



The purpose of this guideline is to assist personnel to store chemicals in a manner that is safe and in accordance with the Dangerous Goods Safety Management Regulations and the applicable Australian Standards.

Storage procedures

When keeping chemicals in storage, the following precautions should be observed:

- The quantities of hazardous chemicals shall be kept to a minimum, commensurate with their usage and shelf life. Some chemicals degrade in storage and can become more hazardous e.g. chloroform can produce phosgene from prolonged storage. Such chemicals shall be identified and managed appropriately. Schools/Centres/Institutes and Divisions are encouraged to purchase through the centralized University Chemical Store to enable purchasing controls to be maintained.
- Ensure chemical containers and their seals or stoppers are appropriate for the type and quantity of chemical stored. As far as is practicable, chemicals should be stored in the containers in which they are supplied.
- All packages in storage shall be labeled to allow unmistakable identification of the contents. All labels should comply with the relevant regulations (see UQ OH&S Guideline for the Labelling of substances).
- Storage of chemicals, including wastes, shall be based on the properties and mutual reactivities of the chemicals. Incompatible chemicals shall be kept segregated from one another, e.g. by fire isolation in a chemical storage cabinet or segregation in space. A separate spill catchment shall be provided for each incompatible liquid.
- Opening of packages, transferring of contents, dispensing of chemicals or sampling shall not be conducted in or on top of a cabinet or a cupboard for storing chemicals unless it is specifically designed for this purpose and appropriate procedures and equipment are used.
- Packages shall be inspected regularly to ensure their integrity. Leaking or damaged packages shall be removed to a safe area for repacking or disposal. Labels shall be reattached or replaced, as necessary, to clearly identify the contents of the package.
- The relevant requirements concerning avoidance of ignition sources shall be complied with in situations other than those where the ignition source is controlled and is necessary for experimental purposes, such as the use of a Bunsen burner. Electrical equipment shall comply with AS 3000 – Electrical Installations if installed or other appropriate standards if portable.
- Hazard zoning assessments should be conducted for all new laboratories storing and using chemicals, in accordance with the provisions of AS 60079.
- Procedures shall be established to deal with clean up and safe disposal of spillages. Supplies and materials needed to control the spillages shall be readily accessible.
- Substances which are unstable at ambient temperature shall be kept in a controlled temperature environment set to maintain an appropriate temperature range. Reliable alternative safety measures shall be provided for situations when utilities, such as power, fail. Substances that can present additional hazards on heating shall be clearly identified.
- Sunlight can affect some plastic containers or the chemical contents. Containers or chemicals that can be affected shall not be stored in a laboratory where they can be exposed to direct sunlight.
- Regularly review the chemicals held in storage and correctly dispose of those no longer required using the chemical waste procedures.
- Tanks holding more than 500L of LPG or 450L of other classes of stated dangerous goods and combustible liquids must display a clearly visible information placard.

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OHS | Safe Storage of Chemicals - Guideline

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Chemical Segregation

Chemicals must be stored compatibly with one another.

Example of a segregation chart

Class of goods	2.1 Flammable gases METHANE	2.2 Non-Toxic, non flammable gases ARGON	2.2SR 5.1 OXYGEN	2.3 Toxic gases CHLORINE	3 Flammable liquids ETHANOL	4.1 Flammable solids HEXAMINE	4.2 Spontaneously combustible WHITE PHOSPHORUS	4.3 Dangerous when wet SODIUM	5.1 Oxidizing agent HYDROGEN PEROXIDE	5.2 Organic peroxide BENZOYL PEROXIDE	6.1 Toxic CYANIDE	8 Corrosive HYDROCHLORIC ACID	9 Miscellaneous DRY ICE
2.1 Flammable gases METHANE	✓	✓	✗ S1	✗ S1	✗ S2	✗ S2	✗ S4	✗ S5	✗ S2	✗ S4	✗ S1	✗ S1	✓
2.2 Non-Toxic, non flammable gases ARGON	✓	✓	✓	✗ S1	✗ S2	✗ S2	✗ S4	✗ S5	✓	✗ S4	✓	✗ S1	✓
2.2SR 5.1 OXYGEN	✗ S1	✓	✓	✗ S1	✗ S2	✗ S2	✗ S4	✗ S5	✗ S2	✗ S4	✓	✗ S1	✓
2.3 Toxic gases CHLORINE	✗ S1	✗ S1	✗ S1	✓	✗ S2	✗ S2	✗ S4	✗ S5	✗ S2	✗ S4	✓	✗ S1	✓
3 Flammable liquids ETHANOL	✗ S2	✗ S2	✗ S2	✗ S2	✓	✗ S3	✗ S4	✗ S5	✗ S2	✗ S4	✗ S3	✓	✓
4.1 Flammable solids HEXAMINE	✗ S2	✗ S2	✗ S2	✗ S2	✗ S2	✓	✗ S4	✗ S5	✗ S2	✗ S4	✗ S3	✓	✓
4.2 Spontaneously combustible WHITE PHOSPHORUS	✗ S4	✗ S4	✗ S4	✗ S4	✗ S4	✗ S4	✓	✗ S5	✗ S4	✗ S4	✗ S4	✓	✓
4.3 Dangerous when wet SODIUM	✗ S5	✗ S5	✗ S5	✗ S5	✗ S5	✗ S5	✗ S5	✓	✗ S5	✗ S5	✗ S5	✗ S5	✓
5.1 Oxidizing agent HYDROGEN PEROXIDE	✗ S2	✓	✗ S2	✗ S2	✗ S2	✗ S2	✗ S4	✗ S5	✓	✗ S4	✓	✗ S3	✓

