Warehousing and storage of solid and liquid chemicals

Storage Rules :

General rules related to storage and warehousing of solid and liquid chemicals are :

OBLIGATIONS

- *Minimize the amount of chemicals stored in premises where staff works*
- *A separate, well-ventilated room, secure, equipped with strong and fixed shelves must be organized around work areas to store chemicals, when space is available.*
- *The shelves must be grounded in order to dissipate static electricity and thus the risk of spark production.*
- *All storage facilities must be equipped with retention and their floor surface must form a retention tank.*
- *Storage must be organized so that separation and compatibility rules of chemicals are complied with. Incompatible chemicals must not be stored together*
- *Define a specific storage place for each category of chemical and store products after use*
- *All storage areas (premises, safety cabinets, refrigerators, etc.) must be identified and identifiable through the relevant pictograms*
- *Not needed, not used or expired chemicals must be moved or removed from the laboratories and storage areas*
- *Containers/packaging of chemical products must be compatible with the content*
- *Keep the containers in good condition by making sure they stay clean (ex: drips, drops), and properly closed*
- *Liquid chemicals attached to equipment must be equipped with containment in a material compatible with the chemical*

PROHIBITIONS

- *Do not store chemicals on benches or under sinks. Prefer ventilated cabinets (ex: under suction hoods)*
- *Do not store inside suction hoods (to keep optimal air flow and avoid creating non ventilated areas)*
- *Do not store products in places where they will be hard to reach*
- *Do not store large bottles in height*
- *Do not store corrosive chemicals above eye level*
- *Food and drinks for personal consumption are strictly prohibited in the laboratories, in chemical storage refrigerators or cold rooms*
- *Do not expose chemicals to heat or to direct sunlight*

As a general rule: chemicals must be stored according to their physical characteristics and compatibility rules. First of all, it is necessary to separate solids, liquids and gases!

Table of compatibility of chemicals :

Storage and warehousing of chemicals depends on the compatibility of these with each other. Indeed, some may be stored together while others must not be stored together to avoid the risk of chemical reactions. The compatibility of chemicals is shown in the following table :

			 Acid	 Base				
	+	−	o	o	o	o	o	−
	−	+	−	−	o	o	+	−
 Acid	o	−	+	−	−	−	−	−
 Base	o	−	−	+	o	o	−	−
	o	o	−	o	+	+	+	−
	o	o	−	o	+	+	+	−
	o	+	−	−	+	+	+	−
	−	−	−	−	−	−	−	+

−	**Must not be stored together**
o	**May be stored together if specific measures are taken**
+	**May be stored together**

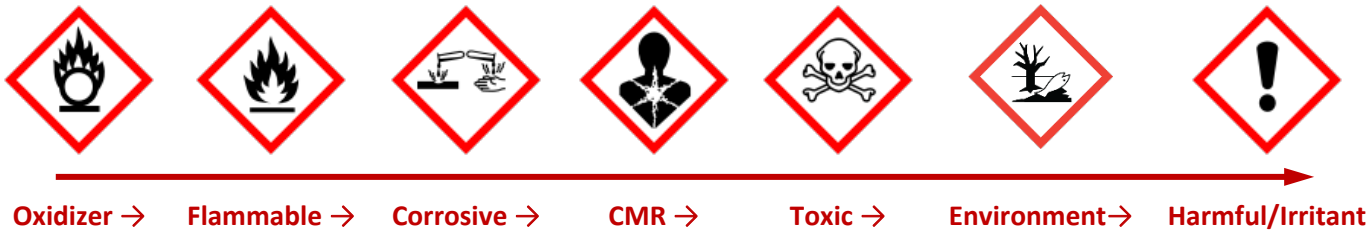
Note regarding oxidizing products (<100 kg)

These materials can be stored with other dangerous materials (o) in the same fireproof compartment provided that there is a safety distance of 2.5 m between them. Should there be a lack of space, this distance can be reduced, by separating materials with a EI 30 fireproof partition.

These incompatibility rules must be respected also in fridges and safety cabinets.

PRIORITY RULE :

If the labelling of a chemical product features several pictograms, secure storage will be defined according to the following priority rule:



Oxidizer → Flammable → Corrosive → CMR → Toxic → Environment→ Harmful/Irritant

STORAGE OF FLAMMABLE PRODUCTS :

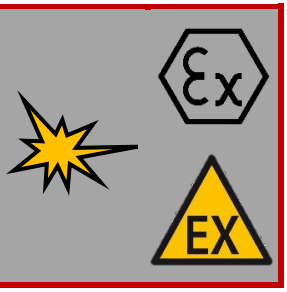
The following products are to be considered as flammable :

- Chemical products with the flammable symbol (SGH02) or with a less than 60 °C flash point
- Preparations containing flammable chemicals

Storage rules to be complied with in case of flammable chemicals are the following :

These products must be stored and used away from sources of ignition

The formation and accumulation of electrostatic charges must be avoided! Attention must be drawn to the fact that users are not a source of electrostatic discharge themselves.



