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# 5.0 Store hazardous substances safely

## **IN THIS SECTION:**

- 5.1 Decanting or transferring hazardous substances
- 5.2 Incompatibles
- 5.3 Store only what you need, store it safely
- 5.4 Gas cylinders
- 5.5 Oxy-acetylene welding
- 5.6 Flammable substances
- 5.7 Other substances

Storing hazardous substances safely is an important part of protecting yourself, your workers, other people at the workplace, neighbouring properties and the environment.

## 5.1 Decanting or transferring substances

It's best to keep hazardous substances in the containers they are bought in.

However, many businesses purchase hazardous substances in drums or large containers and then decant or transfer smaller amounts of the substance into other containers or mix substances in process containers for their own use. While this may seem like a simple task, it needs to be done safely to avoid accidents.

**NEVER** store hazardous substances in food or drink containers – it's just too easy for someone else to get confused about what's in the container – even if it is labelled. Too often people are seriously harmed after accidentally drinking hazardous substances stored in drink containers.

### CHECKLIST

When you are planning to decant a substance from one container to another:

- Read the SDS and note the hazards of the substance, particularly whether it is flammable, toxic or gives off fumes.
- Wear the recommended PPE (eg eye protection, breathing protection, gloves and overalls) and make sure it fits properly. You may need eye wash stations and/or safety showers where transfers take place in case substances spill on workers.
- Ventilate work areas to prevent workers breathing in high concentrations of possibly poisonous vapours and gases and to prevent build-up of flammable vapours, which could ignite and cause a fire or explosion.
- Use only containers able to store the hazardous substance safely. Some substances can react dangerously with containers made out of different materials. For example, hydrochloric acid can react with some metals to form explosive hydrogen gas and hydrofluoric acid reacts with glass, so needs to be stored in a durable plastic container. Check the SDS or ask your hazardous substances supplier about incompatibilities.
- Make sure the new container is clean and doesn't contain any residues of other substances that may cause a violent reaction.
- Clearly label the new container with the product or chemical name of the substance, and a hazard pictogram and hazard statement consistent with its classification. All containers holding hazardous substances must be labelled, including containers of hazardous waste.
- Note that flammable liquids, like petrol, release flammable vapours, so you need to avoid sources of ignition when transferring flammable substances.
- Flammable liquids may also generate static electricity that may discharge and ignite the substance so make sure metal or conductive plastic containers are earthed or bonded correctly.
- Be prepared for any spill that might occur during transfer. Have your spill kit ready to clean up any spill. More information about spill kits can be found on page 41 of this guide in **Emergency Preparation**.

## 5.2 Incompatibles

Not all hazardous substances can be stored together safely. Different types of substances can cause a fire or explosion if they come into contact with each other. These substances are often described as 'incompatible' and must be stored separately to prevent them mixing in a leak or spill. Take care when storing acids and alkalis, as accidental mixing of concentrated materials will generate large quantities of heat and fumes.

The SDS for a hazardous substance will tell you which substances and materials it should be kept away from, but there is also some general guidance below.

HAZARDOUS SUBSTANCE TYPE	KEEP AWAY FROM
Flammable gases (class 2.1.1)	flammable aerosols (class 2.1.2) flammable liquids (class 3) flammable solids (class 4) oxidising substances (class 5) organic peroxides (class 5)
Flammable liquids (class 3)	all class 2 substances class 3.2 (liquid desensitised explosives) class 4 substances; oxidising substances
Oxidising substances (class 5.1)	all other types of hazardous substances (including organic peroxides)
Organic peroxides (class 5.2)	all other types of hazardous substances (including oxidisers)

**TABLE 5:**  
Incompatible substances – general guidance

## 5.3 Store only what you need, store it safely

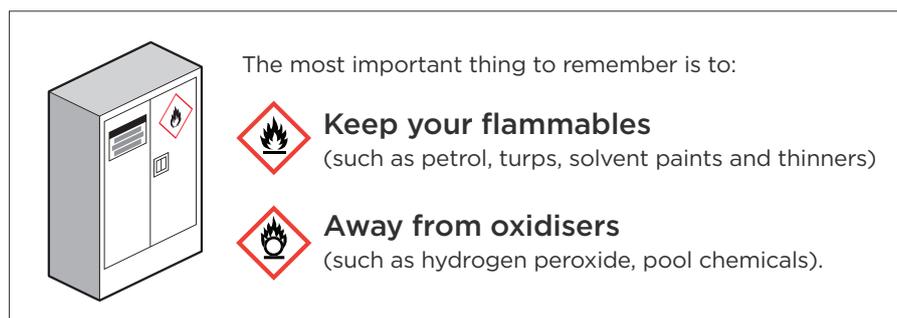
Keep the amount of hazardous substances you store to a minimum. This will make it easier to manage what you have and may reduce your compliance needs and costs.

