



Analyses



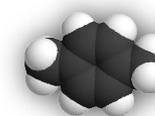
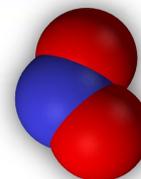
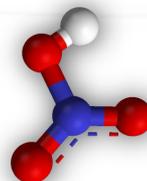
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Pollutants

Information about the pollutants analyzed

- Benzene
- Toluene
- Ethylbenzene
- Xylene
- Nitrite
- Nitrate
- Hydrocarbure
- Sulfur





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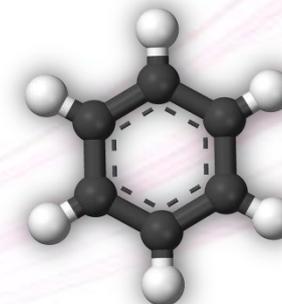
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Pollutants

Benzene

Benzene is an organic chemical compound with the molecular formula C_6H_6 . It is sometimes abbreviated Ph-H. Benzene is a colorless and highly flammable liquid with a sweet smell. Because it is a known carcinogen, its use as an additive in gasoline is now limited, but it is an important industrial solvent and precursor in the production of drugs, plastics, synthetic rubber, and dyes. Benzene is a natural constituent of crude oil, and may be synthesized from other compounds present in petroleum. Benzene is an aromatic hydrocarbon and the second [n]-annulene, a cyclic hydrocarbon with a continuous pi bond. It is also related to the functional group arene which is a generalized structure of benzene.



Discovery

The word "benzene" derives historically from "gum benzoin", sometimes called "benjamin" (i.e., benzoin resin), an aromatic resin known to European pharmacists and perfumers since the 15th century as a product of southeast Asia. Michael Faraday first isolated and identified benzene in 1825 from the oily residue derived from the production of illuminating gas, giving it the name bicarburet of hydrogen.

Toxicology

Benzene exposure has serious health effects. The American Petroleum Institute stated in 1948 that "it is generally considered that the only absolutely safe concentration for benzene is zero." The US Department of Health and Human Services classifies benzene as a human carcinogen. Long-term exposure to excessive levels of benzene in the air causes leukemia, a potentially fatal cancer of the blood-forming organs, in susceptible individuals. In particular, Acute myeloid leukemia or acute non-lymphocytic leucaemia is not disputed to be caused by benzene. IARC rated benzene as "known to be carcinogenic to humans".



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Toluene

Toluene, formerly known as toluol, is a clear, water-insoluble liquid with the typical smell of paint thinners. Chemically it is a mono-substituted benzene derivative, i.e. one in which a single hydrogen atom from the benzene molecule has been replaced by a univalent group, in this case CH₃. It is an aromatic hydrocarbon that is widely used as an industrial feedstock and as a solvent. Like other solvents, toluene is sometimes also used as an inhalant drug for its intoxicating properties; however, this can potentially cause severe neurological harm.

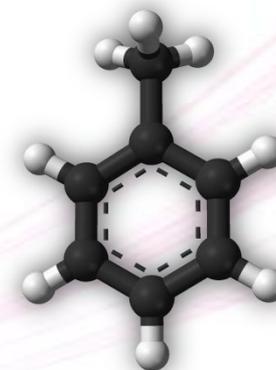
History

The name toluene was derived from the older name toluol, which refers to tolu balsam, an aromatic extract from the tropical Colombian tree *Myroxylon balsamum*, from which it was first isolated. It was originally named by Jöns Jakob Berzelius.

Toxicology

Toluene should not be inhaled due to its health effects. Low to moderate levels can cause tiredness, confusion, weakness, drunken-type actions, memory loss, nausea, loss of appetite, and hearing and color vision loss. These symptoms usually disappear when exposure is stopped. Inhaling high levels of toluene in a short time may cause light-headedness, nausea, or sleepiness. It can also cause unconsciousness, and even death.

Toluene is, however, much less toxic than benzene, and has consequently largely replaced it as an aromatic solvent in chemical preparation.





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Ethylbenzene

Ethylbenzene is an organic compound with the formula $C_6H_5CH_2CH_3$. This aromatic hydrocarbon is important in the petrochemical industry as an intermediate in the production of styrene, which in turn is used for making polystyrene, a common plastic material. Although often present in small amounts in crude oil, ethylbenzene is produced in bulk quantities by combining benzene and ethylene in an acid-catalyzed chemical reaction. Approximately 24,700,000 tons were produced in 1999. Catalytic dehydrogenation of the ethylbenzene then gives hydrogen and styrene. It has been used as a solvent for aluminum bromide in the anhydrous electrodeposition of aluminum. Ethylbenzene is also an ingredient in some paints, and solvent grade xylene (xylol) is nearly always contaminated with a few percent of ethylbenzene.



