Public Health England

Protecting and improving the nation's health

Ammonia

General Information

Key Points

- a colourless gas with a strong odour similar to urine
- it readily dissolves in water to form a corrosive solution
- an important industrial chemical, used to make fertilisers, plastics, synthetic fibres, dyes, explosives and pharmaceuticals
- it is produced naturally in the environment and the human body
- agriculture also contributes to ammonia levels in the environment
- exposure to ammonia may occur at work, from household products that contain it, or from low levels in foods
- the health effects of ammonia are usually immediate and long term effects would not be expected after exposure to small amounts
- inhaling high levels of ammonia may cause burns and swelling in the airways, lung damage and can be fatal
- strong ammonia solutions or gases may cause burns to the skin and serious eye damage

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Public Health Questions

What is ammonia?

Ammonia is a colourless, reactive gas that is lighter than air (approximately half as heavy) which dissolves readily in water. Ammonia has a strong smell, similar to urine, which can be detected by most people even in small amounts. Ammonia gas is non-flammable, but because at certain concentrations when mixed with air it could explode if ignited, it is treated as flammable. Solutions of ammonia are alkali and can be corrosive when concentrated. Ammonia solution may also be called ammonium hydroxide and aqueous ammonia.

What is ammonia used for?

Ammonia is a very important industrial chemical. Ammonia gas is produced industrially by reacting hydrogen and nitrogen at high temperature and pressure. This reaction is known as the Haber-Bosch process.

There are many uses for ammonia including the production of fertilisers, plastics, synthetic fibres, dyes, explosives and pharmaceuticals. In the home, ammonia is used in certain cleaning products and garden fertilisers.

How does ammonia get into the environment?

Ammonia in the environment comes from both natural and manmade sources. It occurs naturally at low levels throughout the environment, released from the breakdown of organic waste matter. Local concentrations may be elevated where there is a lot of animal waste, such as in intensive farming environments for cattle, pig and chickens. Non-agricultural sources include sewage sludge, industry, and petrol vehicles fitted with catalytic converters.

Ammonia gas does not remain in the environment for long; it rapidly reacts to form ammonium compounds.

How might I be exposed to ammonia?

Ammonia is found in very small amounts in some foods, including vegetables and dairy products. It is also produced naturally in the human body by gut bacteria as they break down food. In the home, exposure may occur from certain cleaning agents and dyes; however exposure is likely to be minimal if the products are used appropriately. Inappropriate mixing of cleaning products such as sodium hypochlorite and ammonia based solutions may result in exposure to toxic gasses.

Exposure may occur in the workplace although safe limits are enforced to protect the employees. Such levels are below those that are thought to cause harmful effects.

Ammonia is produced from the natural breakdown of organic matter and so exposure to ammonia will occur at very low levels throughout the environment. Exposure to ammonia from the environment is not considered to pose a risk to human health.

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

The presence of ammonia 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 ammonia by breathing or ingesting the substance, 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.

Breathing in low levels of ammonia may cause irritation to the eyes nose and throat. High levels of ammonia may cause burns and swelling in the airways, lung damage and can be fatal.

Ingestion of ammonia solutions can cause pain and burns throughout the digestive tract. In severe cases the respiratory system, stomach and heart may be damaged and death may follow.

Strong ammonia solutions may cause serious burns if splashed on the skin. At high concentrations, gases and fumes of ammonia can also cause corrosive damage to the skin. Splashes in the eye may cause damage which may be irreversible in some cases and can lead to loss of sight.

The health effects of ammonia are usually immediate and long term effects would not be expected after exposure to small amounts.

Can ammonia cause cancer?

Ammonia has not been classified by the International Agency for Research on Cancer (IARC). It is not believed to cause cancer.

Does ammonia affect pregnancy or the unborn child?

There are limited data available on the effects of exposure ammonia on pregnancy and the unborn child. Effects on the unborn child are more likely to occur at levels that harm the mother.

How might ammonia affect children?

The effect of ammonia on children is likely to be the same as for adults. Ammonia containing products in the home should be stored in an appropriate container and kept out of the reach of children.

Are certain groups more vulnerable to the harmful effects of ammonia?

Asthmatics or individuals with other breathing problems may be more sensitive to the effects of ammonia.

What should I do if I am exposed to ammonia?

You should remove yourself from the source of exposure.

If you have got ammonia on your skin, remove soiled clothing (not over the head), wash the affected area with lukewarm water and soap for at least 10 – 15 minutes and seek medical advice.

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

If you have inhaled or ingested ammonia, seek medical advice.

Additional sources of information

NHS Choices – Poisoning: http://www.nhs.uk/Conditions/Poisoning/Pages/Introduction.aspx

NHS Choices – How do I deal with minor burns? http://www.nhs.uk/chq/Pages/1047.aspx

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

This information contained in this document from the PHE Centre for Radiation, Chemical and Environmental Hazards is correct at the time of its publication.

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