The quantity of flammable products in the open area (worktop) must not exceed 15L and 100L in total in the laboratory (ventilated cabinets + non ventilated cabinets and worktops), according to FCOS Directive 1825

Storage of higher quantities must take place in a storage especially designed for this purpose (independent fireproof partition, well ventilated, equipped with containment, access control, ATEX certified material, etc.). Extraction engines must be “Ex” certified.

Storage of flammable products in hardly flammable and ventilated cabinets, equipped with containment containers, must be preferred. Even safety canisters must be stored in ventilated cabinets.

In case of cold storage, only use refrigerators provided with safety tank designed to that effect and “Ex” certified in order to avoid the risk of explosion due to a spark produced by the thermostat.

The standards to be complied with in this case are the following :

- **ATEX 94/9/EC**
- **EN 1127-1**
- **IEC 60079-0**

If this is the case, the refrigerator in question must carry a label with the relevant indications

Do not store open bottles or containers in the fridge !

When using ovens or furnaces (T° > 30°C) :

- The fumes must be extracted and discharged outside
- The ventilation in the ovens’ enclosure must be sufficient to keep the flammable vapor concentration at less than the 25% of the lower explosive limit (LEL)
- Only use ovens/furnaces designed specifically for the storage of flammable products (components not producing sparks inside, effective air renewal, ventilation connection, “Ex” certified, etc.)

Ovens must conform to standards **EN 1539** and **EN 60529**

Store only bottles that can withstand an internal pressure increase in case of accidental warming of the content

STORAGE OF CHEMICALS THAT EMIT FLAMMABLE GASES WHEN THEY COME IN CONTACT WITH WATER :

H260, H261

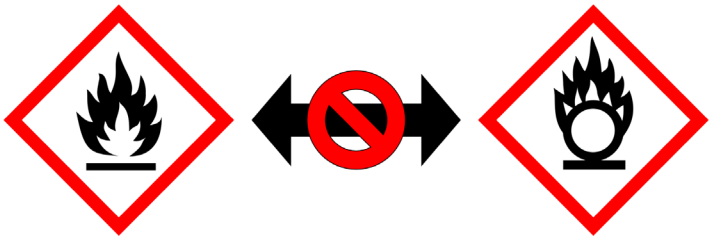
These chemicals (labeled with H260 and/or H261 statements) must be stored separately in safety cabinets where the risk of contact with water (flood, condensation, water extinguishing systems, leak in a water pipe) is totally eliminated.

The hazards in the event of contact with water must be clearly indicated on the cabinet for the attention of firefighters.

STORAGE OF OXIDIZING PRODUCTS :

Oxidizing materials must be stored in a well-ventilated and cool room, away from heat, sparks, and flames.

Oxidizing products must be stored in separate safety cabinets and away from flammable chemicals.

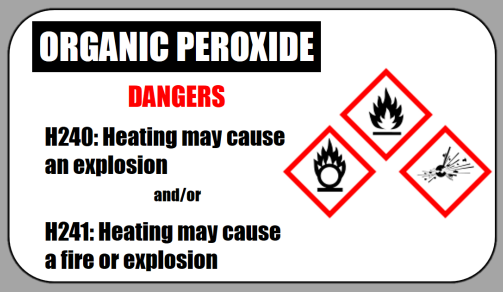


These products must be stored in separate safety cabinets in a safety cabinet provided with containment specific for such products. Where no safety cabinet is available, it is possible to store these products in a cupboard made in non-combustible material according to the same safety rules.

Note regarding explosive organic peroxides :

These materials (with general structure R-O-O-R) have the features of both oxidizing and combustible substances. They generally burn violently, or even in the form of explosion. Organic peroxides having explosive properties (statements H 240, H241) must be stored in a special way :

- Separately from other oxidizing materials
- Away from corrosive materials (explosive reaction)
- Away from organics
- Away from metal powders
- Away from easily oxidizable materials (including wood)



STORAGE OF TOXIC CMR, STOT CHEMICALS :

CMR (carcinogenic, mutagenic or reprotoxic), STOT (Specific Target Organ Toxicity, presenting a particular toxicity for a given organ) and toxic chemicals must be identified, listed and stored in a safety cabinet separated from other products.

H340, H341, H350, H351, H360, H361

A list of CMR substances (according to CLP 1272/2008 CLP regulation) is available on the INRS website.

Cyanide (CN^-) and particularly toxic products must be stored in locked, separate cabinets with access limited to authorized personnel !

STORAGE OF ACIDS AND BASES :

Concentrated acids and bases, therefore corrosive, must be stored separately in containment containers so that they may not react with each other (exothermic reactions).

Different concentrations of these products must also be separated in different containment containers.

STORAGE OF EXPLOSIVE PRODUCTS :

Explosive chemicals should be stored in separate safety cabinets security with appropriate warnings.

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