



Information for employees and students working at the Faculty of Science (W&N)

This AMD information sheet describes the safe and responsible storage of hazardous substances in a laboratory environment.

1 Regulations: the PGS-15 directive

The rules for the storage of hazardous substances in the Netherlands are laid down in the PGS-15 directive. This directive is referred to in the diverse environmental permits of buildings of the Faculty of Science, establishing its force of law. This information sheet provides the translation of the PGS-15 to the daily laboratory practice. Explosive and radioactive substances do not fall under PGS-15. Gasses do fall under PGS-15, even though they are not described here. Please see AMD information sheet VOM022 *Storage of gasses* for information about the storage of gas cylinders.

When it comes to the storage of hazardous substances, occupational health, as well as environmental aspects matter. There should neither be vapours that may pose a health risk, present in the storage facility, nor should there be a risk of their formation. Furthermore, no substances should be released into the environment in cases of fire or leaking. To limit the risks, the diverse risk categories of chemicals must be compartmented or stored separately. In this, PGS-15 is based on the hazard categories of the ADR (transport legislation). Because we work with the hazard symbols from the GHS/CLP within the university, and not the ADR hazard categories, we provide a translation for the practical application.

[GHS/CLP hazard symbols](#) should be present on every packaging in use. The labels of solutions and dilutions for your own use must state the hazards too. Jars with orange/black WMS symbols are not allowed anymore.

2 Where may we put what?

2.1 In lockable, fire resistant cupboards

In the ventilated, lockable, 90 minutes fire resistant, safety cupboards, in short, fire resistant cupboards, you are supposed to store toxic, environmentally hazardous, oxidizing, and flammable substances. CMR substances ("Carcinogenic, Mutagenic, and Reprotoxic substances" see AMD infosheet VOM012) must be stored in a lockable cupboard or lockable compartment.



The content of a packaging according to PGS-15 = conform its label!

- Therefore, even if a 1 litre bottle is only one quarter filled, it still counts as a full 1 litre bottle.
- To EMPTY BOTTLES the same measures apply as to full ones!

The cupboard should be lockable because of legislation regarding toxic substances. It should be fire resistant to prevent fire escalation due to the additional release of the cupboard's contents. The 90 minutes fire resistant cupboards are the only type of cupboards allowed within the Faculty of Science. The cupboards should be ventilated when they contain opened packagings, to protect employee health.

The fire resistant cupboard should conform to standard NEN-EN-14470-1 (for this, there should be a product certificate present in the cupboard) and the following information should be present in an easily visible place on the outside:

- a) "deuren sluiten (wanneer kast niet wordt gebruikt)" [Please close the doors (when the cupboard is not in use)]
- b) hazard symbol: 'Fire, open flames, and smoking prohibited'
- c) hazard symbol: 'Fire hazardous substances'
- d) the applicable NEN standard
- e) the cupboard's fire resistance performance, for the Faculty of Science this is type 90 (minutes fire resistant).

Furthermore, the following information should be present in or on the cupboard:

- f) name or brand of the manufacturer
- g) type number and year of manufacture
- h) maximum capacity
- i) maximum load of the shelf

The diverse shelves serve as compartments and as drip trays of a certain capacity. Therefore, you may only store substances of one single hazard category, for example, flammable, per shelf. Most hazard categories are incompatible and may not be combined on one shelf (See Chapter 3). If you need to store multiple categories on one shelf, you may create more compartments using extra drip trays.

Please make sure that you do not store more on a shelf than allowed:

- The maximum capacity of the fire resistant cupboard is set at 250 litres.
- The maximum spillage capacity per shelf should be 110% of the contents of the largest packaging on said shelf, or 10% of the total contents, the largest capacity applies.

2.2 In a normal cupboard

Solid chemicals with the single pictogram "hazardous (exclamation mark)" may be stored in a normal cupboard. Generally, these are salts.



2.3 In a refrigerator or freezer

Some substances need to be stored under cooling. In those cases one should take forbidden combinations (See Chapter 3) into account as well.

Flammable substances may only be stored in an explosion-safe refrigerator. If not, even the door switch that activates the light in the refrigerator, may provide enough energy to ignite some vapour/air mixtures.

To avoid confusion, it is recommended to have every newly purchased chemicals refrigerator pass by Technical Services to make it explosion-safe. Non-explosion-safe refrigerators are marked with a yellow sticker with the text: “niet-explosieveilig” (“not explosion-safe”). These stickers are available at the AMD. Due to contamination risks, no food stuffs may be stored in chemicals refrigerators!

