



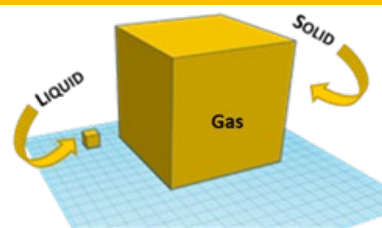
CRYOGENS AND DRY ICE

STANDARD OPERATING PROCEDURES



GENERAL SUMMARY

Cryogenics are **liquefied gases** with a boiling point below -150°C . All cryogenic liquids are gases at normal temperatures and pressures. When placed under pressure in specially designed storage containers (dewars), the gases condense to a liquid state and maintain **very cold temperatures**. Examples of cryogenic liquids include nitrogen, argon, helium, and oxygen. Similarly, solid carbon dioxide or dry ice converts directly to carbon dioxide gas at temperatures above -78°C .



Cryogenic liquids and dry ice undergo substantial volume expansion when converted to the gas phase (500-800x).

CRYOGEN HAZARDS

- **Asphyxiation** – Sublimation/vaporization may lead to oxygen deficient environments.
- **High pressure** – Significant volume expansion may lead to over pressurization within closed systems.
- **Extremely cold temperatures** – Dermal exposure may lead to **skin and eye damage**.
- **Additional Hazards** – Cryogenics may also be **capable of condensing oxygen** from the air, **flammable, toxic**, etc. Always **consult the SDS** for the cryogen you plan to utilize prior to use.

ENGINEERING CONTROLS

- Use in a **well-ventilated** area or in a certified **chemical fume hood** (if possible).
 - **Oxygen monitoring** devices may be needed in some areas. Call EHS & EM for an evaluation if you are unsure proper ventilation is present.
- Ensure all equipment (containers, tubing, valves, etc) is **rated for cryogenic use**.



ADMINISTRATIVE CONTROLS

- Ensure all lab workers receive **lab-specific training**.
- **Never** transport cryogenics in a **tightly sealed container** or in an elevator.
- Do not fill containers to more than 80% capacity to **allow for volume expansion**.
- **Never lean** into/over cryogen or dry ice storage units.

STORAGE REQUIREMENTS

- **Store** in a dry, well-ventilated area.
- **Do not store** in a **tightly sealed** container.
- **Do not store** in **cold rooms**.
- **Store away** from heat and ignition sources

REQUIRED PPE

- **Lab coat**, sleeves extended to the wrist
- **Rubber apron** if large quantities/open containers used.
- **Chemical splash goggles**



- **Face shield**
- **Insulated gloves**; chemically compatible gloves if using chemicals
- **Long Pants** and **close-toed shoes**



WASTE DISPOSAL

- **Evaporate/sublimate** unneeded cryogenics or dry ice in a well-ventilated area or chemical fume hood.
- **Never discard** cryogenics/dry ice in the sink.

EMERGENCY CONTACT INFO

Appalachian Police Department.....(828) 262-8000
 EHS & EM.....(828) 262-4008
 Watauga Medical Center.....(828) 262-4100
 Poison Control Center.....(800) 222-1222

