

CRYOGENIC LIQUIDS INFOSHEET

HAZARDS

The hazards from the use of refrigerated liquefied gases (cryogenic liquids) can include: asphyxiation in oxygen deficient atmospheres; cold burns from liquids, gas or super-cooled material, frostbite and hypothermia; pressurisation in pipes and vessels; embrittlement of material; and combustion or explosion from the creation of an oxygen-enriched environment. Liquid oxygen requires special care as it can explode on contact with dust or oil.

GHS CLASSIFICATION

Gases under pressure, Refrigerated liquefied gas



DANGEROUS GOODS CLASSIFICATION

Class 2.2 Non-flammable, non-toxic gas



Liquid Oxygen only (Liquid oxygen requires special care as it can explode on contact with dust or oil.)

Oxidising Gas, category 1



Subsidiary class



MANAGEMENT

HANDLING

- Assess the risk from the use or storage of cryogenic liquid. The [gas risk calculator](#) should be used to initially assess the workspace containing a cryogenic liquid. Determine the need for oxygen deficient gas monitoring, alarm systems or higher level risk controls in a more detailed risk assessment.
- Work only in a well-ventilated area.
- Document a safe work procedure to describe the best practice when handling cryogenic liquids. Ensure that workers are trained and competent in this procedure. Only trained workers should perform cryogen fills and transfers from bulk containers.
- Use only equipment and material designed for cryogenic liquids. Materials can become brittle and shatter on contact with cryogenic liquids.
- Do not leave an open vessel immersed in a cryogenic liquid for an extended period of time (liquid oxygen can condense in the vessel, which can contribute to a fire risk).
- Wear appropriate personal protective equipment (PPE) for handling cryogenic liquids. This includes long sleeves, long trousers, non-permeable and fully enclosed shoes, eye protection and thermal gloves. When dispensing large volumes a full face shield and/or PVC apron should be considered to protect against potential splashes.
- Dispense a cryogenic liquid slowly into a warm vessel to prevent splashing. Do not overfill the receiving vessel. Do not hold a receiving vessel with unprotected hands.
- Ideally cryogenic liquids should only be dispensed during normal work hours. Additional control measures should be considered if working after hours.

STORAGE

- Use only containers (dewars) designed specifically for cryogenic liquids. Dewars are designed to withstand sudden temperature change. Monitor the integrity of the dewar to ensure it is maintaining vacuum.
- Store dewars out of the workspace. If an indoor location is the only practicable location, then ventilation, the dimensions of the location and quantity of material must be considered. Bulk storage dewars should be placed in a purpose built, ventilated store. Cryogenic tanks are placed outdoors with nitrogen piped back into the laboratory.
- Minimise the volumes that are kept within a laboratory. Small dewars (< 25 L) are generally recommended.

- Never seal a flask that contains cryogenic liquid unless there is a safety valve allowing evaporating gas to safely escape. Pressure can build up in sealed vessels resulting in explosion.

TRANSPORT

IN LIFTS

Transporting cryogenic liquids in a lift presents a potential asphyxiation risk. Staff, students or visitors must not ride in a lift in which cryogenic liquids are being transported. If the method of transport is via a lift, then:

- Place a clearly visible sign on the dewar to warn staff and students not to enter the lift whilst the cryogenic liquid dewar is present. Another option is to temporarily place a chain across the entrance, inside of the lift.
- Ensure a person is in attendance at the destination floor to collect the dewar and return the lift promptly to normal service.
- Ensure staff and students are aware of the procedure for transporting cryogenic liquids and the rationale for it.

AROUND BUILDINGS

- When transporting small quantities, always use a vessel fitted with a carrying handle and splash guard. Wear gloves when carrying the vessel.
- Ensure the dewar or vessel is secure on a trolley.
- Avoid knocks, bumps and uneven surfaces when cryogenic liquids using trolleys around buildings.
- Ensure the route to be taken is free of obstructions and use ramps rather than steps. The building may require modification to eliminate steps from routes regularly used for transport of cryogenic liquids.
- Ensure a lid placed on a dewar is loose fitting (or has a safety valve).

IN VEHICLES

Shocks and bumps to containers may lead to damage to and failure of the containers, followed by a rapid escape of gas. In enclosed spaces (car) this can result in an asphyxiating atmosphere.

- Use transport dewars with appropriate stoppers or safety vents.
- Do not transport cryogenic liquids within enclosed vehicles. Transport on the open tray of truck or utility, so that any gases that are accidentally released will be diluted and dispersed into the atmosphere.
- Secure containers firmly to the vehicle and protect from other objects striking against them during transport.
- Inspect containers for structural integrity prior to and after transport.
- Position vents on dewars so that any escaping fluid or gas will not impinge directly on people, the vehicle or other goods being carried.

FURTHER REFERENCES

1. Australian Standard 1894-1997 - The storage and handling of non-flammable cryogenic and refrigerated liquids
2. Australian Standard 1678.2.2.000, Emergency procedures guide for transport of Oxygen, refrigerated liquids
3. University WHS guideline, [WHS_CHE_GUI_1_Working_with_gases](#)

For further guidance always refer to the safety data sheet or other supplier information.