

Storing

SAFE USE OF LIQUID NITROGEN

General – any person handling liquid nitrogen must:	1. Be trained and competent 2. Wear PPE as follows:	
	Eyes:	Goggles, face visor eg BS EN 166 Grade 3
	Hands:	Non-absorbent, insulated gloves with sleeves covering the end of the glove eg BS EN 511
	Feet:	Enclosed shoes, preferably with reinforced toe caps. Trousers should be worn outside the shoe
	Body:	Overalls or lab coat, without pockets where liquid could collect
Handling Dewars	<p>Carry out a Manual Handling Assessment – use trolleys / cradles</p> <p>Beware of items that could trap liquid close to the skin eg rings, bracelets</p> <p>Keep dewar upright unless pouring from a specifically designed dewar</p> <p>Never 'walk', roll or drag a dewar</p> <p>Avoid jolting / impacts against the dewar</p> <p>Use tongs to remove objects, handle both carefully</p> <p>Only use in well ventilated areas</p>	
Removing Liquid Nitrogen from Dewar	<p>Always use a liquid nitrogen draw device fitted with a pressure relief device that stops the internal pressure exceeding the dewar's</p>	

<p>Moving Liquid Nitrogen Dewars</p>	<p>GENERAL</p> <p>Never walk, roll or drag a dewar</p> <p>Avoid jolting / impacts against the dewar</p> <p>MOVING DEWARS UP STAIRS</p> <p>If the use of stairs is unavoidable, restrict access to the stairs eg display 'No Entry' signs top and bottom and use two people to move the dewar</p> <p>MOVING IN A LIFT</p> <p>If the use of a lift is unavoidable adopt the following:</p> <p>Check the lift has an emergency alarm / telephone</p> <p>Only fill the dewar to 90% capacity</p> <p>Vent liquid withdrawal devices to less than half relief-valve pressure</p> <p>Use two trained / competent persons to move the dewar:</p> <ul style="list-style-type: none"> ○ One to put the dewar in the lift and send to the correct floor (use call override if possible, if unavailable place a 'No Entry' sign around the dewar neck) ○ The second to wait at the floor the dewar is travelling to
<p>NEVER:</p>	<ol style="list-style-type: none"> 1. Accompany a dewar in a lift 2. Move a dewar that is venting gas, leaking, damaged etc 3. Move an overfilled dewar 4. Vent dewars in lifts
<p>Storing Liquid Nitrogen Dewars</p>	<p>FULL / PART FULL DEWARS</p> <p>Ensure the area is well-ventilated, dry and sheltered from rain</p> <p>Always store with protective caps fitted</p> <p>EMPTY DEWARS</p> <p>Check the dewar is completely empty before storing</p> <p>Only empty in a secure, well-ventilated area. Allow liquid to evaporate naturally. Never pour down the sink / drain</p> <p>Ensure the storage area is dry</p> <p>Always store with the protective cap in place</p>

Calculating Ventilation Requirements	<p>NORMAL OPERATION</p> <p>Ventilation should be sufficient to ensure oxygen does not fall below 19.5% during the following normal conditions:</p> <ul style="list-style-type: none"> Normal evaporation of all liquid nitrogen containers in the room Losses when filling the largest dewar in warm conditions <p>SPILLAGE</p> <p>Total spill of the largest dewar must not cause oxygen to fall below 18%</p>
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Effect of Spillage on Oxygen Concentration

Resulting % Oxygen Concentration = $100 \times V_o / V_r$

Where:

V_o = the volume of air, m
= the room volume, m³

V_d = dewar capacity

F_g = gas factor –

<p>Transporting Liquid Nitrogen Dewars</p>	<p>REGULATORY REQUIREMENTS</p> <p>Liquid nitrogen dewars moved by road must comply and be labelled in accordance with the Carriage of Dangerous Goods (Classification, Packaging and Labeling) and the use of Transportable Pressure Receptacles Regs.</p> <p>Recipients of dewars must hold a Gas Safety Data Sheet.</p> <p>GENERAL TRANSPORT RECOMMENDATIONS</p> <p>Dewar must be in a separate compartment from the driver / passengers</p> <p>Drivers must be trained in the use of liquid nitrogen dewars</p> <p>Always check the dewar for damage etc before transporting</p> <p>Fit a protective cap. Do not secure unless integral to the cap design</p> <p>Ensure the dewar is appropriately labelled</p> <p>Secure the dewar during transport to prevent spill / damage</p>
<p>NEVER:</p>	<p>TRANSPORT DEWARS IN CARS</p>
<p>General Maintenance</p>	<p>In addition to general checks eg before filling, transporting carry out the following regularly (not exceeding six months):</p> <p>Empty dewar in a well ventilated area</p> <p>Allow liquid to evaporate naturally</p> <p>Check the cap and liquid withdrawal device condition, replace if necessary</p> <p>Check the dewar for damage, the neck for twisting etc</p> <p>Ensure the dewar is free from dirt and contaminants</p> <p>If contaminated wash the dewar out with warm water</p> <p>Check the dewar is completely dry before refilling</p>

EMERGENCY PROCEDURES

SMALL SPILL

to be affected

LARGE SPILL

- Evacuate personnel from the area likely to be affected
- Never allow anyone to enter the evolved gas – if necessary, wear appropriate PPE
- Close interlocks to stop gas flowing to vulnerable areas – if necessary, use emergency stop
- Open exhaust fans and windows to encourage evaporation of gas / dispersion of gas
- Allow the gas to evaporate naturally
- Never allow anyone to enter the area until the nitrogen gas has dispersed. Check with the safety officer



FIRST AID ACTION

INHALATION

1. Remove person to well-ventilated area. Rescuers may require BA equipment
2. Call University Security on **333/2795** to summon an ambulance
3. Keep the person warm and rested until help arrives

SKIN CONTACT

1. Call University Security on **333/2795** to summon an ambulance
2. Whilst waiting:
 - Loosen any restrictive clothing
 - Place the affected part under tepid water, until the skin changes from pale yellow through blue to pink or red
 - Protect frozen parts with loose, dry, sterile dressing
 - Keep the patient warm and rested

NEVER

1. Pull clothing away from burned / frozen skin
2. Apply a direct heat source eg heater
3. Allow smoking or alcohol consumption
4. Give analgesics eg paracetamol, aspirin