Use of HAZCHEM Code

The HAZCHEM Code is a three digit, alphanumeric code providing initial emergency response information about:

- appropriate, compatible fire suppression media
- the likelihood of a violent reaction and other response advice
- spills containment or dilution
- personal protective equipment.

The DGSM Regulation, Schedule 3 stipulates the form and dimensions of placards. It is now only required for a tank placard because it involves a single product Where dangerous goods thresholds are exceeded, only the applicable class label (i.e. diamond) is required.

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














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Chemical storage limits

S2243.10 – *Safety in Laboratories: Storage of Chemicals*, states the following quantities of chemicals are permitted to be stored in a laboratory, other than in a chemical storage cabinet (i.e. open bench storage). These limits should be followed as closely as possible, and quantities in excess of these levels should be stored in a dedicated storage cabinet.

DG Class	Class of Dangerous Goods	Maximum per 50m ² (kg or L)	Maximum pack size (kg or L)	Alternative storage options
	Class 3	10	5	AS 1940 or AS3833
	Combustible liquids	50	20	AS 1940 or AS3833
              				

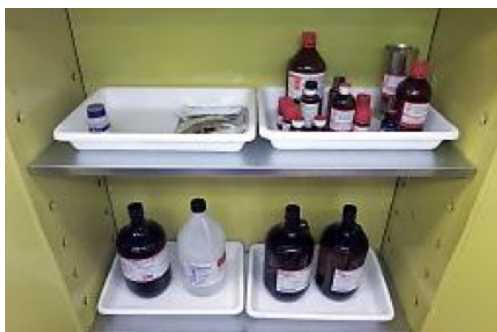
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Chemical storage in cabinets

Chemical storage cabinets for the storage of dangerous goods are required where the storage quantities exceed those listed in the table above. The cabinets shall comply with the design requirements of AS1940 or the design criteria in the relevant standard.

The following requirements apply to the storage of chemicals within cabinets at UQ:

- When storing flammable substances, the contents of the cabinet shall not exceed 100L. If a 250L cabinet is used for the storage, it must be de-rated. This involves removing some of the shelving and placing a sticker over the manufacturer's capacity rating, so that it is clear that 100L is the maximum cabinet capacity.
- All new installations of flammable solvent cabinets must be mechanically ventilated in accordance with AS1940. There is no requirement for venting of cabinets containing other classes of dangerous goods.
- The capacity of any chemical storage cabinet used in a laboratory to store chemicals of classes 4.1, 4.2, 4.3, 5.1 or 5.2 shall not exceed 50L.
- Within a radius of 10m, measured from any one cabinet, the cabinet storage capacity aggregated for all cabinets in that radius shall not exceed 250L or 250kg, including no more than 10L or 10kg each of dangerous goods of classes 4.1, 4.2, 4.3, 5.1 or 5.2 that are classified as PGI. The radius shall be measured horizontally through intervening walls, unless those walls are able to prevent the spreading of a fire of the magnitude that could be expected to result from the contents of the cabinet(s).
- Cabinets shall not be located:
 - One above the other;
 - Where they can jeopardize emergency escape (minimum 3m);
 - Under stairs or in corridors;
- The spill catchment/bund of cabinets must not be used to store chemicals;
- Where possible, store chemicals on spill trays within cupboards or cabinets



Examples of suitable spill trays

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Storage of time sensitive chemicals

Time-sensitive chemicals are those chemicals that, when stored for prolonged periods or under poor storage conditions, can develop hazards that were not present in the original formulation. There are four general categories of time-sensitive chemicals loosely based on those unsafe properties that can develop, being:

1. peroxide formers,
2. peroxide formers that can undergo hazardous polymerization,
3. materials that become shock or friction sensitive upon the evaporation of a stabilizer, and
4. materials that generate significant additional hazards by undergoing slow chemical reactions.

