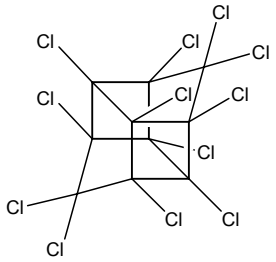
MIREX
CAS No. 2385-85-5
First Listed in the *Second Annual Report on Carcinogens*



CARCINOGENICITY

Mirex is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity in experimental animals (IARC 1974, 1979, 1987, NTP 1990). When administered by gavage for 4 weeks followed by incorporation in the diet, mirex increased the incidence of hepatomas in mice of both sexes. When administered in the diet, mirex increased the incidence of neoplastic nodules of the liver in rats of both sexes, pheochromocytomas of the adrenal gland in male rats, and mononuclear cell leukemias in female rats.

No adequate human studies of the relationship between exposure to mirex and human cancer have been reported (IARC 1979, 1987).

PROPERTIES

Mirex occurs as a white, odorless, nonflammable crystalline solid. It is practically insoluble in water, but it is soluble in dioxane, xylene, benzene, carbon tetrachloride, and methyl ethyl ketone. Mirex is very stable at normal temperatures; however, at temperatures >500°C, it decomposes to hexachlorobenzene, hexachloropentadiene, carbon monoxide, carbon dioxide, hydrogen chloride, chlorine, carbon tetrachloride, and phosgene (IARC 1979, ATSDR 1995).

Technical grade mirex was formerly available in the United States as a white crystalline solid in two particle size ranges (5 to 10 μm or 40 to 70 μm). The technical grade contained approximately 95% mirex. Insect bait formulations contained 0.075% to 0.5% mirex. Chlordecone (Kepone®) occurred in technical mirex at concentrations up to 2.58 mg/kg, and in mirex bait up to 0.25 mg/kg as a contaminant (IARC 1979, ATSDR 1995).

USE

Mirex was used in the United States from 1958 until 1978. The U.S. EPA canceled all registered uses of mirex in December 1977; however, selected applications were allowed until existing stocks were exhausted. Approximately 75% was used as a fire-retardant additive under the name "Dechlorane," and approximately 25% was used as an insecticide to control fire ants in southeastern states (ATSDR 1995). From 1962 to 1976, 132 million acres in 10 states were treated with approximately 500,000 lb of mirex bait, primarily by aerial application to antrol fire ants. Mirex was also used to control other species of ants, yellow jackets, and mealybugs in pineapples (IARC 1979).

PRODUCTION

Mirex was first synthesized in the mid 1940s, but it did not become commercially available in the United States until 1958. Technical-grade mirex was produced commercially by one company in the United States until 1967. The insecticidal baits were produced until 1975, when all registrations and the right to manufacture and sell mirex were transferred to the Mississippi Department of Agriculture (IARC 1979). One company produced an estimated 3.3 million lb of mirex between 1959 and 1975 and purchased an additional 1.5 million lb from another company. Peak production occurred from 1963 to 1968 (ATSDR 1995). In 1972, approximately 41,500 lb were produced, and in 1975, less than 1,000 lb were produced in the U.S. (HSDB 2001). Mirex is available in small quantities for laboratory use from nine U.S. suppliers (Chem Sources 2001).

Before cancellation of its registrations for technical products, some quantities were imported from Brazil; however, no import volumes were available. Over 90% of the mirex produced in the U.S. was exported (ATSDR 1995).

EXPOSURE

Although mirex is no longer produced or used in the U.S., it is very persistent in the environment and highly resistant to degradation; therefore, the general population may continue to be exposed to low concentrations in the environment. Populations with the greatest potential for exposure include those who ingest fish caught from contaminated water bodies, reside near a former manufacturing or waste disposal site, or live in areas where mirex was extensively used to control fire ants. The primary route of potential human exposure to mirex is ingestion of contaminated food; however, no dietary intake estimates were available. Mirex has been detected in human adipose tissue, blood, and breast milk (ATSDR 1995).

The National Occupational Hazard Survey, conducted by NIOSH from 1972 to 1974, estimated that 932 workers were possibly exposed to mirex in the workplace (HSDB 2001). However, occupational exposure is now limited to workers employed at hazardous waste sites or those involved in remediation of sites contaminated with mirex (ATSDR 1995).

REGULATIONS

EPA canceled the registrations of pesticides containing mirex under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), with specified termination of uses of existing stock. The State of Mississippi received an emergency exemption from EPA for specific uses effective through 6/79.

OSHA regulates mirex under the Hazard Communication Standard and as a chemical hazard in laboratories. Regulations are summarized in Volume II, Table 115.

REFERENCES

ATSDR. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Mirex and Chlordecone. (Final Report) Atlanta, GA: ATSDR, Public Health Service, U.S. Department of Health and Human Services. 1995. 362 pp. NTIS Accession No. PB95-264354.

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IARC. International Agency for Research on Cancer. IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Some Organochlorine Pesticides. Vol. 5. 241 pp. Lyon, France: IARC, 1974.

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NTP. National Toxicology Program. Technical Report Series No. 313. Toxicology and Carcinogenesis Studies of Mirex (1,1a,2,2,3,3a,4,5,5,5a,5b,6-Dodecachlorooctahydro-1,3,4-metheno-1H-cyclouta[cd]pentalene)(CAS No. 2385-85-5) in F344/N Rats (Feed Studies). NTIS Publication No. PB90-241084. 140 pp. National Toxicology Program, Research Triangle Park, NC, and Bethesda, MD, 1990.