

DIOXICE

The safe use of Dry Ice for entertainment

VERY IMPORTANT NOTES:

- 1) **Read our Data Sheet "The Safe Handling of Dioxide" supplied with the product.**
- 2) **Follow these guidelines and stick only to the experiments shown below.**
- 3) **NEVER PLACE dry ice in a closed container such as a bottle. The bottle can explode with a loud bang, damaging your eardrums, and if the bottle shatters, the flying debris will cause serious physical damage to any persons nearby. If the bottle is strong the cap can fly off and damage someone's eyes.**
- 4) **Follow the safety notes in bold in the text below.**

What is Dry Ice?

Dry ice is frozen Carbon Dioxide (CO₂). At normal atmospheric pressure frozen CO₂ does not melt into a liquid, but evaporates directly into its gaseous form. Hence the name *dry* ice. This process is called *sublimation*. All of the experiments below rely on this property of dry ice. 1 kg of dry ice, when it "sublimes" and turns to gas, will produce 250 litres of gas at atmospheric pressure. That's a lot of gas!

Storing and Transporting Dry Ice

Dry ice continuously sublimates as heat enters it from its surroundings. The CO₂ gas that evolves must be vented from the container. Do not seal dry ice into a container except as detailed below, because an explosive bursting of the container can result. A polystyrene foam ice chest with a loose fitting lid makes a good container for transporting dry ice. **See the safety leaflet for information on the transportation of dry ice.**

Handling Dry Ice

Due to its extremely cold temperature (-78.6°C, or -109.3°F), dry ice can cause damage to the skin if handled. Use tongs or insulated gloves when handling dry ice. It is also important when crushing or grinding the solid not to get any of the dust into your eyes. **Wear protective goggles.**

Fog Effects

If you place 1 kg of dry ice into a bucket of warm or hot water, clouds of white fog are created, which should last for 5-10 minutes. This white fog is not the CO₂ gas, but is condensed water vapour, mixed in with the invisible CO₂. The extreme cold causes the water vapour to condense into clouds. The fog is heavy as it is being carried by the CO₂, and will settle to the bottom of a

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container, and can be poured. You can produce enough ground hugging fog to fill a medium sized room with a kilo or so of dry ice. **Do not allow anyone to lie down in this fog, or allow babies or pets into it, as CO₂ gas does not support life.** Dry ice fog also allows low powered laser beams to be seen.

An ordered quantity of 10 kg of dry ice (7-8 kg on delivery because of sublimation) should yield enough fog to cover a medium sized room for almost 1 hour, if added to the water gradually, and the water is kept warm. Too little water will cause the water next to the dry ice to freeze and stop the creation of fog.

Popping Film Cans

A fun activity vividly demonstrates the sublimation process. Place a piece of dry ice into a plastic 35mm film container, the kind that has the snap on cap. Then wait. The cap will pop off, and sometimes fly several meters. **To be safe wear eye protection to stop the caps flying into onlooker's eyes.**

Inflate A Balloon

Force the neck of an uninflated balloon open with the index and middle fingers of both hands, and drop in one or more pellets of dry ice. Tie the balloon closed. Set aside, and observe for a while. Better still, drop the balloon into a pond or swimming pool. This will help supply heat to the dry ice. At first, the balloon will sink, but soon, as it begins to inflate, it will rise to the surface. If you manage to put enough dry ice into the balloon, it will eventually reach the bursting point. Again, this is lots of fun if the balloon is in a pool, **but be careful no one is near to the balloon.**

Sound Lens Using a Balloon

A balloon full of CO₂ gas can act as a sound lens, because sound travels more slowly in CO₂ than it does in air, Just as light travels more slowly in glass than in air or vacuum. **Do not use a balloon for this if it is over inflated, or if it contains remaining pieces of dry ice, because the balloon could burst, causing temporary or even permanent deafness.** Hold the balloon about a foot from your ear, and listen for faint sounds, such as a radio turned low, a ticking clock or a distant conversation, that will appear louder.

Singing Spoon

Press a warm spoon firmly against a chunk of dry ice. The spoon will scream loudly as the heat of the spoon causes the dry ice to instantly turn to gas where the two make contact. The pressure of this gas pushes the spoon away from the dry ice, and without contact, the dry ice stops sublimating. The spoon falls back into contact again, and the cycle repeats. This all happens so quickly that the spoon vibrates, causing the singing sound you hear.