Storage of Chemicals in Fridges, Freezers and Cold Rooms Guideline

Section 1 - Purpose and Scope

(1) This Guideline provides information about the safe storage of chemicals in refrigerated conditions at The University of Queensland (UQ) and applies to UQ workers (as defined in the Appendix) involved in the storage of chemicals at UQ.

(2) The storage of flammable solvents, gases and powders in laboratory refrigerated units presents a risk of fire or explosion that can cause damage to equipment and property as well as personal injury, especially if stored incorrectly. The information in this Guideline is intended to help UQ workers understand their obligations and apply the recommended procedures to minimise this risk.

(3) Refrigerated units can be used to store volatile, noxious and air-sensitive material and it is possible for the atmosphere inside the unit to become saturated with chemical vapours if containers are not properly sealed. Over time these vapours can penetrate porous surfaces and lead to odour problems. Similarly, material from spills or leaking containers can impregnate surfaces that then give off odours long after the original material is removed.

(4) The Australian Standard AS/NZ 2243 series requires that flammable and combustible liquids are stored away from ignition sources and from excessively hot locations.

(5) Any electrical systems installed in hazardous locations, where the lower explosive limit (LEL) could be exceeded, must be Ex rated in accordance with the zoning classification and hazard class (AS/NZ 2381.1:2005 Electrical equipment for explosive gas atmospheres - Selection, installation and maintenance - General requirements). Alternatively electrical sockets, switches and equipment may be located away from the hazardous zone. Similar consideration must also be given to the location of switches and sockets in relation to the where chemical vapours may accumulate or vented to from a refrigeration unit.

(6) Examples of ignition sources include:

a. switches associated with the internal light and thermostat;
b. timers and heating elements in frost free fridges or freezers;
c. compressor motors, if the cabinet is not effectively sealed and vented;
d. power points;
e. electrical equipment running inside fridges or cold rooms.

(7) Loss of electrical power can also produce extremely hazardous atmospheres as chemicals warm up or decompose.

Relevant Standards and Legislation

(8) Relevant standards and legislation include:

a. AS1940 The storage and handling of flammable and combustible liquids.
b. AS/NZ 2243.10 Safety in Laboratories - Storage of Chemicals.

c. AS/NZ 2381.1:2005 Electrical equipment for explosive gas atmospheres - Selection, installation and maintenance - General requirements.
d. AS/NZS 60079.10.1:2009 Explosive atmospheres – Classification of areas – Explosive gas atmospheres.
e. AS/NZS 60079.10.2:2011 Explosive atmospheres – Classification of areas – Combustible dust atmospheres.
f. Work Health and Safety Act 2011.
g. Work Health and Safety Regulation 2011.

(9) This Guideline should also be read in conjunction with other UQ procedures and guidelines regarding occupational hygiene and chemical safety, especially the Flammable and Combustible Liquids: Storage and Handling Procedure and the Chemical Storage Safety Guideline.

Section 2 - Summary

(10) UQ Organisational Units are responsible for prioritising the safe storage of chemicals within refrigerated units and managing associated risks – in accordance with the Work Health and Safety Regulation 2011 (WHS Regulation).

(11) UQ requires that all refrigerated units used for storing volatile chemicals must be ANZEx rated. Only approved refrigerators and freezers designed for laboratory use should be used for flammable chemical storage.

(12) For existing fridges, freezers and cold rooms:

a. they must be 'spark free' (spark proof interior), if currently storing flammables chemicals; or
b. they must be labelled with the phrase 'no storage of flammable solvent or samples in flammables solvents within the fridge/freezer/cold room'.

