



# Dry Ice Safety Awareness Training



# Hazards of Dry Ice

- Dry ice is the solid form of Carbon Dioxide ( $\text{CO}_2$ )
  - non-combustible, available in flakes, pellets or block form.



- As dry ice heats up, it sublimates into asphyxiant gas
  - Dry ice will sublimate about five to ten pounds every 24 hours (blocks last longer) in a typical storage cooler
  - Plan on purchasing dry ice as close as possible to the time needed.



- A small amount of dry ice can sublime into a large volume of gas
  - Dry ice will sublime (vaporizes directly to the gas state) at a temperature of  $-78.5\text{ C}$  ( $-109.3\text{ F}$ ) or higher.

# Hazards of Dry Ice

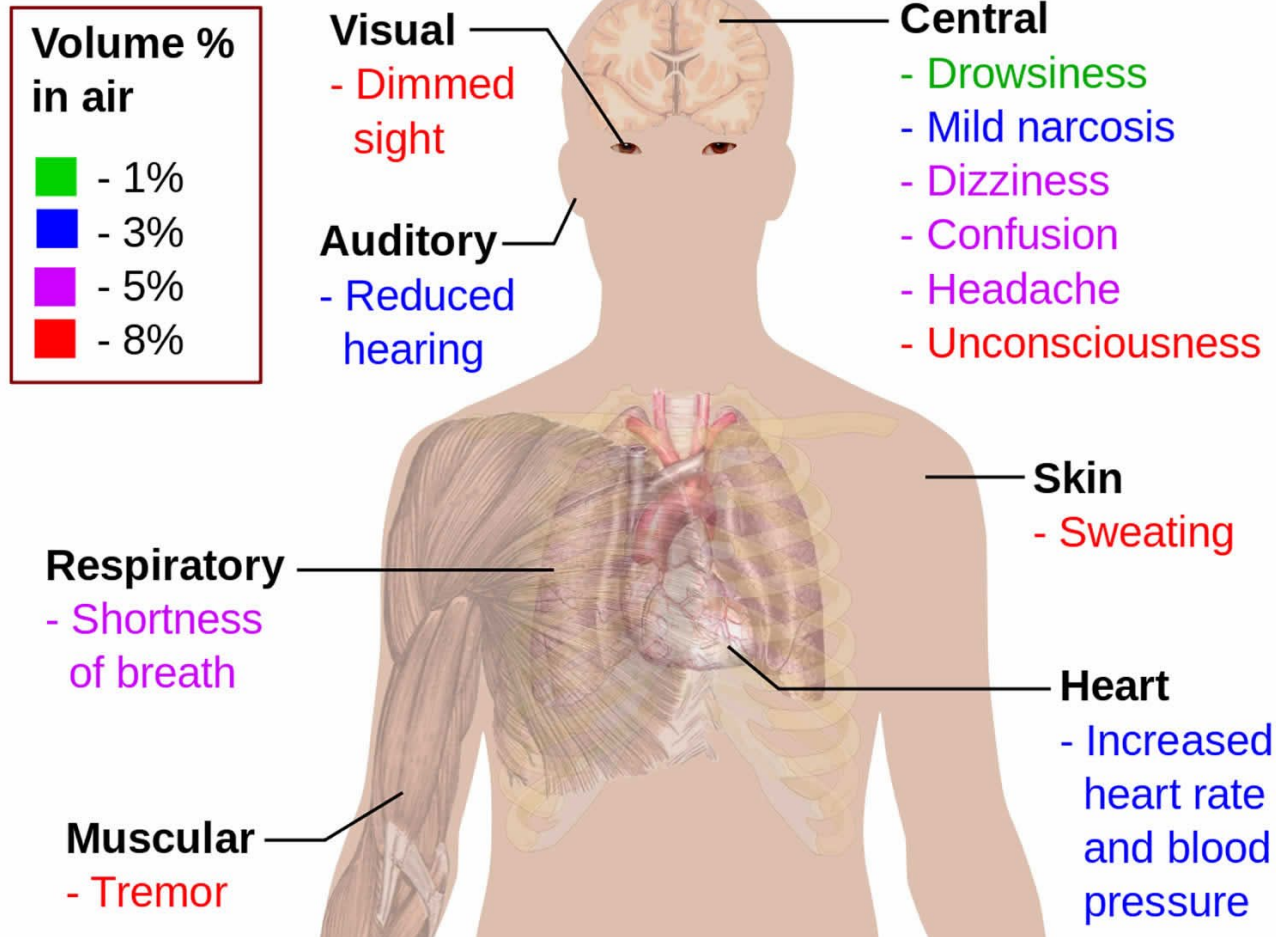
- Dry ice can be hazardous when used or stored in a confined space or when consumed in “smoke drinks”



