



Laboratory Safety Guideline

Dry Ice (Carbon Dioxide, Solid) [CAS 124-38-9]

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Overview


This document outlines minimum expectations for use of dry ice in Harvard labs. Departments or labs may choose to implement more stringent requirements for those operating in their spaces. All users of dry ice should review this document before use.

Dry ice is the solid form of carbon dioxide (CO₂). It is available in flake, pellet, or block form. It is most often used for rapid cooling of materials or for shipping biological samples. It poses unique risks to those who may work with or around it. Users should contact their [EH&S Laboratory Safety Advisor](#) or department safety officer about any questions they have before beginning work.

Hazards

Hazard Symbol	Hazard Description
	Contact Hazard: Dry ice is -109 °F (-79 °C). Skin contact with dry ice can lead to severe frostbite. At this temperature skin cells freeze and become damaged very quickly.
	Asphyxiation Hazard: Dry ice will sublime, or change from solid to gas, at any temperature above -109 °F. This sublimation can release substantial volumes of CO ₂ , with 1 pound of solid dry ice releasing 250 liters of CO ₂ gas. The gas can displace oxygen quickly in the air around the dry ice, which can lead to dizziness, headaches, difficulty breathing, loss of consciousness and death. This is especially of concern in nonventilated or confined spaces.



Hazard Symbol	Hazard Description
	Over-pressurization Hazard: Due to the emission of large volumes of CO ₂ gas as dry ice sublimates, 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.

Training

Lab personnel working with dry ice must complete applicable EH&S training and keep it up to date. At a minimum this includes the following.

- [General Lab Safety](#): Renewed annually.
- [Laboratory Safety Orientation Checklist](#): Completed for each lab a person works in and kept on file by the lab.
- [Laboratory Biosafety](#): If using biological materials with dry ice; renewed annually.
- [Shipping Biological Materials and Dry Ice](#) or [Shipping Non-Regulated Materials and Dry Ice](#): Required training before shipping dry ice.
 - Shipping Biological Materials and Dry Ice is taken if the individual will ship biological materials with dry ice.
 - Shipping Non-Regulated Materials and Dry Ice can be taken for shipping non-regulated biological materials with dry ice.

In addition, users of dry ice should review this document and be familiar with emergency procedures.



Precautions

Personal Protective Equipment

Proper personal protective equipment (PPE) and attire are important whenever working with hazardous materials. Each space should have a lab-specific PPE Assessment posted for reference by lab users.

The following table outlines basic requirements. More information can be found on the [EH&S Lab PPE webpage](#).

PPE Type	Requirement
Attire	Wear a combination of clothing and shoes that fully cover the legs and feet.
Eye and Face Protection	Wear safety glasses with side shields at a minimum. Use safety goggles when there is a greater risk of splashes or flying particles. A face shield over safety goggles may be needed based on other hazards present.



PPE Type	Requirement
Gloves	<p>Never handle dry ice with bare hands. Use tongs or other tools to handle it when possible.</p> <p>Use loose-fitting, thermally insulated gloves such as leather or cloth to manually handle dry ice. Gloves must be thoroughly inspected prior to each use. Do not put on or continue to use damaged gloves.</p> <p>Nitrile gloves will not provide enough protection on their own. There is a risk of the glove material freezing to the hand and becoming hard to remove if it comes into contact with dry ice while being worn.</p> <p>Glove compatibility with other chemicals used in combination with dry ice must also be considered. Refer to each chemical's Safety Data Sheet (SDS) and the EH&S Lab Glove Selection Guide for help identifying compatible gloves.</p>
Lab Coat	Lab coats are recommended when handling dry ice. Note that a lab coat may be required based on other hazards present.
Respiratory Protection	Respiratory protection should not be needed if using dry ice in a well-ventilated area. There is a risk of asphyxiation if dry ice melts and releases carbon dioxide gas in a poorly ventilated area. If dry ice will be used or stored in an area with poor ventilation or in a small space, contact EH&S for an assessment.

