



# Nitrobenzene

## General Information

### Key Points

- nitrobenzene is a colourless or yellow oily liquid
- uses of nitrobenzene include the chemical synthesis of aniline, manufacture of some pharmaceuticals, dyes and rubbers and polish, paint and petroleum solvents
- exposure is more likely to occur in the workplace
- exposure to nitrobenzene can cause a headache, nausea, vomiting, weakness, dizziness, vertigo, bluish discolouration of the skin, rapid heart rate, anemia, convulsions and breathlessness
- inhalation and contact can cause irritation of the skin, eyes and respiratory tract
- ingestion can cause gastrointestinal irritation with nausea, vomiting and diarrhoea as well as symptoms associated with inhalation
- can possibly cause cancer in humans

## Public Health Questions

### What is nitrobenzene?

Nitrobenzene is a colourless or yellow oily liquid, with an odour of bitter almonds.

### What is nitrobenzene used for?

The main use of nitrobenzene is in the chemical synthesis of aniline, which is a chemical used in the manufacture of polyurethane foams. Nitrobenzene is also used industrially in the manufacture of some pharmaceuticals, dyes and rubbers, as a constituent in some polishes and paint solvents and as a solvent in the refining of petroleum and cleaning gun barrels. Historically nitrobenzene was used in perfumes and as a flavouring known as 'artificial oil of bitter almonds' due to its strong odour. This use of nitrobenzene has long been discontinued due to its toxicity.

### How does nitrobenzene get into the environment?

Nitrobenzene does not occur naturally in the environment and as such is most likely to enter the environment from workplaces where it is manufactured or used.

### How might I be exposed to nitrobenzene?

Nitrobenzene is not commonly present in household products, so the most likely place people might be exposed is 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 nitrobenzene how might it affect my health?

The presence of nitrobenzene 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 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.

Exposure to nitrobenzene vapours or liquid will cause irritation of the skin, eyes and respiratory tract. Ingestion of nitrobenzene may cause gastrointestinal irritation with nausea, vomiting and diarrhoea.

Nitrobenzene can be absorbed into the body following inhalation, ingestion or skin contact. The main symptom of exposure to nitrobenzene is a condition called methaemoglobinaemia, which affects the ability of the blood to carry oxygen. This condition is associated with headache, nausea, vomiting, weakness, dizziness, vertigo, bluish discolouration of the skin, rapid heart rate, anaemia, convulsions and breathlessness. The symptoms may be delayed for up to 1 to 4 hours following exposure. In some cases, nitrobenzene may cause jaundice (yellow discoloration of the skin), kidney failure coma and even death.

Repeated exposure to nitrobenzene by any route may cause damage to the liver in addition to the effects resulting from a single exposure.

### Can nitrobenzene cause cancer?

The International Agency for Research on Cancer (IARC) has concluded that there is enough evidence in experimental animals, but not in humans that nitrobenzene can cause cancer. Therefore, it has classified nitrobenzene as possibly having the ability to cause cancer in humans.

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

There is evidence to suggest that exposure to nitrobenzene during pregnancy, at concentrations that may harm the mother, may possibly cause adverse effects to the unborn child. For further information on chemicals and pregnancy, please visit <http://www.medicinesinpregnancy.org/>.

Available evidence does not indicate that exposure to nitrobenzene during pregnancy will have a direct effect on the unborn child. However, if the exposure to nitrobenzene causes the mother to become unwell this may affect the health of the unborn child.

There is evidence to suggest that exposure to nitrobenzene can have an adverse effect on male fertility.

### How might nitrobenzene affect children?

Children exposed to nitrobenzene are expected to show similar adverse health effects to those seen in exposed adults. However, the effects are expected to be more severe in children as they are particularly susceptible to the adverse effects of exposure to nitrobenzene.

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

People with breathing problems such as asthma may be more sensitive to the effects of nitrobenzene.

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

It is very unlikely that the general population will be exposed to a level of nitrobenzene high enough to cause adverse health effects as it is not commonly used in the home in substantial quantities. However, if you have any health concerns regarding exposure to nitrobenzene seek guidance from your GP or contact NHS 111.

### Additional sources of information

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

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

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

First published: November 2017

For queries relating to this document, please contact: [chemcompendium@phe.gov.uk](mailto:chemcompendium@phe.gov.uk)

For all other enquiries, please contact: [phe.enquiries@phe.gov.uk](mailto:phe.enquiries@phe.gov.uk)

© Crown copyright 2017, [www.gov.uk/phe](http://www.gov.uk/phe)

Re-use of Crown copyright material (excluding logos) is allowed under the terms of the Open Government Licence, visit [www.nationalarchives.gov.uk/doc/open-government-licence/version/3/](http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/) for terms and conditions.