- In well-ventilated areas, CO<sub>2</sub> gas dissipates and is harmless.
  - However, in confined or poorly ventilated spaced, CO<sub>2</sub> gas can accumulate and displace oxygen.
- Risks of CO<sub>2</sub> exposure include:
  - dizziness,
  - loss of consciousness
  - suffocation

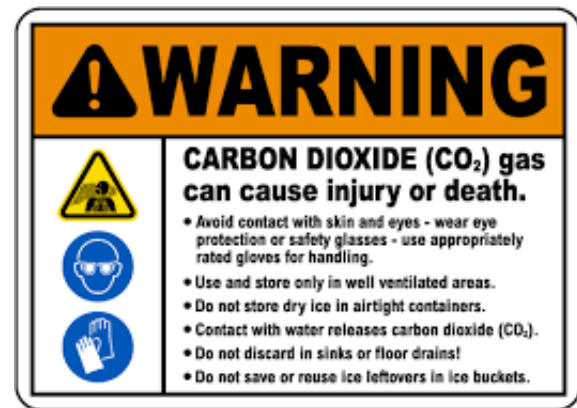


# Main symptoms of Carbon dioxide toxicity



- Normal air is composed of 78% nitrogen, 21% oxygen, and only 0.04% carbon dioxide.
- Concentrations greater than 0.5% (5000 ppm) can become dangerous.
  - Therefore, handle dry ice in well-ventilated locations.

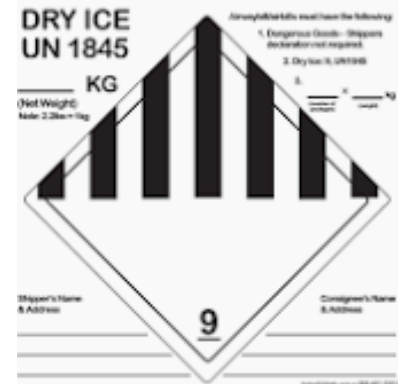
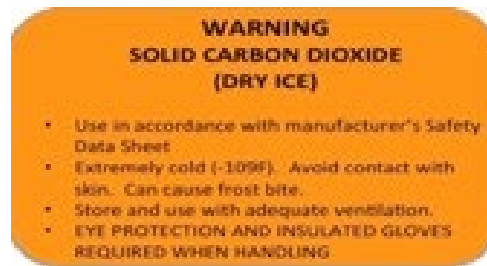
# Safety Precautions



- Dry ice must be stored in a Styrofoam chest, insulated cooler, or a special cooler designed for the storage of dry ice.
  - The cooler must then be located in a well-ventilated place, such as the open lab.
  - NEVER store coolers in closets, cabinets, refrigerators, or walk in coolers/cold rooms.
- Due to the thermal expansion of dry ice (one pound of dry ice produces about 250 liters of gaseous carbon dioxide), sufficient gaseous carbon dioxide can be produced in a sealed container to cause an explosion.
- Dry ice is NEVER to be stored in any type of tightly sealed devices such as an ultra-low freezer or plastic/glass container.

# Transporting Dry Ice

- You should avoid transporting dry ice in the cab of a truck or passenger compartment of a car when possible.
  - Shipping dry ice requires DOT training.



- If you must transport dry ice in the driver's compartment, ensure the compartment is well-ventilated (window open)
- Make sure the container holding the dry ice is closed securely to minimize the release of gas
- Transporting dry ice in an insulated cooler will minimize off-gassing.
- Load and unload dry ice in a well-ventilated area.

# How to Handle Dry Ice

- Wear thermal gloves when handling dry ice
- Store in a well-ventilated space
- Secure dry ice to prevent unauthorized access
- Do not store in tightly sealed containers
- **Do not lean into or over any storage container storing dry ice**
- Do not consume dry ice



# Disposing of Dry Ice

- Let the unused portion sublimate in a well-ventilated area
- Never dispose of dry ice in a sink or toilet
- Never dispose of dry ice in the trash or garbage
- Never leave unneeded dry ice in hallways or other public areas

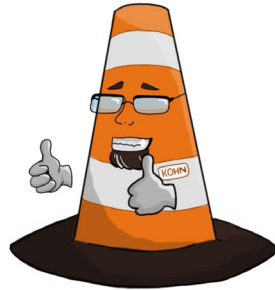




# Questions?

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<http://safety.engr.wisc.edu/>



Quiz link is on  
next slide



# Video & Safety Quiz

## Why is dry ice so dangerous? – VIDEO



## Training Quiz & completion verification