

Roger Palmer BOC Gas.

BOC Gas - Dry-ice

If handled properly Carbon Dioxide is perfectly safe.

However there are four main hazards;

- Asphyxiation - the reduction in Oxygen content in the breathing zone.
- Toxicology - low lying concentration of vapour causes rapid circulatory insufficiency. Symptoms are headache, rapid gasping for breath, nausea and vomiting.
- Cold Hazard - the extreme cold of Dry Ice (-78°C) - Contact may cause cold burns or frostbite. Chrome leather insulated gloves are available from BOC.
- Weight - solid dry ice is heavy (10kg is the standard package weight).

The important property of CO₂ is weight of the gas relative to air. CO₂ is 1.5 times heavier than air.

No one should enter an atmosphere with less than 20% oxygen. Under the COSHH Regulations for CO₂ the *short term exposure limits* - is 1.5% for ten minutes in any eight hour period the *Long term exposure limits* - is 0.5%. Victims may not be aware of their situation. The first faculty to go is the power to reason; heavy gasping/breathing is the first symptom. Ensure the storage of dry ice is in a cool ventilated area. And if you are transporting CO₂, isolate from the driver - never have the load in the drivers carriage. It is possible he could be overcome from CO₂. BOC is not keen to serve a customer unless there is separate load space.

Always store Dry Ice in properly designed containers. The container should not be air-tight. If a block of dry ice is put into an air tight container it will sublime to gas and could build to a high pressure. This will produce a nasty surprise when opening the lid! It has been known when stored in a damp atmosphere for the container's lid to freeze shut. Insulated containers with vented seals are available to hire. Before using dry ice in any area do a risk assessment - one kg of dry ice will supply 1/2 cubic meter of gas. In any production where dry ice is being used, consider the breathing zone. During rehearsals use the monitor to warn of any problems - a one sensor - one readout - mains operated unit will cost from around £300*. For larger productions with the dry ice effect, a multi sensor should be used to register levels. Using this equipment a test can be carried out for your local authority. Monitoring allows you to record the results and shows that the theatre is taking the correct precautions and recognising the risks.

Under your risk assessing, ask the cast and technicians associated with a particular dry ice effect if anyone is asthmatic. Although the effect may be safe and within the HSE limits it could disturb a person with an asthmatic symptoms. Warn them to keep clear during the effect. Ensure performers' heads are well above the effect and a watch is being observed should anyone have cause to 'fall' to the ground during their performance. Always be aware in which direction the gas is going to travel - remembering CO₂ is 1.5 times heavier than air!

The 'Dracula' effect is a common use of dry ice - when the drink 'steams'. But beware! Pellet could easily be swallowed. This would cause severe internal injuries!

Disposing of dry ice is a common problem. Take it to a clear area, away from the public, particularly children, and spread it out to evaporate.

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