### Signage

Depending on the types and amounts of hazardous substances you have, you may need signs to warn people that hazardous substances are present. The signs should tell people about the hazards of the substances and the precautions and emergency actions to take. See pages 29-31 of this guide for more information.

### Be prepared for a spill

Your workplace needs measures in place to control any hazardous substance spill or leak. For small spills, a spill kit might be sufficient to contain and clean up the spill. If you have large amounts of hazardous substances you are likely to need secondary containment (also known as bunding). See page 42 of this guide for more information.



**FIGURE 10:**  
Storage reminders

## Put a lid on it!

Keep lids on your hazardous substance containers to keep vapours inside. This keeps vapour out of the air, and reduces the chance of spills.

## 5.4 Gas cylinders

Store and handle gas cylinders (including empty cylinders and SCBA or SCUBA cylinders) carefully. If a cylinder is weakened (eg due to incorrect storage or use, knocks or other damage), the risk of explosion increases. Store, handle and use cylinders upright, unless designed for horizontal use.

### Types of cylinders

- Most general purpose LPG cylinders are designed for upright use.
- Vehicle and forklift cylinders are designed for horizontal use although forklift cylinders can normally be handled and stored vertically.
- Self-contained breathing apparatus (SCBA) or self-contained underwater breathing apparatus (SCUBA) cylinders can normally be handled and stored horizontally.
- Acetylene cylinders contain acetone as a gas solvent and must be used upright to avoid the possibility of acetone being discharged with the acetylene. If transported horizontally, they must be stood upright for at least one hour before use.

### Testing gas cylinders

Have gas cylinders tested at gas cylinder test stations to ensure that they remain safe to use. Poorly maintained gas cylinders may leak, which could expose workers to hazardous substances or potentially cause an explosion.

#### CHECKLIST

##### Store any gas cylinder in a location that:

- is suitable for the type and quantity stored
- is secure (ie the cylinder is locked up, chained or in a cage)
- is well ventilated, and
- has an emergency response plan and signs in place, if required.

##### For flammable gases, the location must also be:

- built to be fire resistant
- suitably separated from potential sources of ignition (also required if the gas is an oxidiser).

Fire extinguishers must also be available (also required if the gas is an oxidiser).

It's good practice for the cylinders to be protected from the weather.

## 5.5 Oxy-acetylene welding

Oxy-acetylene welding equipment is one of the few exceptions where incompatible hazardous substances (acetylene, a flammable gas, and oxygen, an oxidiser) are allowed to be used together. Because these substances are incompatible, it's vitally important to make sure the gas cylinders containing them are correctly maintained. If your workplace keeps spare acetylene and oxygen cylinders, store them separately to minimise the potential for harm if an incident involving a set of cylinders occurs.

Welding activities can cause workplace fires, so take all necessary safety precautions when welding. Oxy-acetylene welding kits must have flashback arrestors fitted – if the item being welded ignites, the flashback arrestors stop the flame from travelling down the lines to the cylinders.

WorkSafe has a page on its website about health and safety in welding. Search for 'welding' on WorkSafe's homepage: [worksafe.govt.nz](https://www.worksafe.govt.nz)

## 5.6 Flammable substances

### Storage cabinets

You can store up to 250 L of flammable liquids in an approved flammable goods cabinet as long as each container is not greater than 20 L in size.

However, a cabinet is not required where the aggregate quantity of flammable liquids present is less than or equal to:

- a. 15 L, for class 3.1A or 3.1B substances kept in securely closed containers with a capacity of 5 L or less; or
- b. 100 L, for class 3.1C substances; or
- c. 500 L, for class 3.1D substances.

The cabinet must comply with Australian Standard *AS 1940-2004: The storage and handling of flammable and combustible liquids*; or *BS EN 14470-1:2004 Fire safety storage cabinets. Safety storage cabinets for flammable liquids*. Ask your safety supplier for help in selecting appropriate cabinets if needed.

You may need to keep very large amounts of flammable liquids in a dangerous goods store or separate building.

Ask a compliance certifier or a safety consultant to find out how you can safely store your substances.

### Flammable vapour

Flammable liquids release vapour, which can cause an explosion if accidentally ignited.

You need adequate ventilation when using or storing flammable liquids to prevent build-up of flammable vapours.

### IGNITION

Remove ignition sources where flammable liquids are used and stored. Some common ignition sources are listed below.

