## Naphthalene

### General information

#### Key Points

**Fire**
- Flammable
- Reacts strongly with strong oxidants and non-violently with strong acids
- Emits toxic and irritating fumes on combustion
- In the event of a fire involving naphthalene, use coarse water spray and normal fire kit with breathing apparatus

**Health**
- Toxic by inhalation, ingestion and skin contact
- Possible carcinogen
- Inhalation and ingestion of naphthalene can cause nausea, vomiting, abdominal pain, diarrhoea, headache, confusion, profuse sweating, fever, rapid heart rate, rapid breathing and agitation which may lead to convulsions and possibly coma
- Break down of red blood cells and their presence in urine may occur 3-5 days after exposure to naphthalene, particularly in some people who are more susceptible
- Urine may be dark brown or black in colour due to the presence of red blood cells
- Skin contact with naphthalene can cause skin irritation and possibly dermatitis
- Exposure of the eyes to naphthalene can result in eye irritation and damage and may cause clouding of the lens and the formation of cataracts

**Environment**
- Dangerous for the environment
- Inform Environment Agency of substantial incidents

---

Prepared by J C Wakefield  
CHAPD HQ, HPA  
2007  
Version 1
NAPHTHALENE – GENERAL INFORMATION

Background

Naphthalene is a white, crystalline solid which is flammable, and has an aromatic odour of mothballs.

Naphthalene is the most abundant component of coal tar, which is the liquid by-product of the distillation of coal into coke for use as a smokeless fuel. Naphthalene is also produced upon the burning of organic material, such as fossil fuels, wood and tobacco, and is present in exhaust emissions and cigarette smoke.

The primary use of naphthalene is as a raw material in the production of phthalic anhydride, which is commonly used in the production of dyes, plasticizers, insecticides and some pharmaceutical products. In the past, naphthalene has been used as a fumigant for repelling moths, for which it is popularly known as mothballs. Another classical use of naphthalene was as a fumigant for soil. Such uses are now discontinued.

Exposure to naphthalene is most likely to occur in an occupational setting. However, the general public may be exposed if they burn fossil fuels or other organic materials. Its use in household preparations such as mothballs has been replaced and therefore, such exposure in the home is now less common.

Naphthalene is toxic by all routes of exposure, whether it is ingested, inhaled or comes into contact with skin and eyes. Breathing fumes containing naphthalene, drinking solutions or swallowing solid naphthalene can cause nausea, vomiting, pain in the abdomen, diarrhoea, confusion, sweating, fever, fast heart rate, rapid breathing and may lead to convulsions, coma and possibly death. Approximately 3-5 days after an exposure to naphthalene, blood may be present in the urine and may be dark brown in colour, caused by breakdown of the red blood cells, leading to kidney failure.

Skin contact with naphthalene can cause skin irritation and could possibly cause inflammation of the skin, with redness, swelling, pain and itching. Exposure of the eyes to naphthalene may result in irritation, damage to the cornea and may lead to the formation of cataracts.

Children exposed to naphthalene 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.

Naphthalene has been classified by the International Agency for Research on Cancer as being possibly carcinogenic in humans.
Production and Uses

Key Points

- Naphthalene is obtained from the distillation of coal into coke, and can be purified from the coal tar residue as it is a major component
- The most common current use for naphthalene is in the production of phthalic anhydride, which is used in the manufacture of dyes, plasticizers and insecticides
- Naphthalene has been widely used in the past as a fumigant in mothballs, but this use is now limited
- Naphthalene is released upon burning fossil fuels and is present in exhaust emissions and cigarette smoke

Naphthalene is the most abundant component of coal tar, the liquid residue formed during the distillation of coal into coke. Coke is distilled from coal to remove many of the impurities, leaving a carbonaceous solid which produces little or no smoke when burnt, and as such is used as a smokeless fuel. Distillation of the coal tar itself, can yield around 50% naphthalene, which following treatment with sodium hydroxide and sulphuric acid to remove impurities can be fractionally distilled to yield approximately 95% pure naphthalene.

Naphthalene is released into the environment upon burning organic materials, such as fossil fuels and wood. As such, naphthalene is a constituent of industrial and vehicle exhaust emissions due to its presence in coal and petroleum. Naphthalene is also released when tobacco is burnt and is therefore also found in cigarette smoke.

The most common current use for naphthalene is as a raw material in the production of phthalic anhydride, which is used in the manufacture of dyes, plasticizers and insecticides. It is also used in the production of some pharmaceutical preparations.

Naphthalene can be used as a fumigant for repelling moths and therefore, was historically used in mothballs. Its use in mothballs has since been limited due to both the flammability and toxicity of naphthalene. Naphthalene is a component of coal tar creosote, which was used as a wood preservative, however, in the European Union its use has since been banned for amateur and unlicensed professional applications due to the health effects of not only naphthalene but also the many other toxic constituent compounds.
**Frequently Asked Questions**

*What is naphthalene?*

Naphthalene is a white, crystalline solid which is flammable, and has an aromatic odour of mothballs.

*How does naphthalene get into the environment?*

Naphthalene does not occur naturally in the environment, hence is most likely to enter the environment from workplaces where it is manufactured or used. Naphthalene may be also released into the environment due to burning organic material such as fossil fuels, petroleum and wood. Smoking cigarettes and tobacco will also release small quantities of acrylonitrile into the environment.

*How will I be exposed to naphthalene?*

The most likely way that you may be exposed to naphthalene is inhalation of smoke from burning fossil fuels or wood, or from inhaling vehicle exhaust fumes. Naphthalene along with other chemicals is also present in cigarette smoke. Exposure to naphthalene may also occur in individuals who may come into contact with it in the workplace, either from the use of naphthalene to produce other chemicals, or from the processing of fossil fuels such as coal.

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

The presence of naphthalene 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.

Common signs and symptoms of exposure to naphthalene may include nausea, vomiting, abdominal pain, diarrhoea, confusion, sweating, fever, fast heart rate, rapid breathing and may lead to convulsions, coma and in very severe cases can be fatal. Blood may be present in the urine approximately 3-5 days after exposure to naphthalene, and may be dark brown in colour due to breakdown of the red blood cells. In some severe cases, this may lead to kidney failure.

*Can naphthalene cause cancer?*

There is evidence from studies in animals to suggest that prolonged exposure to naphthalene can possibly cause cancer in humans.

*Does naphthalene affect children or damage the unborn child?*

The effect of naphthalene exposure upon children is expected to be similar to that upon adults, although it is expected that children may be more sensitive to the effects because of their smaller size.

There is no evidence to suggest that exposure to naphthalene can affect the health of the unborn child at amounts below those which would cause adverse effects to the mother.
What should I do if I am exposed to naphthalene?

You should remove yourself from the source of exposure.

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

If you have inhaled or ingested naphthalene seek medical advice.