

Safety Moment: Cryogenics and Dry Ice

DUQUESNE UNIVERSITY

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Cryogenics

- ❖ liquids used to reduce temperature below -153°C
- ❖ e.g. nitrogen, helium, argon, oxygen, methane
- ❖ high expansion ratio (average 800:1) when vaporizing
- ❖ cooling mechanism is latent heat of vaporization



Dry Ice

- ❖ solid carbon dioxide
- ❖ gas deposits to solid at -78°C
- ❖ expansion ratio 554:1



Health Hazards

- ❖ flammable: hydrogen, methane, carbon monoxide
- ❖ explosive: sealed containers, oxygen-enriched condensates around containment systems
- ❖ frostbite: cryogenics, dry ice
- ❖ asphyxiation: cryogenics, dry ice
- ❖ liquid oxygen: carbon and stainless steels, cast iron, aluminum, zinc, Teflon, clothing – may burn

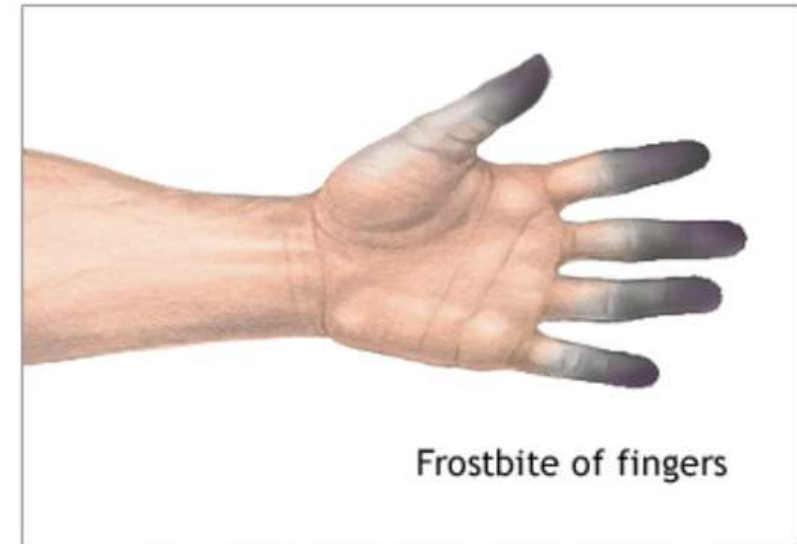
General Precautions

- ❖ avoid skin contact with cryogenics, dry ice, and uninsulated cryogenic piping systems / reservoirs
- ❖ cryogenic gloves / face shield
- ❖ long sleeves, long pants, no cuffs
- ❖ store and use in ventilated areas
- ❖ do not store in confined space



Tissue Exposure to Cryogen/Dry Ice

- ❖ obtain emergency medical assistance as soon as possible
- ❖ remove clothing not frozen to skin
- ❖ place affected body part in warm water
- ❖ do not rub frozen body parts
- ❖ even brief exposure can damage eye tissue



Cryogen Spill Response

- ❖ contact Campus Safety immediately (412-396-2677)
- ❖ if oxygen level in room is low, leave immediately

- ❖ proactively assess risk of oxygen deprivation by being aware of:
 - ❖ largest cryogenic container size
 - ❖ cryogen expansion ratio
 - ❖ volume of room

Additional Information

- ❖ Material Safety Data Sheet
- ❖ University of Minnesota safety website
- ❖ West Virginia University safety website