS classification	**Hazardous to the ozone layer**
Signal word	***Warning***
Hazard statements	**H420:** Harms public health and the environment by destroying ozone in the upper atmosphere.

References

GHS (ver. 8, 2019) : https://www.unece.org/trans/danger/publi/ghs/ghs_rev08/08files_e.html

CLP (2008) : https://eur-lex.europa.eu/legal-content/FR/TXT/?uri=LEGISSUM:ev0013

ECHA : https://echa.europa.eu/fr/home

REACH : https://echa.europa.eu/fr/regulations/reach/understanding-reach

ADR-RTMD : https://www.unece.org/fr/trans/danger/publi/adr/adr_f.html and http://www.unece.org/index.php?id=41869

SUVA : https://www.suva.ch

For more information, please contact the SCC @ go.epfl.ch/Support-SCC