Toxicology

Ethylbenzene is added to gasoline in order to increase the octane rating. Most of all in-vitro analysis done with ethylbenzene show negative effects. Studies made with L5178Y lymphatic cells of mice show genetic mutation and metabolic activity.

Paralysis of respiration, cardiac arrest. Swallowing or absorption through skin can lead to serious health damages. It degrades the skin (peril of skin absorption).

Irritates airways, digestive organs and eyes. Might lead to state of intoxication. Dizziness, headaches, drowsiness, unconsciousness and damage seriously brain functions.



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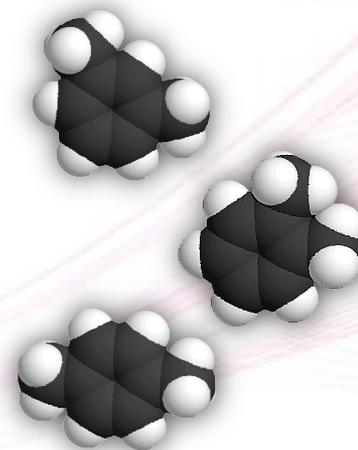
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Pollutants

Xylene

The term **xylene** or **xylol** refers to a mixture of three structural isomers of the aromatic hydrocarbon dimethylbenzene. Xylene is a clear, colorless, sweet-smelling liquid that is very flammable. It is usually refined from crude oil in a process called alkylation. It is also produced as a by-product from coal carbonization derived from coke ovens, extracted from crude benzole from gas, or by dehydrocyclodimerization and methylating of toluene and benzene. It is also manufactured from reformat. Xylene is used as a solvent in the printing, rubber, and leather industries. Xylene is also abused as an inhalant drug for its intoxicating properties



Toxicology

Xylene exhibits neurological effects. High levels from exposure for acute (14 days or less) or chronic periods (more than 1 year) can cause headaches, lack of muscle coordination, dizziness, confusion, and alterations in body balance. Exposure of people to high levels of xylene for short periods can also cause irritation of the skin, eyes, nose, and throat, difficulty in breathing and other problems with the lungs, delayed reaction time, memory difficulties, stomach discomfort, and possibly adverse effects on the liver and kidneys. It can cause unconsciousness and even death at very high levels. Xylene or products containing Xylene should not be used indoors or around food. Xylene is not a controlled substance. Studies of unborn animals indicate that high concentrations of xylene may cause increased numbers of deaths, and delayed growth and development. In many instances, these same concentrations also cause damage to the mothers. It is not yet known whether xylene harms the unborn fetus if the mother is exposed to low levels of xylene during pregnancy. Besides occupational exposure, the principal pathway of human contact is via soil contamination from leaking underground storage tanks containing petroleum products. Humans who come into contact with the soil or groundwater may become affected. Use of contaminated groundwater as a water supply could lead to adverse health effects.



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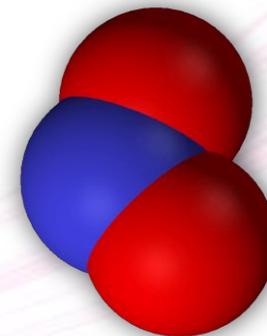
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Pollutants

Nitrite

In organic chemistry, nitrites are esters of nitrous acid and contain the nitrosooxy functional group. They possess the general formula RONO , where R is an aryl or alkyl group. Amyl nitrite is used in medicine for the treatment of heart diseases. Nitrites should not be confused with nitrates, the salts of nitric acid. Nitro compounds share the formula RNO_2 , but in these compounds the R group attaches to the nitrogen rather than oxygen. The nitrite anion NO_2^- should not be confused with the nitronium NO_2^+ . A named reaction for the synthesis of alkyl nitrites is the Meyer synthesis in which alkyl halides react with metallic nitrites to a mixture to nitroalkanes and nitrites.



Toxicology

Nitrites are toxic. They hamper the transportation of oxygen in the blood. Humans getting in touch with nitrites can suffer from nausea, sickness, stomach troubles and dyspnoea (breathlessness). It is a normal symptom of heavy exertion; however becomes pathological if it occurs in unexpected situations.

Especially babies are vulnerable (vegetables from intensely fertilized cultures – as the nitrate is bacteriologically transformed into nitrite).

In the gastro-intestinal system nitrite converts into nitrosamines. Those kind of compounds are highly carcinogenic.



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Pollutants

Nitrate:

The nitrate ion is a polyatomic ion with the molecular formula NO_3 .

Almost all inorganic nitrate salts are soluble in water at standard temperature and pressure. Nitrate should not be confused with nitrite (NO_2), the salts of nitrous acid.

