



This form is to be used in conjunction with the Environment Health and Safety Manual Procedure 3.2 Hazard Identification, Assessment and Control - Application.

Information of Activity

Activity: Use & transport of liquid nitrogen_ Location: ___Chemistry_____

Identified by: _G. Papadopoulos_____ Date: _____19/12/06_____

Identified Hazard / Aspect: Spillage causing cryogenic burns, asphyxiation or skin adhering to Liq N₂ cooled surfaces causing tearing on removal.

Risk Analysis matrix – level of risk

| Identified Hazards | Risk Assessment | | | Risk Score | Risk Level |
|--|-----------------|----------------|-----------------|------------|------------|
| | Exposure (E) | Likelihood (L) | Consequence (C) | E x L x C | |
| Cryogenic burns (similar to handling boiling water) | 6 | 0.3 | 5 | 9 | M |
| Asphyxiation-displacement of oxygen (1 litre of liquid gives 0.7 m ³ of vapour, or 682 lt of gas) | 3 | 0.1 | 10 | 3 | M |
| Pressure build up &/or explosion due to large expansion ratio during evaporation | 3 | 0.3 | 10 | 9 | M |
| Skin freezing and adhering to liq. N ₂ cooled surfaces | 6 | 0.3 | 5 | 9 | M |

Definitions

| Exposure | E | Likelihood | L | Consequence | C | Risk Score | Hierarchy of Risk Controls |
|--------------|----|----------------|------|---------------|----|---|---|
| Continuously | 10 | Almost Certain | 1.0 | Catastrophic | 20 | E >20 H >10 M 3-10 | Elimination is a permanent solution and should be attempted in the first instance. Substitution involves replacing the hazard or environmental aspect by one of lower risk. Engineering controls involve physical barriers or structural changes to the environment or process. Administrative controls reduce hazard by altering procedures and providing instructions. Personal protective equipment last resort or temporary control. |
| Frequently | 6 | Likely | 0.6 | Major | 10 | | |
| Occasionally | 3 | Possible | 0.3 | Moderate | 5 | | |
| Infrequently | 2 | Unlikely | 0.1 | Minor | 2 | L < 3 | |
| Rarely | 1 | Rare | 0.05 | Insignificant | 1 | | |

LEGEND

E: extreme/significant risk; immediate action required; must be managed by senior management with a detailed plan, notify RMO immediately.

H: high risk, senior management attention needed, detailed research and management planning at senior levels

M: moderate risk, management responsibility must be specified; manage by specific monitoring or response procedures

L: low risk, manage by routine procedures; unlikely to need specific allocation of resources

Details of Risk Controls to be Taken

Risk Controls: (These should be determined by both the person(s) identifying the risk and the responsible manager and HSR or Environmental Representative). When determining risk controls refer to Hierarchy of Risk Control. Some examples are operating manuals, safe work procedures, licenses, permits to work, training and instruction etc

The dispensing of liquid nitrogen from the nitrogen vessel (for filling 10lt-160lt dewars) may be carried out only by those trained to do so. (See Store personnel for training). Lab coat, leather gauntlet gloves, full face



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shield, long pants and closed shoes to be worn. Cotton gloves are not recommended because any spills on the gloves will cause the liquid nitrogen to be trapped against the skin.

Unless there are compelling circumstances, glass dewars are not to be used. When scratched, glass dewars can implode when cryogenic liquid is poured into them. Stainless steel dewars (0.5lt-6lt) are the preferred vessel to be used. An explosion can occur if the container is not rated to withstand the pressure. Dewars shall not be stored in fridges. Long term storage of liquid nitrogen in open containers or in fridges can result in oxygen build up in the product. Pressure can build up in a sealed container due to the boil off of nitrogen gas. All vessels shall have lids or closures that prevent spillage of the contents and also prevent pressurization of the container. The lids shall be on the container at all times (including when empty) except when filling, emptying or during use. House hold vacuum flasks or thermoses are not to be used. These can be sealed with a lid and could explode due to pressure build up.

Dewars of liquid nitrogen (10lt-160lt) must not be accompanied in lifts. This is to avoid any possible risks from nitrogen spillage or boil off during, for example, a prolonged period of lift breakdown. Rather, two people should be used to transport the dewars, one to load and one to receive at the destination floor.

New users of liquid nitrogen should receive instruction in its use from experienced members of staff or senior PhD students.

Person assessing the risk: G. Papadopoulos Date: 19/12/06

Authorised by: G. Papadopoulos Planned completion date: 19/12/06

Risk Control Measures Completed

Actions by: G. Papadopoulos Completed (Initials & date): 19/12/06