Health and Safety Services

UNIVERSITY OF GREENWICH

Safe Storage of Chemicals in Laboratories

Contents

1. Overview

This document explains the minimum expectations regarding the safe storage of chemicals in University laboratories, in compliance with statutory requirements including the Control of Substances Hazardous to Health Regulations 2002 (COSHH), the Classification, Labelling and Packaging of Substances and Mixtures Regulation (CLP), and the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR).

It is designed to protect staff, students, visitors, and contractors from risks associated with hazardous chemicals by setting out principles for safe segregation, secure containment, correct labelling, and appropriate storage conditions. However, the guidance is not meant to be exhaustive, and risk assessors must check specific Safety Data Sheets (SDS) for more detailed information.

2. Definitions

"Flammable Cabinet" - A fire-resistant metal cabinet designed for safe storage of flammable liquids and vapours.

"Hazardous Chemical" - Any substance classified under COSHH, CLP or DSEAR as flammable, toxic, corrosive, oxidising, explosive, harmful to health or the environment.

"Incompatible Substances" - Chemicals that react dangerously when mixed (e.g. oxidisers and flammables, acids and bases).

"(Material) Safety Data Sheet / (M)SDS"- Manufacturer's safety information sheet detailing chemical properties, hazards, handling, storage, and emergency procedures.

"Secondary Containment" - Use of trays, cabinets or bunds to contain spills or leaks from primary storage containers.

3. Roles and Responsibilities

3.1. Senior leadership

Members of the University Senior Leadership Team (SLT), play a role in chemical safety by ensuring that sufficient resources financial, personnel, and infrastructural are allocated to support safe chemical storage and handling.

They are responsible for integrating chemical safety responsibilities into faculty and directorate activities, embedding these obligations within departmental objectives and performance metrics. Senior leadership must promote a culture of health and safety, ensuring that all staff understand their accountability for chemical safety and are supported in fulfilling these responsibilities

3.2. Managers

Anyone with line manager or supervisory responsibility for the laboratory users or of the facilities / equipment within them, are critical in translating institutional policies into practical safety arrangements. They ensure that chemical storage follows university procedures, including proper segregation, labelling, and secure containment.

Managers / Supervisors are also responsible for guaranteeing that all staff / students under their supervision receive appropriate chemical safety training, encompassing inductions, refresher sessions, and specialised hazard awareness. They conduct regular inspections of

chemical storage areas to identify and mitigate risks, ensuring that any deficiencies are addressed promptly.

3.3. Health and Safety Managers

Health and Safety Managers provide competent technical advice to support safe chemical practices across the organisation. They advise management and staff on chemical hazards, compatibility, storage requirements, and compliance with regulatory standards.

Their responsibilities include developing, reviewing, and updating chemical safety procedures, policies, and guidance documents in line with best practice and legislative requirements. Health and Safety Managers also coordinate risk assessments and audits related to chemical storage to ensure continuous improvement.

3.4. Health and Safety Local Officers

Health and Safety Local Officers (HSLOs) act as a vital link between managers, laboratory users, and the health and safety services team. They support managers in monitoring chemical storage practices through routine inspections and checks. HSLOs report deficiencies, unsafe practices, or non-compliance and escalate significant risks to the Health and Safety Manager or senior leadership. They can also provide practical advice on the correct use of storage equipment, spill containment measures, and day-to-day safe handling of chemicals.

3.5. All staff

All staff members who handle chemicals are responsible for following guidance and procedures on chemical storage, handling, and segregation. They must report any damaged containers, leaks, spills, or unsafe practices immediately to supervisors or their managers, and they are expected to actively participate in training sessions and maintain awareness of updates to chemical safety policies

3.6. Students

Students working with chemicals in laboratories or workshops are required to handle substances responsibly and in strict accordance with laboratory instructions and risk assessments. They must store chemicals only in designated areas and report incidents, leaks, or damaged containers to staff without delay.

3.7. Lab Technicians

Laboratory technicians are expected to maintain accurate inventories of chemicals, ensure proper labelling and segregation, and support safe storage practices.

3.8. Contractors

Contractors must comply fully with university procedures for the temporary storage, handling, and disposal of chemicals while on site, ensuring that their activities do not compromise the safety of staff, students, or the wider laboratory environment.

4. Basic Principles on Chemical Storage

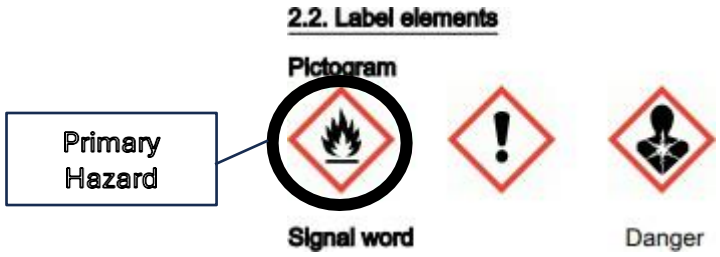
On receipt, containers must be labelled with the date acquired together with the name / initials of the owner / purchaser and the disposal date.

