



## 3.19 Chemical Safety Management

### Information Sheet : Cryogenic Substances

#### Purpose

The purpose of this information sheet is to guide workers and supervisors in general precautions and emergency responses for cryogenic substances.

#### Q1 Why do cryogenic substances warrant special care?

A cryogenic substance is extremely cold (usually has a boiling point below  $-90^{\circ}\text{C}$ ). Working with cryogenic substances exposes workers to a number of potential hazards including cold-contact burns, frostbite, suffocation, lung disorders and general body cooling. These liquids can produce large volumes of gas when they vaporise and may create oxygen-deficient conditions. The vapours themselves may also cause cold-contact burns

#### Q2 Is there anything I need to consider before handling and transporting cryogenic substances?

- Ensure appropriate control measures are put in place by the School/Area including emergency/contingency arrangements.
- Use appropriate personal protective equipment (PPE) including insulated gloves, eye protection (face shield) and closed-in shoes during transfer of cryogenic substances. Avoid clothing that can trap spilled liquid against the skin. Do not handle dry ice with bare hands. **NEVER** place gloved hands into liquid nitrogen.
- Minimise boiling and splashing of cryogenic substances during transfer to containers (use Dewar flasks and liquid withdrawal devices).
- DO NOT travel in lifts when transporting cryogenic substances (even when stored in a Dewar flask).
- Liquid nitrogen and dry ice must not be transported by road in an enclosed vehicle, use a utility or outside cab.
- **NEVER** place cryogenic substances in a sealed or sealable container.
- Biological specimens packed in cryogenic substance, to be transported by road, are required to be packed in accordance with the Australian Code for transport of Dangerous Goods by road or rail, which includes venting holes and cryogenically suitable containers.
- If chemicals are being transported by post, refer to [Australia Post Guidelines](#)
- If biological samples packed in a cryogenic substance are to be transported by air refer to [CASA\\* Guidelines](#)
- Mixing liquid oxygen with flammable material greatly increases the flammability risk of the material. Mixing liquid oxygen and grease will result in an explosion or fire.
- For handling of other types of cryogenic substances refer to the following: Ammonia (refer to Australian Standard 2022); and Chlorine (Australian Standard 2927); For other gases refer to the manufacturer's instruction for handling

#### Q3 How should I store cryogenic substances?

- Only store in a suitable container designed to hold cryogenic substances, i.e. use high quality Dewar flasks, with protective covers- not standard "Thermos" flasks. **NEVER** use a sealed or sealable container.
- Pressure relief valves are required on containers since large volumes of gas formed from these liquids may cause explosions if not vented correctly. Regular inspection of these valves is required in accordance with the manufacturer's instructions.
- Do not store dry ice or liquid nitrogen in screw-top containers (pressure will build and may cause an explosion due to the lack of venting).

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## Information Sheet : Cryogenic Substances (Continued)

**Q4 How should I store cryogenic substances? Continued**

- Cryogenic substances must not be stored in an unventilated or small room (e.g. cold room) because of the risk of oxygen depletion and asphyxiation. Oxygen monitoring and other controls may be required in all other rooms. Contact the [HSW Team](#) for advice.
- Using or storing large quantities in basement laboratories and basement storage areas is not advisable.

**Q5 What should you do in the event of an emergency with cryogenic substances?**
**First Aid**

- In the event of a spill onto the body, quickly remove any clothing that has come into contact with cryogenic liquids, but take care not to remove clothing which is frozen to flesh.
- Do not rub the skin; in the event of skin contact, gently flush the area with large quantities of room temperature tap water (do not apply heat).
- It is important that medical attention be sought as quickly as possible.
- Refer to [AS 1894 The storage and handling of non-flammable cryogenic and refrigerated liquids \(1997\)](#) for a complete medical treatment guide for cryogenic liquids.

**Spills or leaks**

If a spill with a cryogenic liquid cannot be contained then the area should be evacuated and the Emergency Services contacted. The potential hazards associated with some cryogenics are:

- Asphyxiation;
- Fire (if liquid oxygen is spilt); and
- Explosion (if liquid hydrogen or methane is spilt, a flammable or explosive mixture with air will result).

**Further information**

If you require further information, please contact a member of the [HSW Team](#).

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