Before Starting Work

- Determine if a less hazardous substance can be used instead of dry ice.
- Review the manufacturer's Safety Data Sheet (SDS) and [additional chemical safety information available on the EH&S website](#).



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- Be familiar with the general University emergency procedures in the [EH&S Lab Emergency Response Guide](#).
- Use only the quantity that you need.
- Identify the location of the nearest sink, eyewash, and safety shower and verify that they are accessible.

During Work

- **Avoid inhalation!** Perform all operations in a well-ventilated area.
- **Avoid any contact with dry ice.** Wear PPE as outlined [in the PPE section of this document](#).
- 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 containers are an appropriate storage material as long as they are not sealed, such as with packing tape.

- **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 exposure or a spill.

After Completing Work

- Clean work area.
- Return dry ice that will be used again to appropriate storage locations.
 - **Always store dry ice in a well-ventilated location.** Do not store or use dry ice in confined areas with limited ventilation, including but not limited to cold rooms, walk-in refrigerators, and environmental chambers.
 - Do not leave dry ice unattended in open areas.



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- Store in original containers or other appropriate containers such as Styrofoam boxes or dry ice storage chests.
- Dispose of dry ice.
 - 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 or waste can.
 - Never dispose of dry ice in a sink, toilet or other fixture. The temperature difference can damage the plumbing. If dry ice is inadvertently put into the plumbing, do not add hot water. Water can create a thick opaque cloud and is unlikely to help.
- Wash hands and forearms thoroughly with soap and water before leaving the lab.

Emergency Procedures

Refer to the [Lab Emergency Response Guide](#) and the information outlined in this section.

If you see or receive a container that is swollen, bulging, or that you believe may contain improperly packaged dry ice, secure the area and contact the Operations Center by calling 617-495-5560. Harvard Medical School (HMS) and Harvard School of Dental Medicine (HSDM) labs should call 617-432-1901.

Do not try to release pressure in the container.

Notify the Principal Investigator (PI) or supervisor of any exposures or incidents involving dry ice. The PI or their designee must [report all exposures or injuries](#) within 24 hours.

First Aid

- For serious medical emergencies, go to the closest emergency room or call 911.
- For non-emergency medical attention, contact the Occupational & Environmental Health Network (OEHN) hotline at 1-866-360-8100.



Skin Contact

Treatment starts immediately following exposure.

In case of cold burns (frostbite), do the following:

- **Do not apply hot water or radiant heat.**
- Move the exposed person into a warm area before thawing the affected part. If feet are exposed, carry the exposed person, if possible.
- Bathe the affected area immediately in lukewarm 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 cell phone).
- Follow up with OEHN at 1-866-360-8100 for minor skin exposure. Call 911 for major skin exposure.

Eye Contact

- Using eyewash, flush eyes while holding eyelids open.
- Seek medical attention.

Inhalation

- Move person from contaminated area.
- Lay the exposed person down. Keep warm and rested.
- Prosthesis 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 cell phone).



Ingestion

- If conscious, immediately give a tepid glass of water.
- Never give anything by mouth to an unconscious person.
- Seek medical attention by calling 911.

Sharps Injury

- Immediately wash the area with soap and water for at least 15 minutes.
- Seek medical assistance.

Spill Response

If spilled, dry ice will sublimate to carbon dioxide gas. 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 and activating the hood's emergency purge button, 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 and activate the emergency purge button to increase ventilation in the room.
- Alert others and evacuate to a safe distance and prevent entry.
- If you need support or technical assistance, contact the Operations Center by calling 617-495-5560. HMS and HSDM labs should call 617-432-1901.
- 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:



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- Close the fume hood and wait for the dry ice to sublimate.
- If you need support or technical assistance, contact the Operations Center by calling 617-495-5560. HMS and HSDM labs should call 617-432-1901 if you need support or technical assistance.

Supporting Documents

- [Airgas Dry Ice SDS](#)
- [EH&S Lab Glove Selection Guide](#)
- [Lab Emergency Response Guide](#)
- [Lab Glove Selection Guide](#)
- [Lab PPE Webpage](#)
- [Safe Chemical Work Practices](#)