Substances which have an expiry date assigned by the manufacturer must have this date highlighted. For substances with no assigned expiry date, the date of purchase must be noted and an expiry date of 7 years from this date must be assigned to the item.

These details must be entered onto a local chemical inventory for traceability.

4.1. Hazard Based Storage

All chemicals should be stored according to their hazard classification, with primary hazards prioritised. The primary hazard can be identified from the first pictogram listed in Section 2.2 of the Safety Data Sheet (SDS). For example, a chemical whose primary hazard is **'flammable'** should be stored accordingly.



4.2. Segregation of Incompatible Substances

Chemicals with similar hazard types should be stored together, while incompatible substances must be kept separate to prevent dangerous reactions. All hazardous chemicals should be clearly labelled with their hazard category (e.g., flammable, corrosive, oxidising, toxic).

4.3. Minimising Stock

Laboratories should maintain only the minimum necessary quantities of hazardous chemicals. Unneeded chemicals should be disposed of promptly in accordance with disposal procedures.

4.4. Safe Handling and Storage Practices

- Store containers, particularly liquids, below shoulder height to reduce the risk of spills and accidents.
- Ensure that all containers are tightly sealed to prevent leaks or the release of fumes and vapours.
- Never carry chemical bottles by the top. Large containers, such as 2.5-litre Winchester bottles, should be transported in carriers or baskets that provide full base support.

4.5. Fume Cupboards

- Fume cupboards are not intended for chemical storage.
- Working surfaces should remain clear of containers not actively in use.

- Excessive storage within fume cupboards can disrupt airflow, reducing protection for users.
- Flammable solvents should never be stored in fume cupboards, as the airflow could fan a fire and potentially spread it through the ventilation system or ducting.

5. Storage of Specific Chemicals

5.1. Flammable Solvents (e.g., alcohols, toluene, hexane)

Vapours from flammable liquids are highly susceptible to ignition from naked flames, sparks from electric switches or motors, and static discharge. Appropriate precautions must be taken to prevent contact between flammable solvents and any ignition sources.

Flammable solvents should be stored in specialised metal flammable solvent cabinets that are clearly labelled and positioned away from doors or emergency exits. These cabinets are constructed from fire-resistant materials with a minimum 30-minute fire resistance, in accordance with British Standard 476, and are fitted with metal spill trays to contain any leaks.

- Laboratory storage of flammable solvents should be limited to no more than 50 litres per room.
- Working volumes on benches should not exceed 500 ml, kept in a properly closed vessel.
- Flammable solvents must not be stored in non-spark-proof refrigerators. All laboratory fridges are recommended to be spark-proof to prevent ignition from internal lights or thermostats.

Flammable solvents must never be stored with:

- **Oxidising agents** (e.g., chlorates, nitrates, perchlorates, permanganates, peroxides).
- **Corrosive chemicals** (e.g., acids such as sulfuric, nitric, acetic; bases such as ammonium hydroxide, calcium oxide, sodium hydroxide).
- **Materials prone to spontaneous heating or explosions** (e.g., hydrogen peroxide, dry picric acid).
- **Substances that react with air or moisture to generate heat** (e.g., concentrated sulfuric acid).

Always consult the MSDS for specific storage and incompatibility information.

5.2. Chlorinated Solvents (e.g., chloroform, dichloromethane, trichloroethylene)

Chlorinated solvents must be stored separately from flammable non-chlorinated solvents, as mixing can produce toxic gases such as phosgene, hydrogen chloride, and chlorine. They must also be kept away from alkali metals (lithium, potassium, sodium), as contact can cause explosions.

Ideally, chlorinated solvents should be stored in a dedicated ventilated storage unit.

5.3. Corrosive Substances

Corrosive acids and bases must be stored separately to prevent violent reactions and the generation of heat and fumes. Suitable storage includes vented or metal cabinets with containment trays to capture any spillages.

- Acid cabinets are made from acid-resistant materials and should include trays to contain any leakage.
- Consider the effects of corrosive fumes on metal fittings and cabinets.
- Ventilated cabinets connected to fume cupboards are recommended to remove harmful vapours or fumes at source. They are usually positioned beneath the fume cupboard and attached to the fume cupboard duct.
- All containers must be tightly sealed; any discoloration of lids or containers indicates chemical degradation and potential leaks, requiring disposal.

5.4. Oxidising Agents (e.g., peroxides, perchlorates, nitrates)

Oxidisers must be stored in metal cabinets away from organic materials (wood, paper) and never with flammable solvents or reducing agents, since fires and explosions can result after any spillage, even without a naked flame or heat.

- Perchloric acid, an extremely strong oxidiser (especially in its concentrated form), can react explosively with organic materials. They should be stored separately on a metal tray, away from organic matter and dehydrating agents such as sulphuric acid.
- Oxidizing agents should never be sorted in a wooden cabinet.
- Consult the MSDS for storage duration and additional precautions.

5.5. Toxic Substances

Toxic and highly toxic substances, including carcinogens, mutagens, and reproductive toxins, should be stored in locked cupboards with controlled access and security.

