Public Health England

Protecting and improving the nation's health

Carbon Dioxide

General Information

Key Points

- carbon dioxide is a colourless, tasteless, odourless gas that is naturally present in the Earth's atmosphere
- It can be manufactured and used as solid, gas or liquid;
- solid carbon dioxide is also known as dry ice
- carbon dioxide is used to produce bubbles in fizzy drinks, as a refrigerant, a preservative and used in fire extinguishers
- carbon dioxide is naturally released into the atmosphere as part of the carbon cycle and from human activity
- large amounts of dry ice or release of a fire extinguisher in an enclosed space with no ventilation can result in high concentrations of carbon dioxide in the air
- high levels can reduce the amount of oxygen available in the air, leading to asphyxiation
- there may be headache, dizziness, sweating, muscle twitches, increased breathing rate, shortness of breath, drowsiness, fast heart rate and loss of consciousness
- higher concentrations can cause fitting, coma and death
- contact with dry ice or carbon dioxide released under pressure onto the skin can cause frostbite
- ingesting dry ice can burn the mouth and throat

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Public Health Questions

What is carbon dioxide?

Carbon dioxide is a colourless, tasteless, odourless gas that is naturally present in the Earth's atmosphere. It is produced by all living organisms. In humans it is removed from the body in air breathed out. It can also be man-made.

What is carbon dioxide used for?

Carbon dioxide is produced naturally by living organisms such as humans, animals, plants and microbes. It plays an important role in various processes that are essential for life.

It can be manufactured and used as solid, gas or liquid (when kept under pressure). Solid carbon dioxide, which is also known as dry ice, is used to keep things cool and is used in fog machines. Carbon dioxide is also used to produce bubbles in fizzy drinks, as a refrigerant, a preservative and used in fire extinguishers.

How does carbon dioxide get into the environment?

It is constantly being produced and removed from the environment by oceans and growing plants in a process known as the carbon cycle. Other natural sources of carbon dioxide include forest fires and volcanoes. Human activities such as burning coal, oil and gas lead to the production of carbon dioxide; hence it can enter the environment from emissions from factories or power stations that burn fossil fuels. Other sources that can increase levels include motor vehicles and the burning of oil and gas in homes for heating.

Carbon dioxide is the most important greenhouse gas emitted in the UK. Greenhouse gases trap and hold heat in the atmosphere which warms the Earth's surface.

How might I be exposed to carbon dioxide?

Carbon dioxide is produced naturally by living organisms and is present naturally in the environment. Breathing in fumes from factories, motor vehicles or smoke from burning fossil fuels can increase exposure.

Exposure may occur in workplaces in which carbon dioxide is used or released. However safe levels are enforced to protect employees who may be exposed to carbon dioxide at work. Such levels are below those that are thought to cause harmful effects.

Large amounts of dry ice or release of a fire extinguisher in an enclosed space with no ventilation can result in high concentrations of carbon dioxide in the air.

If I am exposed to carbon dioxide how might it affect my health?

You may be exposed to carbon dioxide by breathing or ingesting it, or by skin contact with it. Following exposure to any chemical, the adverse health effects by which you may encounter depend on several factors, including the amount to which you are exposed (dose), the way

you are exposed, the duration of exposure, the form of the chemical and if you were exposed to any other chemicals.

Exposure to low levels of carbon dioxide in the environment would not be expected to cause adverse health effects.

Higher levels in an enclosed space can reduce the amount of oxygen available in the air. This can lead to asphyxiation and the higher the carbon dioxide concentration, the worse symptoms may get. This can cause headache, dizziness, sweating, muscle twitches, increased breathing rate, shortness of breath, drowsiness, fast heart rate and loss of consciousness. Exposure to very high concentrations can cause fitting, coma and death.

Contact with dry ice or carbon dioxide released under pressure onto the skin can cause frostbite. Ingesting dry ice can burn the mouth and throat.

Can carbon dioxide cause cancer?

Carbon dioxide is not a cancer causing chemical.

Does carbon dioxide affect pregnancy or the unborn child?

Carbon dioxide is not considered to cause harm to the unborn child. However, if exposure to carbon dioxide causes the mother to become unwell this may affect the unborn child.

How might carbon dioxide affect children?

Children exposed to high levels of carbon dioxide are expected to show similar effects to adults.

What should I do if I am exposed to carbon dioxide?

It is unlikely that the general population will be exposed to a level of carbon dioxide high enough to cause adverse health effects. However, if you have any health concerns regarding exposure to carbon dioxide seek guidance from your GP or contact NHS 111.

Additional sources of information

UKTIS. Best Use of Medicines in Pregnancy http://www.medicinesinpregnancy.org/

NHS Choices- Burns and scalds http:// www.nhs.uk/Conditions/Burns-and-scalds/Pages/Introduction.aspx

Information on greenhouse gases: http://www.environment.gov.au/climate-change/climate-science-data/climate-science/greenhouse-effect

This document from the PHE Centre for Radiation, Chemical and Environmental Hazards reflects understanding and evaluation of the current scientific evidence as presented and referenced here.

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