



LABORATORY SAFETY GUIDELINE




Dry Ice (Carbon Dioxide, Solid) [CAS No. 124-38-9]

All users of Carbon Dioxide, Solid or Dry Ice must review this document before use. Dry ice is the solid form of carbon dioxide that is available in flakes, pellets or block form and is non-combustible. It is most often used for rapid cooling of materials or shipping biological samples. It poses unique hazards to those who may work with or around it - those hazards are addressed below. Users should contact their EHS Laboratory Safety Advisor and department safety officer if they plan on shipping materials on Dry Ice or have questions before beginning work.

HAZARDS

Carbon Dioxide, Solid or Dry Ice is NOT considered a Hazardous Substance by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200). It IS classified as a Dangerous Good for transport purposes.

The precautions associated with handling this material are as follows:

	Contact Hazard: At -109 °F (-79 °C), skin contact with dry ice can lead to severe frostbite; skin cells freeze and become damaged very quickly.
	Asphyxiation Hazard: Dry ice will sublime (change from solid to gas) at any temperature above -109 °F. This releases potentially substantial volumes of CO ₂ (1 pound solid = 250 liters gas), which can displace oxygen quickly in the air around the dry ice, causing dizziness, headaches, difficulty breathing, loss of consciousness and death. This is especially of concern in nonventilated or confined spaces.
	Overpressurization Hazard: Due to the rapid emission of large volumes of CO ₂ gas, any dry ice that is stored in a closed container can pressurize the container. Given enough time at normal room temperature, such a container may violently rupture if the gas is not able to escape.

PRECAUTIONS

Before starting work:

- Review manufacturer's Safety Data Sheet and additional chemical information at ehs.harvard.edu/safety-data-sheets-sds;
- Be familiar with general University emergency procedures in the [EHS Lab Emergency Response Guide](#);
- Use only the quantity that you need;
- Identify the location of the nearest sink with lukewarm water;
- Ensure another person who knows emergency procedures is in the area.

During work:

- AVOID INHALATION! Perform all operations in a well-ventilated area;
- AVOID CONTACT! Skin contact with Dry Ice can lead to frostbite. Use appropriate personal protective equipment (PPE):
 - Wear closed-toed shoes.
 - Wear a lab coat or a garment covering to the ankles (required in labs at biosafety level 1 and above and strongly recommended elsewhere).
 - Wear appropriate eye protection, including goggles and/or a face shield. Use tongs to handle dry ice when possible.
 - Use loose-fitting, thermally insulated gloves (e.g., leather or cloth) to manually handle dry ice. Nitrile exam gloves will not provide enough protection. If a nitrile glove material comes into contact with dry ice while you are wearing it, it will freeze to your hand and be very hard to remove. **Never handle dry ice with bare hands.**

- Gloves must be thoroughly inspected prior to each use. Do not put on or continue to use damaged gloves;
- Use materials and containers appropriate for Dry Ice use and remain aware of potential incompatibilities:
 - Never store dry ice in a tightly sealed container, or any container with a screw-top lid that will not vent. Styrofoam is an appropriate storage material since it is both insulated and not airtight. When dry ice sublimates to carbon dioxide gas, the gas pressure greatly expands. This expansion will cause an airtight container to expand and possibly violently rupture.
 - Do not store Dry Ice in metal, plastic, or glass containers, unless the container is specifically rated for use with Dry Ice. The extremely cold temperature of Dry Ice is likely to fracture or break these containers, possibly resulting in personnel exposure and a spill.

After completing the work:

- Dispose of excess Dry Ice as follows:
 - Place in a well-ventilated location, such as a fume hood, at room temperature; the remainder of the ice will sublimate away.
 - Never dispose of dry ice in a trash can, chemical waste container or other garbage/waste can.
 - Never dispose of dry ice in a sink, toilet or other fixture; the temperature difference can damage the plumbing.
- Return container to storage area following the Harvard University [Laboratory Chemical Storage Guide](#)
 - Always store dry ice in a well-ventilated location;
 - Do not store/use dry ice in confined areas with limited ventilation. This includes cold rooms, walk-in refrigerators and environmental chambers;
 - Do not leave dry ice unattended in open areas;
 - Store in original containers or other appropriate containers;
 - Store primary container in designated and compatible secondary containers;
 - Store away from incompatibles.
- Wash hands and forearms thoroughly with soap and water before leaving the lab.

EMERGENCY PROCEDURES

If you see or receive a container that is swollen, bulging, or that you believe may be improperly packaged dry ice, secure the area and contact the University Operations Center at (617) 495-5560 [HMS/HSDM (617) 432-1901]. Do not try to release pressure in the container.

First Aid

SKIN CONTACT

- In case of cold burns (frost-bite):
 - **DO NOT apply hot water or radiant heat.**
 - Move the exposed person into a warm area before thawing the affected part; if feet were exposed, carry the exposed person, if possible.
 - Bathe the affected area immediately in luke-warm water (not more than 35 deg C) for 10 to 15 minutes, immersing if possible, and without rubbing the exposed area. Remove any exposed clothing as well as any jewelry.
- Seek medical attention; call 911 on a landline phone for medical assistance (or provide location if calling on a mobile phone).

EYE CONTACT

- Using eyewash, flush eyes while holding eyelids open;
- Seek medical attention; call 911 on a landline phone for medical assistance (or provide location if calling on a mobile phone).

INHALATION

- Move from contaminated area.
- Lay the exposed person down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Seek medical attention; call 911 on a landline phone for medical assistance (or provide location if calling on a mobile phone).

INGESTION

- If conscious, immediately give a tepid glass of water.
- Never give anything by mouth to an unconscious person.

- Seek medical attention; call 911 on a landline phone for medical assistance (or provide location if calling on a mobile phone).

Spill Response

If spilled, Dry Ice will sublime to carbon dioxide. The gas is heavier than air and will accumulate in low areas of the space. Open the room, or increase ventilation by opening the fume hood sash, if possible. Do not enter or place your face near any pits, sump areas or other confined low spots in the room.

OUTSIDE FUME HOOD OR VENTILATED ENCLOSURE

- If safe to do so, open the fume hood sash to increase ventilation in the room
- Alert others and evacuate to a safe distance and prevent entry.
- Contact the University Operations Center at (617) 495-5560 [HMS/HSDM (617) 432-1901] if you need support or technical assistance.
- Remain in a safe location until the dry ice has sublimated, or if applicable, EH&S or other response personnel arrive.

INSIDE FUME HOOD OR VENTILATED ENCLOSURE

- Close the fume hood and wait for the Dry Ice to sublime.
- Contact the University Operations Center at (617) 495-5560 [HMS/HSDM (617) 432-1901] if you need support or technical assistance.