

JOB HAZARD ANALYSIS DRY ICE (CARBON DIOXIDE)	JOB DESCRIPTION:	PAGE 1 OF 2	DATE: 6-21-02	<input checked="" type="checkbox"/> NEW <input type="checkbox"/> REVISED
	EMPLOYEE/OPERATOR: All Employees	SUPERVISOR:	ANALYSIS BY: rlk (crrso)	
ORGANIZATION: U. S. Geological Survey	LOCATION: ALL		CERTIFIED BY:	

PHYSICAL PROPERTIES

Critical Density	28.9855 LB/FT ³
Critical Pressure	1066.3 PSIA
Critical Temperature	87.8°F
Density Gas	0.1234 LB/FT ³ @32°F
Density Liquid	63.69 LB/FT ³ @0°F
Latent Heat of Vaporization	241 BTU/LB 0°F
Molecular Weight	44.004
Sublimation Temperature	-109.3°F or -78.5°C
Solubility in H2O	79FT ³ CO2 GAS/FT ³ (when H2O is at 32°F)
Viscosity Gas	0.015 Centipoises @32°F
Chemical Formula	CO2
Chemical Family	Inorganic
Sublimation	A pound of Dry Ice will sublime into 8.3 cubic feet of carbon dioxide gas.
DOT Shipping Class:	ORM-A UN-1845 Pkg. Group III Class Nonflammable Gas UN2187

SHIPPING WITH DRY ICE

Plan on using 5 to 10 pounds of dry ice for every 24-hour period depending upon the thickness of the insulated shipping container. This will keep everything frozen in a container up to 15 quarts. For larger containers and greater shipping times, multiply dry ice quantities by this rate. The best shipping container is a three-inch thick urethane insulated box tested to loose only 5 pounds for a 10-quart storage area every 24-hours. When packing items in the container fill the empty space with wadded newspaper or a paper bag. Any "dead-air-space" will cause the Dry Ice to sublime faster. Dry Ice sublimation (changing from a solid to a gas) will vary depending on the temperature, air pressure and thickness of insulation. The more Dry Ice you have stored in the container, the longer it will last. Dry Ice, at -109.3°F or -78.5°C, will freeze and keep frozen everything in its container until it is completely sublimated. These frozen items will still take some extra time to thaw because they will have been so cold.

Dry ice shipments prepared in accordance with IATA regulations do not require a Shipper's Declaration, and there is no special handling fee for transporting dry ice at this time. However, the dry ice box must be checked and the dry ice information must be entered under the special handling section on the air bill. Where dry ice is tendered as a refrigerant with Dangerous Goods that require a declaration, the "Dangerous Goods" block and the dry ice block on the airbill must be checked, and the dry ice information must be entered under the special handling section on the airbill. All dry ice shipments require package marking and labeling.

JOB TASK	POTENTIAL HAZARDS UNSAFE ACTS OR CONDITIONS	REQUIRED PERSONAL PROTECTIVE EQUIPMENT
<p>1. PICK-UP TIME AND TRANSPORTING</p> <p>Plan to pick up the Dry Ice as close to the time it is needed as possible. It sublimates at 10% or 5 to 10 pounds every 24 hours, whichever is greater. Carry it in a well-insulated container such as an ice chest. If it is transported inside a car or van for, more than 15 minutes make sure there is fresh air.</p>	<p>1. HANDLING</p> <p>Dry Ice temperature is extremely cold at -109.3°F or -78.5°C. Always handle Dry Ice with care and wear protective cloth or leather gloves whenever touching it. An oven mitt or towel will work. If touched briefly it is harmless, but prolonged contact with the skin will freeze cells and cause injury similar to a burn</p> <p>DO NOT leave Dry Ice unattended around children.</p>	<p>1. BURN TREATMENT</p> <p>Treat Dry Ice burns the same as a regular heat burns. See a doctor if the skin blisters or comes off. Otherwise, if only red it will heal in time as any other burn. Apply antibiotic ointment to prevent infection and bandage only if the burned skin area needs to be protected</p>
<p>2. PHYSICAL DESCRIPTION</p> <p>Dry Ice is frozen carbon dioxide, a normal part of our earth's atmosphere. It is the gas that we exhale during breathing and the gas that plants use in Photosynthesis. It is also the same gas added to water to make soda water. Dry Ice is particularly useful for freezing, and keeping things frozen because of its very cold temperature: -109.3°F or -78.5°C. Dry Ice is widely used because it is simple to convert to its frozen form and easy to handle using insulated gloves. Dry Ice changes directly from a solid to a gas -sublimating- in normal atmospheric conditions without going through a wet liquid stage.</p>	<p>2. STORAGE</p> <p>Store Dry Ice in an insulated container. The thicker the insulation, the slower it will sublimate. Do not store Dry Ice in a completely airtight container. The sublimation of Dry Ice to Carbon Dioxide gas will cause any airtight container to expand or possibly explode. Keep proper air ventilation wherever Dry Ice is stored. Do not store Dry Ice in unventilated rooms, cellars, autos or boat holds. The sublimated Carbon Dioxide gas will sink to low areas and replace oxygenated air. This could cause suffocation if breathed exclusively. Do not store Dry Ice in a refrigerator freezer. The extremely cold temperature will cause your thermostat to turn off the freezer. It will keep everything frozen in the freezer but it will be used up at a faster rate. It is the perfect thing if your refrigerator breaks down in an emergency.</p>	<p>2. VENTILATION</p> <p>Normal air is 78% Nitrogen, 21% Oxygen and only 0.035% Carbon Dioxide. If the concentration of carbon dioxide in the air rises above 5%, carbon dioxide can become toxic. Smaller concentrations can cause quicker breathing but is otherwise not harmful. If Dry Ice has been in a closed auto, van, room, or walk-in, for more than 15 minutes, open doors and allow adequate ventilation before entering. Leave area containing Dry Ice if you start to pant and breath quickly. This is the sign that you have breathed in too much CO2 and not enough oxygen. Dry Ice CO2 is heavier than air and will accumulate in low spaces. Do not enter closed storage areas that have or have had Dry Ice before airing out completely.</p>
<p>3. DISPOSAL</p> <p>Unwrap and leave it at room temperature in a well-ventilated area. It will sublimate from a solid to a gas.</p>	<p>3.</p>	<p>3. from dryiceinfo.com http://www.dryiceinfo.com/science.htm</p>