

Dry ice safety



The Civil Aviation Safety Authority (CASA) reports an incident where a heavy-duty plastic cylinder, packed with dry ice for transporting bio-hazardous material, exploded in transit. While no one was injured by the explosion, and none of the dangerous material was released from the container, the incident highlights one of the dangers of incorrectly using dry ice.

What is dry ice?

Dry ice is frozen, solid carbon dioxide (the gas we exhale as we breathe). It is colder than normal ice with a surface temperature of minus 78.5 degrees Celsius. When exposed to normal atmospheric conditions (for example, in a room) or low pressure (such as in an aircraft), dry ice doesn't melt, it sublimates: it turns from a solid into an odourless gas, bypassing the liquid phase (hence the name 'dry').

Liquid carbon dioxide can not exist in free air at normal temperatures. It does exist under pressure in storage cylinders and fire extinguishers.

Dry ice is used when transporting or storing frozen goods, food and medical supplies.

How is dry ice dangerous?

Carbon dioxide can kill by suffocation: if the concentration of carbon dioxide in the air becomes too high, it can become toxic. You can hyperventilate, experience headaches, nausea and vomiting, and become unconscious.

Solid carbon dioxide can destroy flesh: touching dry ice causes frostbite (severe freezing which resembles a burn) within seconds.

Dry ice is produced as a very cold white cloud when carbon dioxide is rapidly released from a cylinder or fire extinguisher. Inhaling this cloud can cause significant injuries, as can touching the pipes and nozzle on the cylinder or fire extinguisher.

While dry ice is dangerous, handling and storing it safely is actually quite easy to do.

How should dry ice be stored?

Dry ice can only be stored long-term under refrigeration. Temporary storage should be in a well-insulated, ventilated container.

When using dry ice as a refrigerating agent, it should be stored in a ventilated, insulated container.

Do not, under any circumstances, store dry ice in a completely airtight container. Carbon dioxide as a gas has a volume hundreds of times larger than the volume occupied by the same mass of carbon dioxide as dry ice. As the dry ice sublimates to carbon dioxide gas, it expands and will cause an airtight container to explode (as illustrated by the CASA incident).

Carbon dioxide does not support life, so do not store dry ice in an unventilated room, car, van, aircraft or boat.

Do not store dry ice in a normal or domestic freezer: they can not hold a low enough temperature to preserve the dry ice, and it can damage the thermostat.

How should dry ice be transported?

Carry dry ice in a well-insulated container such as an ice chest.

If it is being transported in a van or car, travel with your windows down so there is plenty of fresh air coming from outside — don't re-circulate the inside air.

How should dry ice be handled?

Always wear insulated gloves, and use tongs if possible. Wearing safety glasses or goggles, long-sleeved shirt, long trousers, and covered shoes is also recommended.

Never saw dry ice; use a hammer to break a block into smaller pieces instead. The best option is to obtain it from your supplier in the size and form you need it.

How should it be disposed of?

Allow the ice to sublimate in a well-ventilated area where the carbon dioxide can't build up.

Don't dispose of dry ice in sewers, sinks, toilets, garbage chutes or bins, or areas where the general public can get to it.

Any other safety precautions?

Collect dry ice from your supplier as close as possible to the time you will be using it.

Get a material safety data sheet (MSDS) from your supplier.

Don't let children near dry ice.

Don't put dry ice in drinks or in your mouth.

Don't place it directly against bottled or canned foods or drinks, as they might split or explode.