

Sulphuric acid

General information

Key Points

Fire

- Non flammable under normal conditions
- Highly reactive
- Releases toxic and irritating fumes when heated to decomposition
- Do not use water on fuming acid
- Use fine water spray and liquid-tight chemical protective suits with breathing apparatus
- Gas-tight protective suits with breathing apparatus required for fuming acid

Health

- Exposure may occur following ingestion, inhalation, skin or eye exposure
- Corrosive
- Short-term inhalation may result in irritation of eyes and nose with sore throat, cough, chest tightness, headache and confusion
- Short-term ingestion results in burns to the mouth and throat
- Short-term skin exposure can result in irritation, swelling or burns
- Short-term eye exposure may cause swelling, watering and sensitivity to light
- Long-term inhalation leads to inflammation of the lungs and dental decay
- Sulphuric acid mists are carcinogenic to humans. Sulphuric acid or sulphuric acid solutions are not considered to be carcinogenic
- Sulphuric acid is not considered to be a developmental toxin

Environment

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

Background

Sulphuric acid is clear, colourless or brown oily liquid that is highly corrosive. Sulphuric acid is a very important chemical worldwide and over one million tonnes of sulphuric acid are made in the UK each year.

Sulphuric acid is made by burning sulphur. The sulphur dioxide given off is then reacted with a catalyst at high temperature to give sulphur trioxide. This can then be absorbed to give the acid. Depending on its intended use, it can be further diluted with water. This method of manufacture is called the Contact Process.

There are many uses for the acid including the manufacture of fertilisers, rubber, other acids, detergents, dyes, some medicines and in oil refining. Because it is so widely used in industry, exposure may occur in many work places. Burning fossil fuels also releases sulphur dioxide which can react with water in the air to form sulphuric acid. Sulphuric acid is also used to harvest potatoes; the acid damages the leaves killing the plant and making it easier to lift the potatoes from the ground.



At home the main sources of sulphuric acid are lead-acid car batteries and some solutions for unblocking drains. Sulphuric acid is not persistent in the environment, being quickly neutralised.



Strong solutions of sulphuric acid are highly corrosive and can cause skin burns on contact. The severity of the burn depends on the strength of the acid solution and how long you are exposed to it. Drinking a solution of sulphuric acid will burn the mouth, throat and stomach and can cause death. Burns to the eyes are dangerous and could cause blindness.



Breathing air with high levels of sulphuric acid can cause lung damage, shortness of breath, chest pain and cough, which may lead to death in severe cases. Breathing air contaminated with sulphuric acid over a long period of time can cause damage to teeth, throat and lungs.

Children exposed to sulphuric acid will have the similar effects as adults. However, children they may be more affected by an exposure due to their smaller size. Asthmatics may also be more sensitive to the irritant effects of sulphuric acid after breathing it in.

Sulphuric acid is unlikely to cause harm to the unborn child if the mother is exposed. This is because sulphuric acid causes toxicity at the point of contact only and rapidly breaks down on contact with body tissue.

Sulphuric acid or its solutions are not classified as carcinogens.

Production and Uses

Key Points

- Sulphuric acid is the highest tonnage industrial chemical produced in the UK
- The largest use of sulphuric acid is in the production of phosphate fertilisers. It is also used as an acidic dehydrating agent in petrochemical processes and oil refining, and to make hydrochloric and hydrofluoric acids, aluminium and copper sulphate and chromium compounds
- Other uses of sulphuric acid include the manufacture of plasticisers, dyestuffs, explosives, silicate for toothpaste, adhesives, rubbers, edible oils, lubricants, the production of food acids such as citric or lactic acid and to directly control pH during the processing of some foods and beverages. A minor use in agriculture is its application to growing potato plants to desiccate the shoots effectively stopping any further growth

Sulphuric acid is the highest tonnage industrial chemical, with over 150 million tons produced globally in 1997, of which over 1.2 million tons were produced in the UK. The “Contact Process” is widely used to produce sulphuric acid commercially. Here, sulphur dioxide from the combustion of sulphur is reacted with air over a catalyst such as vanadium pentoxide at high temperature. The emergent sulphur trioxide is then absorbed into sulphuric acid and diluted with water to the required concentration.

The largest single use of sulphuric acid is as a reagent with phosphate rock in the production of phosphate fertilisers, with lesser uses in the production of ammonium and potassium sulphate.

Sulphuric acid is used as an acidic dehydrating agent in organic chemical and petrochemical processes, as well as in oil refining. In the inorganic chemical industry, it is used most notably in the production of titanium dioxide and to make hydrochloric and hydrofluoric acids, aluminium and copper sulphate and chromium compounds.

Sulphuric acid is widely used to chemically remove oxides and scale from the surface of steel and iron (“acid-pickling”) before further processing; for the extraction of metals such as copper, uranium and vanadium from ores; and in non-ferrous metal purification and plating. A minor use in agriculture is its application to growing potato plants to desiccate the shoots (haulms), effectively stopping any further growth. This process makes mechanical lifting of the tubers easier and also makes the plant move resources to the tubers, therefore providing an additional growth surge before harvesting.

Other uses include the manufacture of plasticisers, dyestuffs, explosives, silicate for toothpaste, adhesives, rubbers, edible oils, lubricants, the production of food acids such as citric or lactic acid and to directly control pH during the processing of some foods and beverages.

Probably the largest use of sulphuric acid where it is incorporated into the final product is in organic sulphonation processes, particularly for the production of detergents and pharmaceuticals.

Frequently Asked Questions

What is sulphuric acid?

Sulphuric acid is a clear, colourless or brown, oily liquid that can be highly corrosive.

What is sulphuric acid used for?

Sulphuric acid is used in many industries. For example, it is used in the production of fertilisers, rubber, other acids, detergents, dyes, some pharmaceuticals and in oil refining.

How does sulphuric acid get into the environment?

Apart from industrial and agricultural processes, burning fossil fuels releases sulphur dioxide which can react with water in air to form sulphuric acid. This contributes to “acid-rain” which can cause environmental damage.

How could I be exposed to sulphuric acid?

At home, people may be exposed to sulphuric acid as it present in some household cleaning products.

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

The presence of sulphuric acid 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.

Strong solutions of sulphuric acid are highly corrosive and can cause burns to all parts of the body that they touch. Dilute solutions may cause irritation to the eyes and skin.

Can sulphuric acid cause cancer?

Sulphuric acid or its solutions are not classified as carcinogens. However, long term occupational exposure to mists containing mixtures of inorganic acid vapours (such as hydrochloric acid) that include sulphuric acid can cause an increased risk of cancer of the larynx.

Does sulphuric acid affect children or damage the unborn child?

If children breathe or ingest or touch sulphuric acid they will have similar effects as in adults such as burns to the hand or mouth for example.

Sulphuric acid is unlikely to cause harm to the unborn child if the mother is exposed. This is because sulphuric acid causes toxicity at the point of contact only and rapidly breaks down on contact with body tissue. Sulphuric acid is not known to damage the unborn child as it does not easily go from the mother to the child.

If sulphuric acid is used in car batteries, how should they be safely disposed of?

You should contact your local authority for advice on where to dispose of old car batteries; please do not dump them as they pose a risk to children and animals. They should be disposed of at a proper waste disposal site.

What should I do if I am exposed to sulphuric acid?

You should remove yourself from the source of exposure.

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

If you have got sulphuric acid 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 sulphuric acid seek medical advice.

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