It should be noted that time-sensitive chemicals can be pure reagents or they can be commercial mixtures formulated as cleaners, adhesives and other products.

All time-sensitive chemicals should be immediately marked with an expiration date upon receipt and listed on the laboratory chemical inventory to ensure timely disposal. The Safety Data Sheet for the chemical will state whether it is unstable under certain conditions or after a period of time in storage, and this information should be highlighted in the risk assessment.

Containers should be inspected periodically to verify their condition. Signs of peroxide formation include: crystal formation in the container, discoloration of liquids, or a "mossy" appearance around the cap. If suspect materials are recognized, do not handle the container. Particularly, do not attempt to remove the cap. If explosive crystals have formed around the cap, the friction created by the unscrewing of the cap may be enough to detonate the compounds.

Peroxide hazard on storage – Discard after 3 months

Divinyl acetylene	Potassium metal
Divinyl ether	Sodium amide
Isopropyl ether	Vinylidene chloride
Potassium amide	

Peroxide Hazard on Concentration-Discard After One (1) Year

Acetal	Ethylene glycol dimethyl ether (glyme)
Cyclohexane	Furan
Cyclooctene	Metal acetylene
Cyclopentene	Methyl cyclopentane
Cumene	Methyl-i-butyl ketone
Diacetylene	Tetrahydrofuran
Dicyclopentadiene	Tetrahydronaphthalene
Diethylene glycol dimethyl ether	t-Butyl alcohol
Dioxane	Vinyl ethers
Ethyl ethers	

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Storage of time sensitive chemicals

(cont.)

Hazardous to peroxide Initiation of Polymerization – Discard after 1 years

Acrylic acid	Styrene
Acrylonitrile	Tetrafluoroethylene
Butadiene	Vinyl acetate
Chlorobutadiene (Chloroprene)	Vinyl acetylene
Chlorotrifluoroethylene	Vinyl chloride
Dibenzocyclopentadiene	Vinyl pyridine
Methyl methacrylate	Vinylidene Chloride

Other Time sensitive chemicals

Chloroform (on contact with air)	Sodium azide (on contact with metals)
Picric acid (when dry)	Picrylsulfonic acid (when dry)
Picryl Chloride (when dry)	Anhydrous Hydrogen fluoride

Chemical storage room requirements

All chemical storage rooms must be purpose built and comply with the requirements of Section 5 of AS2243.10. This standard allows for the storage of chemicals in quantities that exceed the quantities permitted to be kept on laboratory shelves or in chemical storage cabinets in the laboratory.

All 500L flammable stores must be designed and constructed to AS1940 and licensed by Brisbane City Council. Stores may be located above ground floor only by exception where a risk assessment shows an acceptable risk, in accordance with AS2243.10.

Storage of chemicals in refrigerators

Where flammable substances are to be stored in refrigerators, a pharmaceutical fridge or freezer with a spark proof interior must be purchased.

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Applicable standards

AS 2243.10– Safety in laboratories – Part 10: Storage of Chemicals

AS 4332- The storage and handling of gases in cylinders.

AS 1596- LP gas - Storage and handling

AS 1894:- The Storage and handling of non-flammable cryogenic and refrigerated liquids. AS 2927- The storage and handling of liquefied chlorine gas,

AS 1940 The storage and handling of flammable and combustible liquids.

AS 4326 - The storage and handling of oxidising agents

AS 2714 - Storage and handling of hazardous chemical materials – Class 5.2 substances

AS/NZS 4452 - The storage and handling of toxic substances

AS 2507 - The storage and handling of agricultural and veterinary chemicals.

AS 3780 – The storage and handling of corrosive substances

AS/NZS 3833- The storage and handling of mixed classes of dangerous goods in packages and intermediate bulk containers.

AS4681– The storage and handling of miscellaneous (class 9) dangerous goods and articles

AS3961– The storage and handling of liquefied natural gas

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