- Certain alkaloids and derivatives (e.g., aconitine, brucine, ecgonine, atropine), including those do not appear on the Poisons List, and other hazardous chemicals (e.g., digitoxin, valinomycin) should also be locked away.
- **Very toxic substances** with Lethal Dose Values LD_{50} (30 days) of less than 10 mg/kg (<10 mg/kg) must be securely stored and locked away at the end of each working day.

Certain hazardous chemicals are subject to additional regulatory controls beyond COSHH and require specific storage, use, and disposal procedures.

6. Legislation

Some chemicals are subject to additional legislation such as COSHH and may require departmental licensing before use.

6.1. Chemical Weapons Convention (CWC)

Controlled chemicals are categorised into three schedules. Use of Schedule 2 and 3 chemicals for lawful research requires annual reporting to the UK CWC/DECC. Schedule 1 substances are not licensed for use by the University.

6.2. Reporting Responsibilities

The Health and Safety Services submits annual declarations to Department of Energy and Climate (DECC). Researchers using controlled substances are considered "consumers" and must:

1. Maintain local records of their usage throughout the year. **Note:** Only you can keep track of this. If other researchers in the department are using the same stock bottle, someone will need to take responsibility for monitoring usage
2. Report any unexpected or unexplained losses to the relevant authority.

6.3. Storage of Controlled Substances

All controlled chemicals must be stored under lock and key, including:

- Controlled Drugs (Schedule 2, Misuse of Drugs Act)
- CWC Schedule 1, 2, 3 substances
- Drug Precursors (Category 1)
- Schedule 5 pathogens and toxins

7. Disposal

The following disposal arrangements apply:

- Substances with a **manufacturer's expiry date** must be disposed of once that date is reached.
- Substances without a manufacturer's expiry date must be disposed of **no later than 7 years after purchase**.
- If, during the annual stock check of substances, a visual inspection of a product, or its container, reveals any **signs of deterioration**, **they must be disposed of immediately**, even if the expiry date has not been reached

Signs of deterioration can include, but are not limited to:

- Colour change of the reagent.
- Cloudiness or solids appearing in a liquid reagent.
- Liquid present in a solid reagent.
- The container becomes swollen(bulging), brittle, cracked or collapsed.
- Labels that are damaged, discoloured, or unreadable.
- Liquid on the outside of the container.
- Powder/solid deposits on or around lids.
- Obvious deterioration of the container, lid or stopper.
- There is a noticeable change in the colour or smell of the product

Certain chemicals, such as diethyl ether, can form explosive peroxides over time. As a shock-sensitive explosive, it can be very dangerous if there is the presence of crystalline

solid in the remaining liquid or it has dried out completely. Peroxide testing strips should be used to verify solvent safety or viability before any crystals have been formed.

Organic chemicals may also decompose, reducing their effectiveness for research, quantitative analysis and use in standard solutions.

To prevent accumulation of legacy chemicals, disposal arrangements are also reviewed as part of the Horizon Exit Journey. Storage practices are also assessed during local workplace inspections. (See the University's Workplace Inspections Arrangements).

Please note that deliberate relabelling or decanting to avoid expiry-date controls is unacceptable and will be treated as a failure to comply with the University of Greenwich Health and Safety Policy.

8. Further information

8.1. Related HSE Guidance:

Further general guidance on Safe Storage of Chemicals in the Laboratory can be found on Health and Safety Executive (HSE) web pages; COSHH basics: overview - COSHH and Chemical warehousing: The storage of packaged dangerous substances - HSE. Subject specific guidance can also be found on the HSE webpages for Lethal Dose Values LD_{50}, the Poisons List, and UK CWC/DECC.

Additional guidance on the chemical weapons convention, can be found on Gov.uk website: Chemical Weapons Convention Guidance -GOV.UK.

8.2. Related University documents:

- Control of Substances Hazardous to Health (COSHH)
- Code of Practice-Hazardous Waste
- the University's Workplace Inspections Arrangements

8.3. Other related guidance:

- Challenges for Health and Safety in Higher Education and Research Organisations. London: Royal Society of Chemistry
- Safety in Academic Chemistry Laboratories. 8th ed. American Chemical Society.
- Control of Substances Hazardous to Health Regulations 2002 (COSHH),
- Classification, Labelling and Packaging of Substances and Mixtures Regulation (CLP)
- Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR).

9. Document History

Details of previous reviews are as follows:

Review Date	Reviewer	Summary of Review
06/02/2024	Isabelle Sangregorio Biological & Scientific safety advisor	New document to support COSHH CoP.

28/11/2025	Isabelle Sangregorio Biological & Scientific safety advisor	Annual review – transferred to new template. No changes required
16/01/2026	Vikki Wood Associate Director of H&S Services	Updated Section 7 to clarify when substances must be disposed.
22/04/2026	Anastasia Liasides Health & Safety Advisor	Amended wording within section 4 from “the date of opening must be noted” to “the date of purchase must be noted”.

This document will be reviewed at least annually, hereafter.