If any GMOs are stored in the refrigerator or freezer, the samples as well as the refrigerator should have a label indicating the GMO project number.

2.4 On the lab bench

Per room the maximum amount of hazardous substances on lab benches is 25 kg or litre. In the Dutch Working Conditions Act (“Arbowet”) this is called the daily inventory or working inventory. In other words, you are allowed to keep the bottles and jars that you are using on a day, outside of a storage facility, but you have to return these to the cupboard at the end of the day. On a lab bench too, the bottles with a hazardous content should be kept in a drip tray.

Solutions of substances that are diluted with water to a level at which the hazardous properties are brought down to the level “harmful” or below, may be stored on the lab bench or in a rack above it. Please ensure clear labelling of the contents and use only clean bottles for this, without the original label with hazard symbols.

2.5 In the fumehood and its bottom cupboards

A fumehood is not a storage facility. Even worse, in case of glass breakage or spillage chemicals may pour directly into the drainage. If you are using bottles from your daily inventory in the fumehood, please always put these in a drip tray. This applies to the waste containers that are put in the fumehood as well.



No hazardous substances may be stored in the bottom cupboards of fumehoods. (Except when the fumehood is fitted with a chemical cupboard underneath.) However, if there is insufficient room in the fire resistant cupboards, our environmental permits allow for the storage of acids and bases in the ventilated bottom cupboards of the fumehoods. Therefore, the acids and bases do not necessarily need to be stored in fire resistant storage facilities, but they have to be separated in separated drip trays, to prevent any unwanted reactions. Ventilated bottom cupboards may be recognized by the sticker with the text: “geventileerde onderkast” (“ventilated bottom cupboard”).

3 The proper lay-out of the fire resistant cupboards

In the lay-out of the fire resistant cupboards one needs to take not only the maximum load and spillage capacity of the shelves into account, but also any combinations of chemicals that may lead to unwanted reactions, the so-called incompatible or forbidden combinations. Below, you will find a table of substances that may not be stored together within one compartment (indicated with X). Even though environmentally hazardous substances form a separate ADR risk category, these are subdivided depending on their other properties. Explosive substances require a separate assessment.

	Oxidizing	Flammable liquid	Flammable solid	Toxic	Corrosive
Oxidizing		X	X	X	X
Flammable liquid	X		X	X	X
Flammable solid	X	X			X
Toxic	X	X			X
Corrosive	X	X	X	X	

*Please note: a lay-out of a fire resistant cupboard based **on the alphabetical order of substance names** is allowed only **within the same hazard category**. For example, when the fire resistant cupboard or compartment is meant only for flammable solvents!*

Conflicts within a compartment may occur too, for example, between acids and bases, that must be separated too. Acids and bases are always stored at the bottom of the cupboard, in separate drip trays. Please be careful with nitric acid (an oxidizer), this has to be stored separately from formic acid, acetic acid, hydrochloric acid, and formaldehyde solutions. Furthermore, (hypo)chlorite (solutions) (oxidizing) should never be stored with acids, and perchloric acid should never be stored with organic substances.

4 Internal regulations for storage of hazardous substances

- On every bottle there should be a [GROS](#) label (see AMD infosheet RhL100 Chemicals Registration). The bottle should be stored in the location mentioned on the label.
- Keep the chemicals inventory as small as possible. That way, there will be sufficient storage capacity, and the amount of chemicals in the lab will remain controllable in case of calamities. Please:
 - Check and clean up the chemicals inventory at least once a year.
 - Make sure that departing researchers put their inventory of used chemicals in order.
 - Do not keep chemicals beyond their expiration dates.
 - Do not order more than you require or will use in the foreseeable future.

- Do not keep substances for periods longer than 5 years, and do not keep peroxide forming chemicals, such as diethyl ether, for periods longer than 12 months.
- Please enter mutations, such as relocation to another cupboard or disposal of jars, also into GROS.
- Make a habit of returning used bottles and jars to the fire resistant cupboards at the end of the workday.
- Make someone responsible for the lay-out and check-ups of the fire resistant cupboard.
- Pallets with solvents must be unstacked within one working day, with the bottles stored in fire resistant cupboards.
- Put acids and bases at the bottom of the fire resistant cupboards in view of their corrosive nature.
- Make sure that jars and bottles are clean at the outside, so they may be handled without gloves.
- Transport bottles in a bottle rack or bucket, and larger amounts on a cart in a drip tray.
- Waste containers next to equipment should be in a drip tray too.
- Please find the regulations regarding hazardous waste in [AMD information sheet RhL090 Waste collection guide](#).