

SAFETY AND HYGIENE REGULATIONS



Servei de Prevenció de Riscos Laborals
UNIVERSITAT POLITÈCNICA DE CATALUNYA

PROPER STORAGE OF CHEMICAL PRODUCTS

CODE **SHR 302** Date: **April 2009** Revision: **00** Page: **1 of 6**

1. INTRODUCTION

Laboratories tend to be equipped with a wide range of chemical products with different characteristics and hazards. They are generally kept in small quantities and need to be stored. Their management has special characteristics, so specific technical regulations and safe working practices are required to ensure the health and safety of laboratory users.

The storage of chemical products in a laboratory depends on several variables:

- ✓ The intrinsic hazards of the chemical.
- ✓ The amount that needs to be stored.
- ✓ The type and dimensions of the container in which the chemical is kept.
- ✓ The location according to the type of storage (safety containers, safety cabinets, store, etc.).
- ✓ The distribution of the chemical products.
- ✓ The prolonged storage of chemical products, which in itself involves risks because polymerization and decomposition reactions may occur, with the formation of unstable peroxides, or the build-up of gas due to the slow decomposition of the substance, which could break the container.

Consequently, laboratory users must have suitable training and information about chemical storage.

The following information is required to manage chemical products properly and efficiently:

- ✓ The amount of the product to be stored, after reducing stock levels.
- ✓ Information about the chemical's hazards, written on the product's label and showing the name of the chemical, symbols, indications, R-phrases and S-phrases, etc.
- ✓ The safety data sheet (SDS).
- ✓ Incompatibilities between chemical products.

2. IDENTIFICATION OF THE CHEMICAL PRODUCT

Identification of chemical products and preparations is a priority and should be done using the following:

- ✓ The label of the chemical product,¹ which contains symbols, pictograms, R-phrases and S-phrases.
- ✓ The safety data sheet (SDS)², specifically Section 7, which specifies how to handle and store the chemical. The SDS should be used to obtain initial information about the danger of the chemical product to be stored, and how to store it properly.

¹ *Manufacturers, importers and suppliers of chemical products and substances for use in the workplace must package and label them in a way that ensures they are kept and handled in safe conditions, and clearly identifies their content and the risks of storing or using them for the safety and health of workers (Law 31/1995, on the prevention of occupational hazards).*

² *The person responsible for marketing a dangerous substance or preparation must provide the recipient of the product, who must be a professional, with a safety data sheet (SDS) in order to provide a system of information directed mainly at these users that enables them to take the necessary measures for protecting health and safety in the workplace.*

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3. STORAGE OF CHEMICAL PRODUCTS

3.1 Criteria for proper storage

Once chemical products have been correctly identified, they should be stored properly, taking into account the following aspects, among others:

- ✓ Some chemicals are associated with more than one hazard through the use of more than one symbol or pictogram on their label. Such products must be stored according to the most restrictive risk.
For example, acetone is a flammable and irritant chemical, according to the pictograms given on its label. Therefore, acetone must be stored along with other flammable chemicals in a specific safety cabinet for flammable products, according to the hazard criterion.

More
restrictive



Less
restrictive

- ✓ Incompatibility between chemical products. Reactivity between chemical products:
 - Compounds that react strongly with water
 - Compounds that react violently with air or oxygen (spontaneous combustion)
 - Incompatible groups of substances
- ✓ Dangerous reactions of acids
- ✓ Easily peroxidisable substances
- ✓ Regarding carcinogenic or mutagenic chemicals, regulations in Article 4 of Royal Decree 665/1997, on the protection of workers from risks associated with exposure to carcinogenic agents at work, states the following:
"As far as technically possible, employers will avoid the use of carcinogenic or mutagenic agents at work, particularly by replacing them with a substance, preparation or procedure that, under normal conditions of use, is not dangerous or is less dangerous for the health and safety of workers".
If the use of such products cannot be avoided, they must be stored in a safe place that can only be accessed by authorised people.
- ✓ Chemical products in larger containers must be placed on lower levels in order to reduce the amount of effort required to pick them up, and consequently the risks. Chemical products in containers of over half a litre should not be placed on high shelves or drawers.
- ✓ If a chemical product is not used, it should be removed from the laboratory using the established procedure for collecting waste.

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3.2 Types of storage of chemical products

3.2.1. Safety containers

Safety cans for storing flammable chemical products (Photo 1). These cans must have the following safety features, among others:

- ✓ A fire guard that dissipates heat to prevent flame blowback.
- ✓ Suitable signs on the can, according to current legislation.



Photo 1

3.2.2. Chemical storage cabinets

Chemical storage cabinets may be located in a laboratory or a chemical store.

They must have the following characteristics, among others:

- ✓ CE marking, identification and proper signs, according to current legislation.
- ✓ An instruction manual in Spanish.
- ✓ An extraction system that ensures circulation of fresh air within the cabinet. The best extraction system to meet the specific needs must be selected according to the class of chemicals stored, the location of the cabinet, and the outlet of the extraction pipe, among other factors.

Examples of extraction systems:

- Mechanical ventilation system that can ensure suitable air exchange within the chemical storage cabinet. The pipes for this system may be rigid or flexible and must reach outside the laboratory or store in which the chemical cabinet is situated.
- A ventilation system with a filter for circulating air that can retain solvent vapours (hydrocarbons) permanently, until the filter is saturated by over 99.999%. The purified air must be emitted directly from the chemical storage cabinet into the workplace.

