

Phosgene

General information

Key Points

Fire

- Non-combustible gas under normal conditions
- Emits toxic vapours
- In the event of a fire involving phosgene, use fine water spray and wear liquid-tight protective clothing with breathing apparatus

Health

- Phosgene is extremely poisonous by inhalation, skin and eye exposure
- Inhalation at low concentrations may cause irritation to the airways
- Inhalation at high concentrations may cause breathlessness and coughing and possible delayed serious lung damage
- Signs of poisoning may be delayed by several hours
- Skin and eye exposure may cause irritation and burns
- The effect of long-term exposure is thought to cause similar symptoms as short-term exposure
- Phosgene is not thought to be carcinogenic or mutagenic

Environment

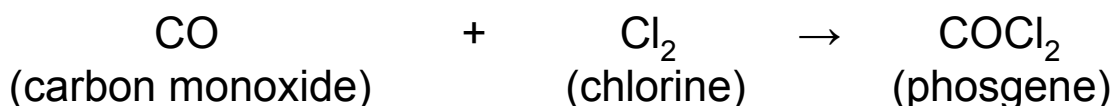
- Avoid release into environment
- Inform Environment Agency of any substantial release incidents

Production and Uses

Key Points

- There are several industrial processes for producing phosgene, the most common involves reacting carbon monoxide with chlorine.
- Phosgene is used extensively as a “starting compound” for the industrial production of many important chemical products, including plastics, pesticides, pharmaceuticals and dyes.

Phosgene is prepared on an industrial scale by the chlorination of carbon monoxide in the presence of a catalyst (such as porous carbon) at elevated temperature (50 – 150°C). The reaction is as follows:-



Phosgene was first produced by John Davy (inventor of the ‘Davy Lamp’) at the start of the 19th century. The chemical was named by combining the Greek words ‘phos’ (meaning light) and genesis (birth), as Davy used sunlight to produce the chemical from carbon monoxide and chlorine.

Phosgene was originally used as a ‘war gas’ during World War I. Since then, its use as a chemical warfare agent has been forbidden by an international treaty known as the Chemical Weapons Convention. For this reason, the production and storage of phosgene is subject to special regulations. Commercially, phosgene is an important precursor material for the manufacture of a wide range of chemicals such as polymers (polyurethanes and polycarbonates), pesticides and pharmaceuticals (medicines).

Frequently Asked Questions

What is phosgene?

Phosgene is a colourless, non-flammable, toxic gas that is heavier than air.

What is phosgene used for?

The main use of phosgene is in the manufacture of other chemicals such as plastics, pesticides, dyes and herbicides.

How does phosgene get into the environment?

A rare cause of phosgene in the environment is accidental release from an industrial site or transport vehicle (so-called 'fugitive emissions'). Phosgene can also be present in smoke from fires which are fuelled by certain types of plastic or chlorine-containing solvents.

If there is phosgene in the environment will I have any adverse health effects?

The presence of phosgene in the environment does not always lead to exposure. Clearly, in order for it to cause any adverse health effects you must come into contact with it. You may be exposed by breathing, eating, or drinking the substance or by skin contact. Following exposure to any chemical, the adverse health effects 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 phosgene may result in transient (brief) eye, throat and chest irritation. There may then be a symptom-free period of 30 minutes to one day, after which signs of lung damage (coughing, chest pain and breathlessness) may occur. Exposure to high concentrations of phosgene may eventually lead to a serious condition called pulmonary oedema (pronounced "ed-eem-a"), where fluid enters the lung and limits the body's ability to absorb oxygen from the air. As these serious effects are delayed and may occur in the absence of initial signs or symptoms, it is important that anyone who has been knowingly exposed to phosgene be taken to hospital for observation.

Like most other chemicals, the concentration of phosgene has to be above a certain level to cause health effects. A one-off exposure (sufficient to cause mild eye nose or throat irritation) is unlikely to result in long-term health effects. After exposure to high concentrations, recovery may take many months for some people.

Smokers and people with existing lung diseases may experience more severe and persistent respiratory symptoms.

How will I be exposed to phosgene?

Phosgene is a gas and the eyes and lungs are most likely to be exposed. Phosgene may also be transported in liquid form in which case contact may cause frost-bite and skin irritation.

Can phosgene cause cancer?

Exposure to phosgene has not been linked to the development of cancer. In other words, phosgene is not thought to be carcinogenic.

Does phosgene affect children or damage the unborn child?

There is little information on the effects of phosgene on children. However, they may be more susceptible to the effects of phosgene due to their smaller size. There is no evidence to suggest that phosgene, at concentrations that do not affect the mother, can affect the health of the unborn child. However, exposure to phosgene during pregnancy should be avoided.

Are people exposed to phosgene at work at risk of adverse health effects?

Work-places are subject to legal restrictions on the allowable concentration of phosgene in the air. These 'exposure limits' are set well below those which are thought to cause health effects following daily exposure to phosgene.

What should I do if I am exposed to phosgene?

It is very unlikely that the general population will be exposed to a level of phosgene high enough to cause adverse health effects.

This document will be reviewed not later than 3 years or sooner if substantive evidence becomes available.