



Toxigram



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BENZENE

Benzene (benzol) is a clear, colorless and volatile liquid which boils at 176.2°F (80°C) and has a pleasant aromatic odor.

Chronic Toxicity:

The greatest hazard associated with benzene exposures is an insidious destructive effect on blood-forming organs. This is most often the result of prolonged or repeated inhalation of vapor in low concentrations, and the condition can be fatal if diagnosis is delayed or excessive exposure is allowed to continue. For this reason an effective control program to limit benzene exposures is mandatory and requires close cooperation with medical and industrial hygiene personnel. A Threshold Limit (Maximum Allowable Concentration) of 25 ppm of benzene in air has been established for the normal eight-hour working day. The limit for benzene has been gradually lowered over the years and may, in actual fact, still be too high. Most authorities agree that, in the light of present knowledge, the only level which can be considered absolutely safe for prolonged exposure is zero.

Acute Toxicity:

Benzene has a low order of acute oral toxicity. The LD_{50} † for the rat by this route is 11.4 ml/kg. However, the aspiration hazard is significant on ingestion; minute amounts which might be aspirated into the lungs during the course of ingestion can be rapidly fatal.

Benzene is poorly absorbed through intact skin so that systemic toxicity from skin absorption is not a hazard. The dermal LD_{50} for the rabbit is greater than 2 g/kg.

In high concentrations benzene vapor is irritating and can depress the respiratory and central nervous systems.

Exposures to concentrations of 3000 ppm are said to be endurable for up to 60 minutes, but levels of 7500 ppm are reported to be dangerous to life, and 5 to 10 minutes in an atmosphere of 20,000 ppm can be fatal. The four-hour LC_{50} † of benzene vapor for the rat is about 16,000 ppm.

Local Effects

Liquid benzene is a primary skin irritant and, like most solvents, may dry and de-fat the skin on repeated, prolonged contact. Although these local effects are seldom severe, they may culminate in dermatitis. If dermatitis occurs, the working atmosphere should be checked to insure that excessive exposure to benzene vapor is not also occurring.

Benzene is slightly to moderately irritating to the eyes, as indicated by direct instillation of 0.1 ml of the undiluted solvent into rabbits' eyes. Slight corneal opacity was observed for 48 hours in one of the six animals tested. Otherwise, the irritation was confined to the conjunctivae and consisted of moderate reddening, moderate to marked swelling and a moderate discharge. At 24 and 48 hours after instillation the most sensitive animal had a Draize irritation score of 18 out of a possible 110; at 72 hours its score was 4. In the remaining five animals the maximum score at 24, 48 and 72 hours was 8, 6 and 4, respectively. There was no evidence of tissue injury in any of the treated eyes.

† LD_{50} : LC_{50} : dose or concentration resulting in 50% mortality.

(Cont.)

*Reg. U.S. Pat. Off.

Esso Research and Engineering Company—Medical Research Division—Linden, New Jersey

Precautions:

Daily eight-hour exposures to atmospheric concentrations below the Threshold Limit of 25 ppm are believed low enough to protect most persons from the chronic toxic effects of benzene vapors, but wherever possible, vapor inhalation should be prevented altogether. Extra care should be taken with solvent mixtures containing greater than 1% benzene to insure that benzene vapor in air does not exceed the Threshold Limit. Skin contact with benzene should be avoided, and it should never be used as a cleaner to remove grease and grime from the skin or clothes.

First Aid:

If overcome by vapor, remove from contaminated atmosphere and call physician. Administer artificial respiration if breathing has stopped or is irregular. Remove from skin by soap and water washing. Remove contaminated clothing. Flush eyes with large quantities of water until irritation subsides. In the event of accidental ingestion, do not induce vomiting. Keep at rest and call physician immediately.

Labeling:

If sold in the United States under conditions where the Federal Hazardous Substances Labeling Act for household products would apply, special labeling, including the Skull & Crossbones symbol is required for containers of benzene and of mixtures containing 5% or more of benzene. In addition benzene would qualify as an eye irritant as defined by the Act.

The precautionary labels recommended by the Manufacturing Chemists Association and by the American Petroleum Institute are as follows:

MCA BENZENE (BENZOL)	API BENZENE * DANGER! EXTREMELY FLAMMABLE VAPOR HARMFUL (HARMFUL OR FATAL IF SWALLOWED) †
DANGER! EXTREMELY FLAMMABLE VAPOR HARMFUL Keep away from heat, sparks, and open flame. Keep container closed. Use only with adequate ventilation. Avoid prolonged or repeated breathing of vapor. Avoid prolonged or repeated contact with skin.	KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME. KEEP CONTAINER CLOSED. USE ONLY WITH ADEQUATE VENTILATION. AVOID PROLONGED OR REPEATED BREATHING OF VAPOR. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. (KEEP OUT OF THE REACH OF CHILDREN) †
 POISON  Call A Physician First Aid	 POISON  FIRST AID—ANTIDOTE REMOVE TO FRESH AIR, GET MEDICAL ATTENTION. IF SWALLOWED, DO NOT INDUCE VOMITING; CALL PHYSICIAN IMMEDIATELY †

*The alternate chemical designation "benzol" may be substituted.
† These additional statements required for household packages.

Published Reviews Available:

- American Petroleum Institute. Toxicological Review on Benzene, 1960.
- Manufacturing Chemists' Association. Chemical Safety Data Sheet SD-2, 1960.
- American Industrial Hygiene Association. Hygienic Guide Series. Benzene, 1961.
- American Standards Association. American Standard ASA Z37.4-1960. October 28, 1960.