A preventive maintenance programme must be established to ensure the good use and condition of the chemical storage cabinet. In particular, the efficiency of the ventilation system and the state of the components in the cabinet must be inspected to see whether any component has rusted, deteriorated, broken, etc.

There are different types and classes of chemical storage cabinets, with different layouts and sizes. Below is a description of two types.

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A) Safety cabinet for storing flammable chemical products

Safety cabinets for storing flammable chemicals (Photo 2) must be capable of resisting fire for at least 15 minutes, in accordance with regulation UNE-EN 14470-1:2005 "Safety cabinets to protect against fires. Part 1. Safety cabinets for flammable liquids".

According to Complementary Technical Instruction ITC MIEAPQ-1 on flammable liquids, the following points should be taken into account:

- ✓ Safety cabinets are all those that are resistant to fire for 15 minutes, in accordance with regulation UNE-EN1634-1.
- ✓ The cabinets must have a clearly visible sign indicating that they contain flammable products.
- ✓ No more than three cabinets should be installed in the same laboratory, unless each group of three is separated by at least 30 metres.
- ✓ The maximum amount of liquid that can be stored in a safety cabinet is 500 L.
- ✓ The maximum amount of products of each class that can be stored is 100 L of class A, 250 L of class B and 500 L of class C. If liquids of different classes (A+B+C) are stored, the total amount must be ≤ 500 L, without exceeding the aforementioned limits for A and B.



Photo 2

B) Cabinet for storing corrosive, irritant, harmful and toxic products

In addition to the general considerations for chemical storage, cabinets for storing **corrosive, irritant, harmful and toxic** products (Photo 3) must meet the following minimum safety requirements, among others:

- ✓ Airtight seals to prevent dangerous vapours from getting out.
- ✓ An interior compartment without metal components.
- ✓ Leak-proof drawers made from plastic that is highly resistant to chemical products.

As a wide range of chemical products may be stored in a safety cabinet, it is very important to separate them by considering incompatibilities between chemicals. Each of the drawers/shelves that form the internal composition of the cabinet should be identified with the corresponding pictogram.

These types of cabinets ARE NOT SUITABLE for storing flammable chemical products.



Photo 3

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3.2.3. Chemical storage

A chemical store must meet the following safety requirements, among others:

- ✓ **Cabinets and/or shelving units must be suitable for chemical storage.**

The types of cabinets that could be placed in a store are, for example, those described in Section 3.2.2.

A shelving unit for chemical storage is made from panels of melamine with PVC, divided into one, two or more compartments without doors. It is particularly suitable for storing acid and base products. It is **NOT SUITABLE** for storing **flammable chemical products**.

Each of the compartments must be used to store acids or bases, and each one must have pull-out drawers made from polypropylene (a suitable material for corrosive products) and a lower shelf with a sheet of polypropylene that is black or the same colour as the shelves to protect against small spills of chemical products.

As a storage model and for suitable management of chemical products, the shelves should be listed, labelled and identified with the corresponding hazard or danger symbol or pictogram on the drawers, to facilitate the location of a chemical product (see Photos 4 and 5).

Below is a diagram showing an example of how to label a shelving unit (by columns and drawers) for chemicals, so that products can be found easily.

A1 Corrosive	B1 Irritant	C1 Inert	D1 Inert
A2 Corrosive	B2 Irritant	C2 Inert	D2 Toxic
A3 Corrosive	B3 Irritant	C3 Inert	D3 Toxic
A4 Corrosive	B4 Inert	C4 Inert	D4 Harmful
A5 Inert	B5 Inert	C5 Inert	D5 Harmful



Photo 4



Photo 5

- ✓ **Forced extraction system:** installed depending on the dimensions and characteristics of the chemical store, to ensure suitable air exchange within the store. For example, if flammable chemical products need to be stored, the motor of the extraction system must be flameproof.

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- ✓ **Identifying signs** at the entry to the store stating:
 - Danger, CHEMICAL STORAGE AREA (Photo 6)
 - No entry to unauthorised people (Photo 7)
 If the store only holds flammable chemical products, the following signs must be added:
 - Danger, flammable materials (Photo 8), and
 - Danger: no smoking or open flames (Photo 9)
 These signs must be placed on one side of the entrance to the chemical store.
- ✓ **An emergency spill kit** for liquid chemical products, for use in the case of an accidental spill (Photo 10).
- ✓ **Baskets to transport bottles or containers** of chemical products, particularly half-, one- and two-litre bottles (Photo 11).
- ✓ **An emergency shower and/or eyewash station** that is clearly visible, accessible, and situated no more than 8 to 10 metres from the chemical store in a place with no obstacles (Photo 12 and 13).
- ✓ **Spill mats** to contain small spills and/or leaks from waste that is stored (Photo 14). All stores of chemical products should have an area set aside for the storage of any waste that is generated. Spill mats measure approximately 50 x 50 cm and each one can retain approximately 3 litres of chemical products (waste).
- ✓ **A system for recording and monitoring the entry and exit** of chemical products from the store. The following variables at least should be monitored:
 - The amount of the chemical product that enters or leaves the store.
 - The date of entry of the chemical product.
 - The expiry date of the chemical product.
 - The location of the chemical product in the store.
- ✓ **Safety data sheets (SDS)** for chemical products that are kept in the store. A printed copy of each stored product's SDS should be kept in the store.



Photo 6



Photo 7



Photo 8



Photo 9



Photo 10



Photo 11



Photo 12



Photo 13



Photo 14