

STANDARD OPERATING PROCEDURE

Procedure:	Cryogenics incl. Liquid Nitrogen
School/Department:	School of Molecular Bioscience
SOP prepared by:	Nick Coleman

Section 1 - Personal Protective Equipment

1. Lab coat
2. Thick temperature-resistant gloves
3. Proper enclosed footwear, preferably leather to prevent absorption of cryogenic gases into the shoe
4. Safety glasses at minimum, full face-shield if handling large quantities (>100 ml)
5. Hair tied back if long

Section 2 – Potential Hazards + Safety precautions

1. **Contact with skin or eyes may result in severe burns, permanent tissue damage and loss of eyesight.** Wear your PPE as described above and be aware of the risks by reading and understanding this document, and the risk assessment for Cryogenics
2. **Spills of cryogenics in enclosed spaces can result in suffocation** as the gases expand and force air out of the space. Only use cryogenics in well-ventilated areas. **Do not carry liquefied gases in lifts.**
3. Use of inappropriate container (eg. glass dewar) can result in explosion if the glass breaks eg. by rough contact by metal forceps, and the cryogenic agent is rapidly vapourised. **THIS HAS HAPPENED IN OUR SCHOOL !** Replace any glass dewars with metal ones.

Section 3 – Procedure

1. Read and understand this SOP and the risk assessment for cryogenics, along with any MSDS sheets
2. Put on PPE as described above
3. Check that all work areas you will use the cryogenic agent in are well-ventilated, and not small enclosed spaces
4. Check that all containers and tools you are going to use are compatible with ultra-cold temperatures, and will not shatter or explode. Glass should be avoided. Metals or plastics are preferred
5. When dispensing liquid N₂ from the large cylinder into a smaller dewar, ensure supply pipe is a few inches inside the vessel, not above it. Slowly turn the supply tap and adjust the speed of dispensing to prevent splashing. Turn the tap off immediately when it starts to splash over. Never leave your dewar unattended.
6. When collecting dry ice from another container use an appropriate scooping instrument or gently tip container to direct the dry ice into your own container. Don't pick up dry ice with bare hands – burns will result.
7. If dispensing liquid nitrogen to another receptacle pour slowly and carefully to minimise splashing.
8. Do NOT create a gas-tight seal on any vessel containing either liquid nitrogen or dry. This can result in explosion and release of extremely cold vapours and/or liquid, and sharp fragments of the container.

Section 4 – Disposal / Spills / Incidents

1. If a very large amount of cryogenic material like liquid nitrogen is spilled (>1 L) leave the area immediately and notify nearby workers to also leave. Consult your supervisor. No particular cleanup is necessary, but it is important to allow the gas to dissipate before returning to work. (time required depends how well ventilated the area is, most likely 5-10 min, but longer for less-ventilated spaces)
2. Any large spills (>1L) or incidents resulting in injury must be reported to your supervisor immediately and via the online incident report form within 24 h. Near misses (dangerous situations not leading to an incident) should also be reported

Section 5 – Repairs / Certification / Validation

N/A

Section 6 – Relevant Material safety data sheets

1. MSDS for liquid nitrogen, liquid helium or solid CO₂, depending on agent being used.

Section 7 - References

1. Risk assessment for Cryogenics

SOP Training Confirmation

By signing below, these individuals confirm that they have read and understood the SOP, and agree to always follow the instructions in this SOP when performing this procedure.

Position	Name	Signature	Date
Supervisor			
employee / student			
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