



# Chlorine

## General Information

### Key Points

- chlorine is a reactive gas that is approximately three times as heavy as air and has a characteristic odour similar to bleach
- chlorine is an important industrial chemical and is used in the disinfection of water supplies and swimming pools
- the most likely cause of chlorine in the environment is following accidental release from an industrial site or transport vehicle, it does not persist in the environment
- chlorine is a gas at room temperature and as such exposure is most likely to occur by breathing it or it coming into contact with the eyes
- breathing small amount of chlorine gas may result in a burning sensation of the eyes and throat; more substantial exposure may cause coughing or breathing difficulties
- exposure to high levels of chlorine gas may damage the lungs and airways, and may be fatal
- exposure to liquid or gaseous chlorine may cause irritation and burns to the skin
- individuals with existing problems of the lungs and airways and heavy smokers may be more sensitive to the effects of chlorine gas

## Public Health Questions

### What is chlorine?

Chlorine is a reactive gas that is approximately three times as heavy as air and has a characteristic odour similar to bleach. It is part of the group of chemicals called 'halogens' which include fluorine, bromine and iodine. The word chlorine comes from the Greek word for 'pale green', the colour of chlorine gas.

Chlorine does not naturally exist as a gas as it is too reactive. Instead, it reacts with other earth elements to form halogen salts. For example, common salt sodium chlorate (also known as sea salt or 'halite') is a combination of sodium and chlorine.

### What is chlorine used for?

Chlorine is an important industrial chemical, used to make other chemicals such as plastics. Perhaps one of the most important applications of chlorine is in the disinfection of public water supplies to prevent the transmission of waterborne diseases such as cholera and typhoid. The introduction of chlorinated water supplies has helped to eradicate such diseases from the developed world. Chlorine based chemicals are used to disinfect swimming pools. Chlorine is used in the pulp and paper industry as a bleaching agent and chlorine based chemicals are also present in many domestic cleaning products.

Chlorine was used as a chemical warfare agent during World War I.

### How does chlorine get into the environment?

Chlorine is a reactive chemical and as such does not normally exist in its gaseous form in the environment. The most likely cause of chlorine in the environment is following accidental release from an industrial site or transport vehicle.

### How might I be exposed to chlorine?

Chlorine is a gas and so the eyes and lungs are most likely to be exposed. It may also be transported in liquid form. Products which contain or release chlorine which are stored at home should be kept out of the reach of children and in an appropriate container. Individuals may be exposed to gases formed by the inappropriate mixing of cleaning products.

Exposure to chlorine gas may occur if it is used, stored or manufactured in the workplace. However, safe limits are enforced to protect the employees; such levels are below those that are thought to cause harmful effects.

### If I am exposed to chlorine how might it affect my health?

The presence of chlorine in the environment does not always lead to exposure. In order for it to cause any adverse health effects you must come into contact with it. You may be exposed to chlorine by breathing it or by skin or eye contact with it. 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.

Minor exposures may result in a burning sensation of the eyes and throat. More substantial exposure may cause coughing or breathing difficulties. Exposure to high concentrations of chlorine gas can damage the lungs and airways; this may cause a build-up of fluid in the lungs which can be fatal. Following severe injuries from inhaling chlorine, there may be a lasting effect on the lungs and airways. However, most people who develop symptoms of poisoning following exposure to chlorine will not suffer any long-term effects.

Exposure to liquid or gaseous chlorine may cause irritation and burns to the skin and eyes.

### Can chlorine cause cancer?

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

### Does chlorine affect pregnancy or the unborn child?

There are limited data available on the effects of chlorine exposure on pregnancy and the unborn child.

Normal use of household products containing chlorine or the use of swimming pools would not be expected to cause harm to the unborn child.

### How might chlorine affect children?

Children are expected to be effected by chlorine in the same way as adults. Household products that contain chlorine should be stored in appropriate containers and kept out of the reach of children

### Are certain groups more vulnerable to the harmful effects of chlorine?

Individuals with existing problems of the lungs and airways (including asthma, hay fever, and chronic bronchitis) and heavy smokers may be more sensitive to the effects of chlorine gas. A small proportion of individuals may acquire a long-term sensitivity to inhaled chemicals known as 'reactive airways dysfunction syndrome' or RADS.

### What should I do if I am exposed to chlorine?

You should remove yourself from the source of exposure.

If you have inhaled chlorine seek medical advice.

If you have got chlorine on your skin, remove soiled clothing, wash the affected area with lukewarm water and soap for at least 10 – 15 minutes and seek medical advice.

If you have got chlorine in your eyes, remove contact lenses, irrigate the affected eye with lukewarm water for at least 10 – 15 minutes and seek medical advice.

### Additional sources of information

NHS Choices - Poisoning <http://www.nhs.uk/Conditions/Poisoning/Pages/Introduction.aspx>

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

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