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Summary Characterizations of Selected Chemicals of Near-Term Interest

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SUMMARY CHARACTERIZATIONS OF SELECTED CHEMICALS OF NEAR-TERM INTEREST



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BENZENE

Why Should the Chemical Be of Concern at This Time?

Benzene, a component in gasoline and an important feedstock for the chemical industry, has been the subject of numerous published reports linking leukemia with worker exposure to it. Large quantities of benzene are discharged into the environment from automobiles, and probably from stationary sources. The Environmental Defense Fund has been particularly concerned about the identification of benzene in drinking water in the parts per billion range. NIGSH has recently recommended a reduction in workplace levels.

What Are the Health and Ecological Effects, and Environmental Behavior?

Numerous fatalities from occupational benzene poisoning have been reported since the early 1900's. After inhalation or ingestion, benzene is absorbed rapidly by the blood. At non-lethal concentrations, a variety of human central nervous system disorders are observed, depending upon the extent of exposure. These include euphoria followed by giddiness, headache, nausea and staggering gait, as well as fatigue, insomnia, dizziness, and unconsciousness. Observed human blood-forming system damage includes anemia, reduction in platelet numbers, and depression of the white blood cell count.

Chronic benzene exposure has also resulted in chromosome aberrations in human lymphocytes. As early as the 1930's, benzene was suspected in cases of leukemia. Available epidemiological data indicate that the compound does induce leukemia, although the data cannot be considered to constitute unequivocal evidence that benzene acting alone is leukemogenic. Attempts by NCI and others to induce leukemia in animals with benzene have not been successful. However, the results of inhalation experiments with mice, the species most susceptible to leukemia, are not yet available.

Based on its physical properties, benzene is expected to be quite mobile and probably persistent. Adverse effects on ecological resources have not been reported.

What Are the Sources, Environmental Levels, and Exposed Populations?

In 1973 over 10 billion pounds of benzene were produced from petroleum and coal in the United States. This volatile, colorless, flammable liquid is used mostly for synthesis of organic chemicals. It has been estimated that at least 80 million pounds of benzene may be lost to the environment during benzene production, storage, and transport, while an upper limit of 650 million pounds may be released during its use to produce other organics. The latter figure was calculated from the difference between 100% yield and the reported yield in these reactions. Therefore, this is only a crude measure of the worst-case benzene emissions during usage. The emissions would be concentrated in the Texas Gulf area and the Northeast.

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