(13) UQ workers should consider the following matters to support the safe storage of volatile chemicals within refrigerated units at UQ:

a. Identifying flammables or volatile chemicals that require refrigeration.
b. Acquiring EX rated units or approved refrigerators and freezers designed for laboratory use.
c. If using existing fridges and freezers and cold rooms, ensuring they are 'spark free'.
d. Labelling non-spark free units with 'no storage of flammable solvent or samples in flammables solvents' and not using them for flammables or volatile chemicals refrigeration.
e. Minimising the potential for volatile chemicals to release vapours and offensive odours by:
    i. wrapping the caps of volatile materials bottles and tubes with Parafilm;
    ii. placing volatile materials in Ziplock bags;
    iii. placing sealed wrapped chemicals in movable trays or containers, ensuring that in the event of a spill the storage container can be removed easily for cleaning;
    iv. promptly cleaning up any spilled material;
    v. not using cork or glass stoppers, as they do not form good seals. Screw-caps with a seal inside may provide a solution, but only if closed correctly; and
    vi. monitoring the integrity of the chemical containers, packaging and seals.
f. Attaching hazard labels for Class 3 flammables (see attached image) to the outside of the door of the refrigerated unit (fridge/freezer/cold room).
g. Ensuring quantities of flammables chemicals are kept to a minimum and not overfilling the refrigerated unit. Restrictions for flammables within a 10m radius still apply.
h. Regularly reviewing chemicals held in storage and correctly disposing of those no longer required using the Chemical Waste Operating Procedure or via the UQ Science Store.

i. Reporting any incidents or near misses to a supervisor and in UQSafe.

Section 3 - Identifying and Segregation for Safe Storage

(14) Refer to the Chemical Storage Safety Guideline.

Section 4 - Chemical Packaging and Labelling

(15) Refer to the Chemical Storage Safety Guideline.

Section 5 - Storage Limits

(16) Refer to the Chemical Storage Safety Guideline.

Section 6 - Monitoring Chemical Holdings

(17) Workers must ensure they minimise the quantities of flammable chemicals. The storage of chemicals must be monitored to facilitate periodic stocktakes to allow for update of registers and manifest, besides proper housekeeping and prompt disposal of old/expired, contaminated and decayed chemical stocks. Refer to the Chemical Storage Safety Guideline, the Chemicals of Security Concern Procedure, and other UQ occupational hygiene and chemical safety procedures and guidelines.

Section 7 - Training

(18) UQ has online training available, eLearning: Chemical Safety, which is mandated for completion by all UQ workers chemical users.

Section 8 - Emergency Response

(19) Please also refer to the Chemical Spill and Response Procedure and Guideline, the Fire Safety Management and Evacuation Plan Procedure, and the Placarding of Chemical Storage Areas Guideline.

Section 9 - Incident Reporting

(20) Incidents involving flammable chemicals during storage or while in storage (e.g., breakages, spills, unwanted reactions, exposures, etc.) must be reported by completing an incident report in UQSafe. Incidents, including near misses, must be reported so learnings and improvements on the safe storage for chemicals can be achieved.

Section 10 - Appendix

Definitions

Term	Definition
ANZEx	Australian Certification/Recognition System for Hazardous Area Equipment and Services, commonly referred to as the ANZEx System.
Ignition Source	A source of energy sufficient to ignite a flammable or explosive atmosphere. It may include naked flames, hot surfaces, exposed incandescent material, electrical arcs, hot particles, electrical discharge including from static electricity, chemical reactions, high intensity electromagnetic radiation including visible light or ultraviolet radiation, mechanical sparks, fixed and portable electrical equipment, portable tools or vehicles such as forklifts.
LEL	Lower Explosive Limit.
Laboratory	Is any building or part of a building used or intended to be used for scientific and related work, including research, quality control, testing, teaching or analysis. This may include workshops, sheds or other areas where chemical containers are opened or handled.
UQSafe	UQ online system for recording risk assessments, injuries/illness, near miss and hazard reporting and certifications.
UQ workers	For the purposes of this Guideline, includes: • staff - continuing, fixed-term, research (contingent funded) and casual staff • contractors, subcontractors and consultants • visiting academics and researchers • academic title-holders, visiting academics, emeritus professors, adjunct and honorary title-holders, industry fellows and conjoint appointments • higher degree by research students • volunteers and students undertaking work experience.

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