

Sodium fluoride

General information

Key Points

Fire

- Non combustible
- Reacts with acids and decomposes on contact with hot surfaces or flames
- Emits toxic and corrosive fumes of hydrogen fluoride on reaction with acids, and disodium oxide and hydrogen fluoride on contact with hot surfaces or flames
- In the event of fire involving sodium fluoride, use fine water spray and normal fire and breathing kit

Health

- Toxic by ingestion
- Toxic and irritant
- Short-term ingestion can cause sickness, diarrhoea, stomach pain, breathing difficulties, fast heart rate and coma
- Short-term inhalation can cause irritation to the nose and throat
- Skin or eye contact can cause irritation
- Long-term ingestion can cause dental mottling of the teeth (dental fluorosis)
- Long-term ingestion or inhalation can cause the bones to become more dense and brittle (skeletal fluorosis)

Environment

- Avoid release to the environment
- Inform Environment Agency of substantial incidents

Background

Sodium fluoride is a colourless to white solid with an ionic structure. It is non-combustible and is soluble in water.

Fluorides occur naturally in the earth's crust, in rocks, coal, clay and soil. Fluoride is naturally present in water, but in some areas where the concentration is low, fluoride is added. Small amounts of fluoride are present in air, due to wind-blown soil or as small particles or dusts being released from industrial processes. Rural areas have lower levels of fluoride in the air than cities. Higher levels of fluoride are present in tea leaves, kale and fish.

Fluoride is used in the fluoridation of drinking water, and sodium fluoride in toothpaste and fluoride tablets to prevent dental caries. Sodium fluoride is also used as a cleaning agent and has a number of specialised uses such as in the manufacture of paper and glass and electroplating.

Exposure to small amounts of fluoride can occur through drinking water and eating food. Occupational exposure to sodium fluoride can occur from some industrial processes, and is most likely to occur from breathing in fluoride containing dust. Apart from occupational exposure, exposure to sodium fluoride by breathing it in is negligible.



If exposed to sodium fluoride, the harmful effects that may occur largely depend on the way people are exposed and the amount to which they are exposed. Ingesting large amount of sodium fluoride can cause

sickness, diarrhoea, stomach pain, breathing difficulties, fast heart rate, and coma. Breathing in sodium fluoride dust for a short time can cause irritation to the nose and throat. Skin or eye contact with sodium fluoride may cause irritation.

Drinking water containing fluoride for a long time can cause a mottling effect of children's teeth, during the development of permanent teeth and in rare cases weakening of the bones. Breathing in sodium fluoride for longer periods can also result in bones becoming denser and more brittle.

Children exposed to sodium fluoride are expected to show similar effects to those seen in exposed adults although the effects may be more severe. Exposure during pregnancy is not likely to cause damage to the unborn child at doses where the mother appears unaffected.



The International Agency for Research on Cancer could not classify fluorides as to their carcinogenicity.

Production and Uses

Key Points

- Fluoride is used in the fluoridation of drinking water, and sodium fluoride in toothpaste and fluoride tablets for the prevention of dental caries
- Sodium fluoride can be released into the environment from industrial processes

Fluoride is used in the fluoridation of drinking water, and sodium fluoride in toothpaste and fluoride tablets for the prevention of dental caries. Sodium fluoride also has a number of specialist uses such as de-gassing steel and frosting glass. Other uses include the production of vitreous enamel and coated paper, chemical cleaning, electroplating, glass manufacture, disinfection of brewing and distilling apparatus. There are also some medical uses of sodium fluoride such as in the treatment of bone pain or to increase bone density.

Frequently Asked Questions

What is sodium fluoride?

Sodium fluoride is a colourless to white solid, which dissolves in water. Fluoride occurs naturally in water and is added to drinking water in some areas where the natural levels are low to prevent dental caries.

What is sodium fluoride used for?

Sodium fluoride is added to dental products such as toothpaste to help prevent dental caries. It is also used as a cleaning product, in the manufacture of glass and paper and in electroplating.

How does sodium fluoride get into the environment?

Fluorides occur naturally in the earth's crust. Small amounts of sodium fluoride are present in air, due to wind-blown soil or as particles or dusts from some industrial processes, in water due to such wind-blown particles landing on water, and in plants.

How could I be exposed to sodium fluoride?

The most likely way of being exposed to fluoride is by drinking water, eating food and to a lesser extent by breathing air. People may also be exposed to fluoride through dental products such as toothpaste and mouth rinses. Exposure to sodium fluoride can also occur in the workplace from certain industrial processes.

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

The presence of sodium fluoride 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.

The only effect likely to occur from exposure to fluoride from drinking water is a slight mottling of the teeth (called dental fluorosis).

Ingestion of large amounts of sodium fluoride over a short period of time can cause stomach pain, sickness and diarrhoea, dizziness, muscle weakness, breathing difficulties, abnormal heart rhythm, low blood pressure and coma. Eating or drinking very large amounts of fluoride for a long period of time can cause weight loss, tiredness, anaemia and bones to become denser and more brittle (called skeletal fluorosis). However, there have been no reported cases of skeletal fluorosis in the UK.

Breathing in sodium fluoride particles over a long period of time can cause irritation and damage to the lungs, weight loss, tiredness and anaemia.

Sodium fluoride causes irritation to the skin and eyes.

Can sodium fluoride cause cancer?

There is no evidence to suggest that exposure to sodium fluoride causes cancer in humans.

Does sodium fluoride affect children or damage the unborn child?

If children breathe or ingest sodium fluoride they will have similar effects as in adults, although it is expected that children may be more sensitive to the effects because of their smaller size.

Exposure to fluoride in drinking water can cause mottling of teeth in young children. This mainly occurs in children during the development of the permanent teeth.

Maternal exposure to sodium fluoride is not expected to harm the unborn child.

What should I do if I am exposed to high concentrations of sodium fluoride?

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

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