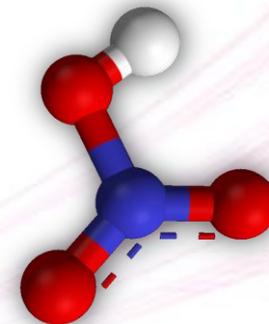
Toxicology:

Nitrate toxicosis in humans occurs through enterohepatic metabolism of nitrate to ammonia, with nitrite being an intermediate. Nitrites oxidize the iron atoms in hemoglobin from ferrous iron (2+) to ferric iron (3+), rendering it unable to carry oxygen. This process can lead to generalized lack of oxygen in organ tissue and a dangerous condition called methemoglobinemia.

Infants in particular are especially vulnerable to methemoglobinemia (known as blue baby syndrome) due to nitrate metabolizing triglycerides present at higher concentrations than at other stages of development. Blue baby syndrome is now thought to be the product of a number of factors, which can include any factor which causes gastric upset, such as diarrhoeal infection, protein intolerance, heavy metal toxicity etc., with nitrates playing a minor role.

However, nitrate exposure may also occur if eating, for instance, vegetables containing high levels of nitrate. Lettuce may contain elevated nitrate under growth conditions such as reduced sunlight, undersupply of the essential micronutrients molybdenum (Mo) and iron (Fe), or high concentrations of nitrate due to reduced assimilation of nitrate in the plant. High levels of nitrate fertilization also contribute to elevated levels of nitrate in the harvested plant .

Some adults can be more susceptible to the effects of nitrate than others. The methemoglobin reductase enzyme may be under-produced or absent in certain people that have an inherited mutation. Such individuals cannot break down methemoglobin as rapidly as those that do have the enzyme, leading to increased circulating levels of methemoglobin (the implication being that their blood is not as oxygen-rich).





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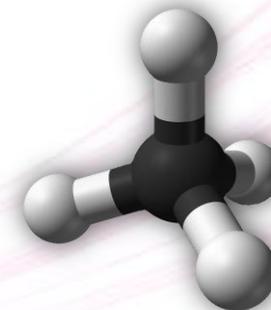
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Pollutants

Hydrocarbon

In organic chemistry, a hydrocarbon is an organic compound consisting entirely of hydrogen and carbon. Hydrocarbons from which one hydrogen atom has been removed are functional groups, called hydrocarbyls. Aromatic hydrocarbons (arenes), alkanes, alkenes, cycloalkanes and alkyne-based compounds are different types of hydrocarbons. The majority of hydrocarbons found naturally occur in crude oil, where decomposed organic matter provides an abundance of carbon and hydrogen which, when bonded, can catenate to form seemingly limitless chains.



Toxicology

Considered on a toxicological level, there are three different types of hydrocarbons:

- aliphatic hydrocarbons (APHCs)
- alicyclic hydrocarbons (ACHCs)
- simple, aromatic hydrocarbons (AHCs), polycyclic AHCs and sulfuric-aromatic AHCs

Effects of the APHCs:	circulatory insufficiency, apnea (respiratory arrest), harmful to the central nervous system injuring skin and lungs
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Effects of the ACHCs:	similar effects as known from the APHCs (aliphatic hydrocarbons)
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Effects of the aromatics HC:	coma, aplasia (defective development of organs), skin cancer, lung cancer, leukemia (blood cancer), bladder cancer and similar effects as know from the the APHCs
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Where are hydrocarbons to be found: in practically all types of mineral oils, such as engine oil, gear oil, food industry, technical greases, lubricants ...



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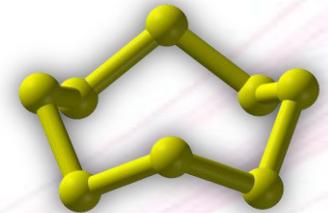
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Pollutants

Sulfur: Sulfur has a very bad effect on exhaust fumes. On the one hand sulfur forms sulfuric acid contributing to acid rain, on the other hand sulfur increases the amount of harmful particles in the exhaust fumes. And, in addition to that, sulfur renders the catalytic converter unusable within a given time.

Please note that in California and in Japan a practically sulfur-free fuel is available on the market.



Toxicology:

The pharmaceutical benefit of sulfur was well-known in ancient times. Internal, sulfur was applied as laxative as it irritates the intestinal mucosa. The hydrogen sulfide generated by bacteria stimulates the muscle activity of the bowels.

Externally sulfur recipes were applied in case of acne, eczemas, scabies and mycosis.

Today sulfur is almost no more used in dermatology but did not disappeared completely from pharmaceutical literature. There are still some pharmaceutical preparation containing sulfur as active ingredient.

In classic homeopathy, sulfur represents one of the so called „big“ remedies and is primarily applied in case of:

skin diseases, acne, psoriasis, chickenpox, eczemas, scabies, cellulite, furuncle, herpes, rubeola and diaper rash.

