This Information Sheet provides guidance on how chemicals should be stored in order to protect people, the environment and other assets such as property. It should be read in conjunction with supporting Information Sheets eg *'Identifying Chemical Hazards'*.

Background

Unless chemicals and chemical waste are stored correctly the health and safety of individuals may be compromised, the environment could be put at risk and property and other assets could also be damaged. The following is an example of what can go wrong if chemicals are stored incorrectly:

Unsafe storage of chemicals leading to M6 and M55 being shut for over two hours

Unsafe handling of chemical waste leading to 50m high fire

What is Storage?

Storage does not just refer to chemicals that are locked away in a cabinet. You must also consider chemicals that are being used daily eg those on the lab bench, chemicals on shelves, waste chemicals or any new chemicals you are thinking of ordering.

General Principles of Storage

- Only store minimum quantities of chemicals in laboratories.
- As a guideline a total volume of flammable liquids in a laboratory should not exceed 50 litres, and the total of any one flammable chemical should not exceed 5 litres.
- Never use fume hoods to store chemicals on a long term basis.
- Bulk chemicals should be stored in suitably risk assessed facilities. At the University external chemical stores are available for storing bulk chemicals.
- Hazardous waste chemicals should be disposed of promptly and properly *(see Information Sheet 7 – Safe Disposal of Chemicals).*
- Use an appropriate bottle carrier when transporting 2.5 litres or more of liquid chemicals.
- Always double check before ordering in case the chemical is already in stock.

If using shelves for storage never:

- Overload the shelves.
- Store hazardous liquids or glass items above shoulder height.
- Store heavy items above shoulder height.
- Stand on a bench or a chair to reach something.

- When storing chemicals you have prepared eg mixtures / solutions always:
  - Use a suitable container, made of a compatible material and size
  - Make sure container caps can vent if the chemicals held could build-up pressure. **Seek advice if unsure how to do this.**
  - Label the chemical container clearly with: chemical name, concentration, associated hazards, your name and date. Remember the change in symbols following the full introduction of CLP from 1st June 2015.

Specialist Requirements

Some chemicals eg solvents must be stored in specific types of cabinets and in bunded trays to capture spills. But remember to keep them clean with materials used such as paper towels, disposed of correctly too.

NOTE: *The Classification, Labelling and Packaging Regulations will fully replace the Chemicals (Hazard Information and Packaging for Supply) Regulations from 1st June 2015. Symbols will be replaced with the red symbols and Risk and Safety Phrases will be replaced by Hazard and Precautionary Statements. Further information can be found on the HSE Website and in Info Sheet 8.*

Definition & New CLP Data	Old Symbol	New CLP Symbol	Storage
TOXIC / VERY TOXIC / HARMFUL: GHS-06: ○ Acute toxicity (Cat 1 - 3) ○ Oral, dermal, inhalation			These must be stored in an appropriate locked Poisons Cabinet with access restricted to this
CORROSIVE: GHS-05: ○ Corrosive to metals ○ Skin corrosion ○ Severe eye damage			Concentrated acids must be stored in special cupboards and properly bunded. Strong alkalis must be kept separate from strong acids

Definition & New CLP Data	Old Symbol	New CLP Symbol	Storage
NO PREVIOUS CATEGORY: Closest match Irritant / Toxic GHS-08 (New): ○ Respiratory sensitisation ○ Germ cell mutagenicity ○ Carcinogenicity ○ Reproductive toxicity specific target organ toxicity ○ Aspiration hazard			These must be stored in an appropriate locked Poisons Cabinet
EXPLOSIVE: GHS-01: ○ Unstable explosives ○ Explosives divisions 1.1 – 1.3 ○ Self-reactive substances and mixtures types A, B ○ Organic peroxides, types A,B			Always seek advice from a suitably qualified person eg experienced Lab Technician or H&S Adviser before purchasing or storing explosive chemicals
OXIDISING: GHS-03: ○ Oxidising gases, liquids and solids			Never store with flammables, highly flammables, inflammable organic solvents, explosives and certain other chemicals as described in the relevant MSDS
HIGHLY / EXTREMELY FLAMMABLE: GHS-02: ○ Flammable gases, aerosols, liquids or solids ○ Self-reactive substances and mixtures ○ Pyrophoric liquids and solids Self-heating substances and mixtures ○ Substances and mixtures, which in contact with water emit flammable gases ○ Organic peroxides			These must be stored in fire proof cupboards and properly bunded
INFLAMMABLE ORGANIC SOLVENTS:			Must never be kept in refrigerators which are not spark proof

Types of Storage

Poisons Store – must be kept locked

Ventilated Acid and Solvents Store

Storage Unit marked to show contents & hazards

External bulk Chemical Store

General Storage

Always check containers are stored in a suitable bund with the volume of the bund at least 110% of the largest container stored in the cabinet.

Regularly inspect cabinets, bunds etc for spills or signs of leaking containers. If there are problems with a container seek help when decanting its contents and ensure any materials used to clean spills, and redundant containers are disposed of correctly.

In addition, keep an eye out for signs of corrosion in Acid Cabinets – this could show the cabinet is unsuitable.

Storing Flammable, Corrosive and Oxidising Chemicals on Laboratory Benches

Minimal quantities of flammable, corrosive and oxidising chemicals needed for ongoing experiments can be stored on laboratory benches **BUT ONLY** if the correct, labelled container is used.

At the end of the experiment the chemicals must either be correctly disposed of, or returned to the appropriate store.

Incompatible Chemicals

General Principles – before storing chemicals, **CHECK** the chart on the following page and remember:

- Segregate organic and inorganic chemicals.
- Separate chlorinated organic liquids and non-chlorinated organic chemicals.
- Keep strong acids and strong alkalis separate.
- Keep flammable and oxidising chemicals separate.
- Always think about what was in an empty container before using it. Even if it has been washed out, it may contain residues that are incompatible with the new chemical leading to fire, explosion or production of toxic gases.
- Use vented containers if there could be a risk of a build-up of pressure.

See *Information Sheet CS4 – Chemical Compatibility* for further information on chemical incompatibility.

Chemical Storage Compatibility

TYPE	Explosive	Oxidising	Extremely Flammable	Highly Flammable	No Symbol	Very Toxic	Toxic	Harmful	Corrosive	Irritant	Radio-active
Explosive	Y	N	N	N	N	N	N	N	N	N	N
Oxidising	N	Y	N	N	N	N	N	?	N	?	N
Extremely Flammable	N	N	Y	Y	Y	N	N	Y	N	Y	N
Highly Flammable	N	N	Y	Y	Y	N	N	Y	N	Y	N
No Symbol	N	N	Y	Y	Y	N	N	Y	N	Y	N
Very Toxic	N	N	N	N	N	Y	Y	Y	N	Y	N
Toxic	N	N	N	N	N	Y	Y	Y	N	Y	N
Harmful	N	?	Y	Y	Y	Y	Y	Y	N	Y	N
Corrosive	N	N	N	N	N	N	N	N	Y	N	N
Irritant	N	?	Y	Y	Y	Y	Y	Y	N	Y	N
Radio-active	N	N	N	N	N	N	N	N	N	N	Y

KEY:

Y	May be stored together
N	**MUST NOT** be stored together
?	May be stored together subject to **SPECIAL PRECAUTIONS**

NOTE:

To prevent fire and explosion organic acids eg acetic and formic acid should be stored separately from common mineral acids such as sulphuric and nitric acid.

Organic acids are generally safe to store with flammables or solvents.