The following table was taken from Safe Work Australia's code of practice: *Managing Risks of Hazardous Chemicals in the Workplace*.

Examples of ignition sources:

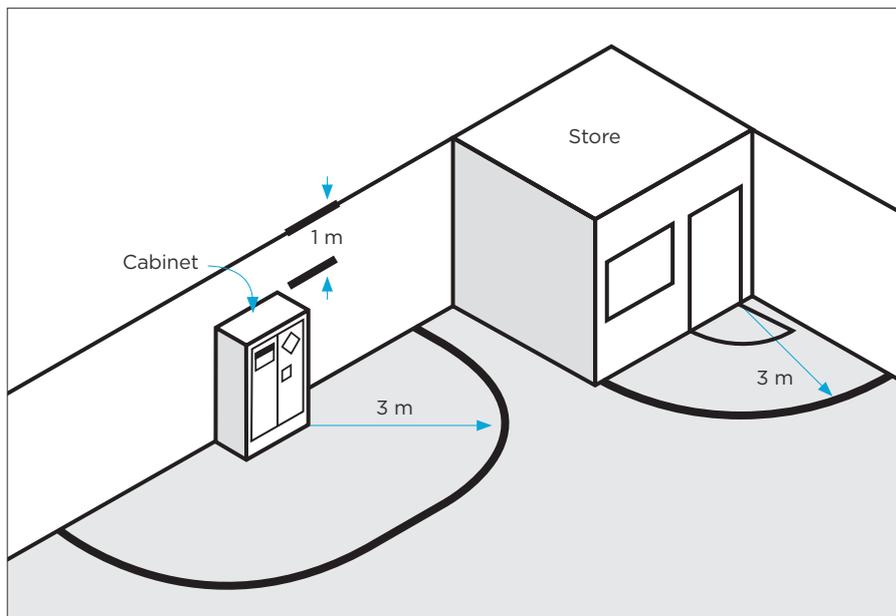
IGNITION SOURCE	EXAMPLE
Flames	- Welding, gas heaters, pilot lights.
Sparks	- Welding arcs, starters for fluorescent lighting, electric motors, electrical equipment like power points, cigarette lighters, switches, telephones. - Static electricity, including from friction.
Heat	- Hot surfaces including light bulbs, ovens, radiators or heaters, flue pipes, vehicle engines and exhaust systems (eg forklifts) pumps and generators.

**TABLE 6:**  
Ignition sources

### HAZARDOUS AREAS

A hazardous area identifies where flammable vapours may be present, requiring special precautions to prevent ignition.

Its dimensions depend on factors including the hazardous substances present and the ventilation in place. Generally, a hazardous area extends out 3 m from a dangerous goods cabinet or store and 1 m above.



**FIGURE 11:**  
Hazardous area

Within each area, you need to consider potential ignition sources. Keep ignition sources out of hazardous areas. If you must have electrical equipment in these areas it must be intrinsically safe.

If you aren't sure whether your electrical equipment is intrinsically safe:

- get advice, or
- if necessary, get an electrical certificate from a registered electrical inspector.

## 5.7 Other substances

### Storing toxic and corrosive substances

If you store toxic and corrosive substances in a package store, the store needs to meet design requirements so that it is secure and there is secondary containment for spills. Safety equipment must also be available.

Standards apply to the design of storage cabinets. Indoor storage cabinets for class 6.1A, 6.1 B or 6.1C substances need to meet AS/NZS 4452:1997, while indoor storage cabinets for class 8.2A and 8.2B substances need to meet the design requirements in AS 3780-2008.

There are limits to the amounts of these substances that can be held in these cabinets. The maximum quantity of class 6.1A, 6.1B, or 6.1C substances kept in a single indoor storage cabinet cannot exceed 250 kg or 250 L, and of this no more than 25 kg or 25 L may be class 6.1A and no more than 50kg or 50L may be class 6.1B or 6.1C.

The maximum quantity class 8.2A or class 8.2B substances kept in a single cabinet cannot exceed 1000 kg or 1000 L, of which not more than 50 kg or 50 L may be class 8.2A and not more than 250 kg or 250 L may be class 8.2 B.

In both cases, you must avoid storing incompatible substances or substances that could react dangerously with each other.

Because there are a number of specific requirements, if you are storing these substances, we recommend you read our *Guide to Storing Class 6 & 8 Substances*.

### Location compliance certificates

If you have flammable, oxidising, or solid or liquid toxic or corrosive substances at your workplace above certain thresholds you may need a location compliance certificate to certify that the hazardous substances are being stored safely and according to the rules. The Calculator will let you know whether you need a location compliance certificate.

See pages 47-48 of this guide for more on location compliance certificates.