

One of the approved COVID-19 vaccines must be stored at -70 degrees C (-94° F). To maintain this ultra-low temperature during shipment and storage, the vaccine will be packed in dry ice or more formally, Carbon Dioxide (CO<sub>2</sub>).

**Dry Ice or Carbon Dioxide is a hazardous material**

This document is intended to be used as general guidance for first responders dealing with transportation and/or fixed facility emergencies potentially involving the shipment, use, and/or storage of the COVID vaccine(s). This guidance is not designed or intended to supersede local Emergency Response Plans or standard operating procedures or guidelines (SOPs/SOGs). This guidance is for INITIAL RESPONSE consideration only. As always, responders should operate within the scope and limitations of their training.

**The most common hazards you may encounter with these shipments are:**

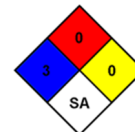
Hazard	Common Name	UN Number	U.S. D.O.T. Emergency Response Guidebook (ERG) Guide	Form(s)
CO <sub>2</sub>	Carbon Dioxide (Solid) – “Dry Ice”	1845	120	May be in flake, pellet, or block form(s)
N	Nitrogen Refrigerated Liquid	1977	120	Liquified gas – kept under pressure
Li <sub>2</sub> O	Lithium Oxide	3090	138	Found in Lithium batteries in refrigeration units used to transport the vaccine
Li1+	Lithium Ion	3480	147	

**IMPORTANT INFORMATION:** COVID vaccines may be transported by any one or more of the following: military/National Guard vehicles; state or public health authority vehicles; medical couriers; commercial couriers; private vehicles; other. **These vehicles may or may not be labeled and/or placarded.**

## CARBON DIOXIDE POTENTIAL PLACARDS, LABELS, AND/OR MARKINGS



## LIQUID NITROGEN POTENTIAL PLACARDS, LABELS, AND/OR MARKINGS



## LITHIUM BATTERY POTENTIAL PLACARDS, LABELS, AND/OR MARKINGS



## DANGERS OF CARBON DIOXIDE [CO<sub>2</sub>]:

**Carbon dioxide** is a simple asphyxiant, therefore continuous monitoring of CO<sub>2</sub> and oxygen should take place whenever working around dry ice. Pay close attention to closed environments like vehicle compartments, rooms with minimal or no ventilation, etc. Be prepared to adequately ventilate and administer first aid for respiratory emergencies. Ensure all responders wear proper PPE including SCBA. **REFER TO ERG GUIDE 120 FOR FIRST AID INFORMATION**

**Carbon dioxide** starts to “sublime” – going directly from a solid to a gas – at -109.3° F (-78.5° C). At -78.5°C (-109.3° F), skin contact with dry ice can lead to severe frostbite. In case of contact, follow local emergency medical protocols. Ensure all responders wear proper PPE including SCBA and use proper thermal protection. **REFER TO ERG GUIDE 120 FOR FIRST AID INFORMATION**

**Carbon dioxide**, as it sublimates, poses a potential explosion hazard. Due to its thermal expansion, dry ice should never be stored in a tightly sealed container or any container with a screw-top lid. Dry ice will sublime at about five to 10 lbs every 24 hours in a typical storage container. This alone could cause an explosion in a tightly sealed container. Use caution around containers that appear to be tightly sealed.

## DANGERS OF LIQUID NITROGEN [N]:

**Liquid nitrogen** is an asphyxiator as its vapors displace oxygen as it changes from a liquid to a gas. Continuous monitoring of oxygen level should take place whenever working around liquid nitrogen. Pay close attention to closed environments like vehicle compartments, rooms with minimal or no ventilation, etc. Be prepared to adequately ventilate and administer first aid for respiratory emergencies. Ensure all responders wear proper PPE including SCBA. **REFER TO ERG GUIDE 120 FOR FIRST AID INFORMATION**

**Liquid nitrogen** has a boiling temperature of -320.8° F (-196° C) at atmospheric pressure. Direct contact can freeze the skin causing frostbite and cold burns. Delicate tissue, such as eyes, can be damaged by an exposure to the cold gas alone, which would be too brief to affect skin.

## DANGERS OF LITHIUM BATTERIES:

When **lithium batteries** fail to operate safely or are damaged, they may present a fire and/or explosion hazard. Damage from improper use, storage, or charging may also cause lithium batteries to fail. **Lithium batteries** that have reached a charge of less than 18% have been shown to generate high heat and/or start fires. **REFER TO ERG GUIDE 138 and 147 FOR FIRE AND EXPLOSION INFORMATION OR TO:**

<https://www.osha.gov/dts/shib/shib011819.html>

## QUICK FACTS:

**Carbon dioxide** has a molecular weight of 44 . . . **It's heavier than air** and will accumulate at ground level.

The **secondary hazard of dry ice** is its low temperature of -109.3° F. This poses a frostbite hazard. **Use cryogenic gloves** when handling.

**Carbon dioxide** gas will dissipate as it warms up — **with adequate ventilation**.

Signs and **symptoms of exposure:** headaches, dizziness, restlessness, increased heartrate, etc.

**Four or five gas meters** can be used to evaluate oxygen deficiency (**if the meter has an oxygen sensor**).

PHMSA's ERG app can be downloaded for Android and iPhone with your IOS service and they are **FREE!**

### ERG 2020

