

# Oregon Department of Human Services

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TECHNICAL BULLETIN

## HEALTH EFFECTS INFORMATION

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**BENZENE**

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Oregon Department of Human Services  
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## **SYNONYMS**

Annulene, benzen, benzol, benzole, coal naphtha, cyclohexatriene, phene, phenyl hydride, pyrobenzol

## **USES**

Benzene is a volatile organic compound (VOC) that is used as a gasoline additive to increase fuel efficiency. It is also used extensively in the production of synthetic materials and consumer products such as synthetic rubber, plastics, nylon, insecticides, paints, dyes, resins and cosmetics. In the past benzene was also widely used as an organic solvent, and is still found as a solvent in some products.

## **CHEMICAL AND PHYSICAL PROPERTIES**

The chemical formula is  $C_6H_6$ . Generally benzene is found as a thin, colorless liquid with a pleasant, sweetish odor. It is readily soluble in water and mixes with a variety of organic solvents. It is extremely volatile and readily evaporates completely at normal ambient temperatures and the vapors are very flammable. Benzene can be detected by odor at levels of 2.5 ppm or greater in air, and in water it is detected by taste/odor at levels of 0.5 to 2.0 ppm. Levels of concern in drinking water are far below the levels at which the benzene could be smelled or tasted in water.

## **OCCURRENCE AND SOURCES OF BENZENE**

Because of its extreme volatility, most releases of benzene into the environment are via vaporization into the air. Because of its widespread presence in consumer products and its solubility in many liquids, benzene is present in many kinds of industrial and household waste. Industrial processes may release benzene in the form of liquid and solid wastes, as well as by vapor from smokestacks and other air discharge points.

Benzene is a natural constituent of petroleum products and is present at low levels as a contaminant of many products and products that contain petroleum solvents. Volcanic eruptions and combustion processes also release benzene to the air.

Benzene is detectable at low levels in most air, water and soils. Generally it is found at excessive levels in areas where uncontrolled sources, spills or leakages

have occurred. Groundwater is often affected as the result of gasoline leakage from underground storage tanks.

The US Environmental Protection Agency estimates that 1.3% of groundwater supplies (wells and springs) and 3% of surface water supplies contain benzene at or above the Maximum Contaminant Level of 0.005 milligrams per liter (parts per million).

## **ENVIRONMENTAL FATE**

When released into air, benzene disperses and dilutes rapidly to very low levels. It reacts readily with ozone and other reactive chemicals producing a number of breakdown products. The half-life of benzene in air is about 13 days. Other pollutants in the air generally reduce the half-life of benzene by increasing the opportunity for chemical reactions. When released to surface water, benzene evaporates quickly into the air with a half-life in water of 2-6 hours. If benzene in liquid form or in dissolved form finds its way into deep soils or groundwater, it is protected from degradation, and can migrate downward and horizontally.

## **DRINKING WATER STANDARDS**

Benzene in water can be absorbed by the body by ingestion and absorption and by inhalation of vapors. The Oregon Department of Human Services and the U.S. Environmental Protection Agency have established a mandatory standard (Maximum Contaminant Level or "MCL") of 0.005 milligrams of benzene per liter of drinking water (0.005 ppm or 5 parts per billion). Drinking water which meets this standard is associated with little or no health risk.

## **REMOVING BENZENE FROM DRINKING WATER**

Water containing more than 0.005 parts per million of benzene should not be used for domestic water supplies. Because of evidence that benzene may contribute to causation of some leukemias, the Department of Human Services and US EPA recommend that exposure to benzene be kept as low as possible.

Persons who wish to avoid any exposure or to reduce exposure to benzene should consider finding an alternate supply that is free of benzene, or applying treatment to the contaminated water. Short-term reductions in exposure may be accomplished by using bottled water for food and beverage preparation and

avoiding bathing or laundering with the contaminated water.

Treatment processes such as aeration and activated charcoal filtration can effectively remove benzene from water. Because of the serious inhalation hazards of benzene, treatment should be applied to all household water. For information and assistance regarding treatment persons are encouraged to contact the Department of Human Services for assistance before purchasing or installing treatment equipment.

Those needing or wanting more information about benzene and drinking water should contact the Drinking Water Section of the Oregon Department of Human Services at (971) 673-0405.