Methoxychlor

72-43-5

Hazard Summary

Exposure to methoxychlor may occur during its manufacture or use as a pesticide. Information on the acute (short-term) and chronic (long-term) effects of methoxychlor in humans is not available. In an acute oral study in animals, changes in the liver were reported. Dermal contact with methoxychlor is slightly irritating to skin. Chronic oral exposure of animals to methoxychlor has resulted in effects to the liver, kidneys, and nervous system. Reproductive and developmental effects are the primary concern from methoxychlor exposure. Animal studies have reported developmental and reproductive effects, such as abortions, reduced fertility, reduced litter size, and skeletal effects from oral exposure to methoxychlor. EPA has classified methoxychlor as a Group D, not classifiable as to human carcinogenicity. Inhalation studies are not available for methoxychlor. However, oral studies are available and a risk management decision can be made to assume that the hazards resulting from oral exposure may be indicative of that resulting from inhalation exposure.

Please Note: The main sources of information for this fact sheet are EPA's Integrated Risk Information System (IRIS) (6), which contains information on oral chronic toxicity of methoxychlor and the RfD, and the Agency for Toxic Substances and Disease Registry's (ATSDR's) Toxicological Profile for Methoxychlor. (4)

Uses

- Methoxychlor was used as an insecticide effective against a wide range of pests including biting flies, houseflies, mosquito larvae, cockroaches, and chiggers. It was used on field crops, vegetables, fruits, stored grains, livestock, pests, homes, gardens, lakes, and marshes. (1,3,4)
- Methoxychlor was also used against the elm bark-beetle vectors of Dutch elm disease. (3)
- In veterinary practices, methoxychlor was used as an ectoparasiticide (a medicine used to kill parasites that live on the exterior of their host). (3)
- All pesticide uses of methoxychlor were suspended in 2000, and all products are expected to be voluntarily canceled by the end of 2004.

Sources and Potential Exposure

- The most probable route of exposure to methoxychlor would be from inhalation or dermal contact by workers involved in the manufacture, handling, or application of this compound. (1)
- Individuals could be exposed during home use of this insecticide or by ingestion of food or drinking water contaminated with methoxychlor. (1,4)

Assessing Personal Exposure

- Tests have been developed to detect methoxychlor in blood, fat, semen, and breast milk. (4)

Health Hazard Information

Acute Effects:

- Information on the acute systemic effects of methoxychlor in humans is not available.
- Dermal contact with methoxychlor is slightly irritating to skin in humans. (2)
- Depression of the central nervous system, progressive weakness, trembling, convulsions, diarrhea, and possibly death are symptoms reported in animals acutely exposed to methoxychlor. (3)
- Mild liver effects were reported in animals orally exposed to methoxychlor. (4)
- Tests involving acute exposure of rats, mice, and rabbits, have demonstrated methoxychlor to have low to moderate acute toxicity from oral or dermal exposure. (5)

Chronic Effects (Noncancer):

- Information on the chronic inhalation effects of methoxychlor in humans is not available. However, exposure to chemically-related organochlorine pesticides has caused liver and kidney damage in humans. (1)
- In human volunteers who ingested low levels of methoxychlor for 6 weeks, no gastrointestinal, hematological, liver, testes, or menstrual cycle effects were observed. (4)
- Chronic oral exposure of animals to methoxychlor has resulted in effects to the liver, kidneys, body weight, and nervous system. (4)
- EPA has not established a Reference Concentration (RfC) for methoxychlor. (6)
- The Reference Dose (RfD) for methoxychlor is 0.005 milligrams per kilogram body weight per day (mg/kg/d) based on the excessive loss of litters in rabbits. The RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious noncancer effects during a lifetime. It is not a direct estimator of risk but rather a reference point to gauge the potential effects. At exposures increasingly greater than the RfD, the potential for adverse health effects increases. Lifetime exposure above the RfD does not imply that an adverse health effect would necessarily occur. (6)
- EPA has low confidence in the critical study because no conclusions could be made relative to the maternal or developmental toxicity of methoxychlor due to the total loss of litters in the high-dose group and the small number of litters available for evaluation in the mid-dose group; low confidence in the database because of the lack of definitive chronic toxicity; and, consequently, low confidence in the RfD. (6)

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of methoxychlor in humans.
- Methoxychlor and its metabolites possess estrogenic properties. Reproductive and developmental effects have been reported in animals orally exposed to methoxychlor. (4,6)
- Effects to the development of the female reproductive system, gross and histopathological changes in the male and female reproductive systems, effects on male and female reproductive function (i.e., decreased fertility in males and females, decreased spermatogenesis, and interference with estrus cycling), and changes to hormone levels have been reported in orally exposed animals. (4)
- In rabbits orally exposed to methoxychlor, excessive loss of litters (abortions) was observed. (6)
- Skeletal effects were observed in the offspring of rats exposed to methoxychlor by gavage (experimentally placing the chemical in the stomach). (4,6)
- Long-term oral exposure to methoxychlor has been reported to increase fetotoxicity in animals, as well as to affect the reproductive development and reduce the fertility of offspring. (4,6)

Cancer Risk:

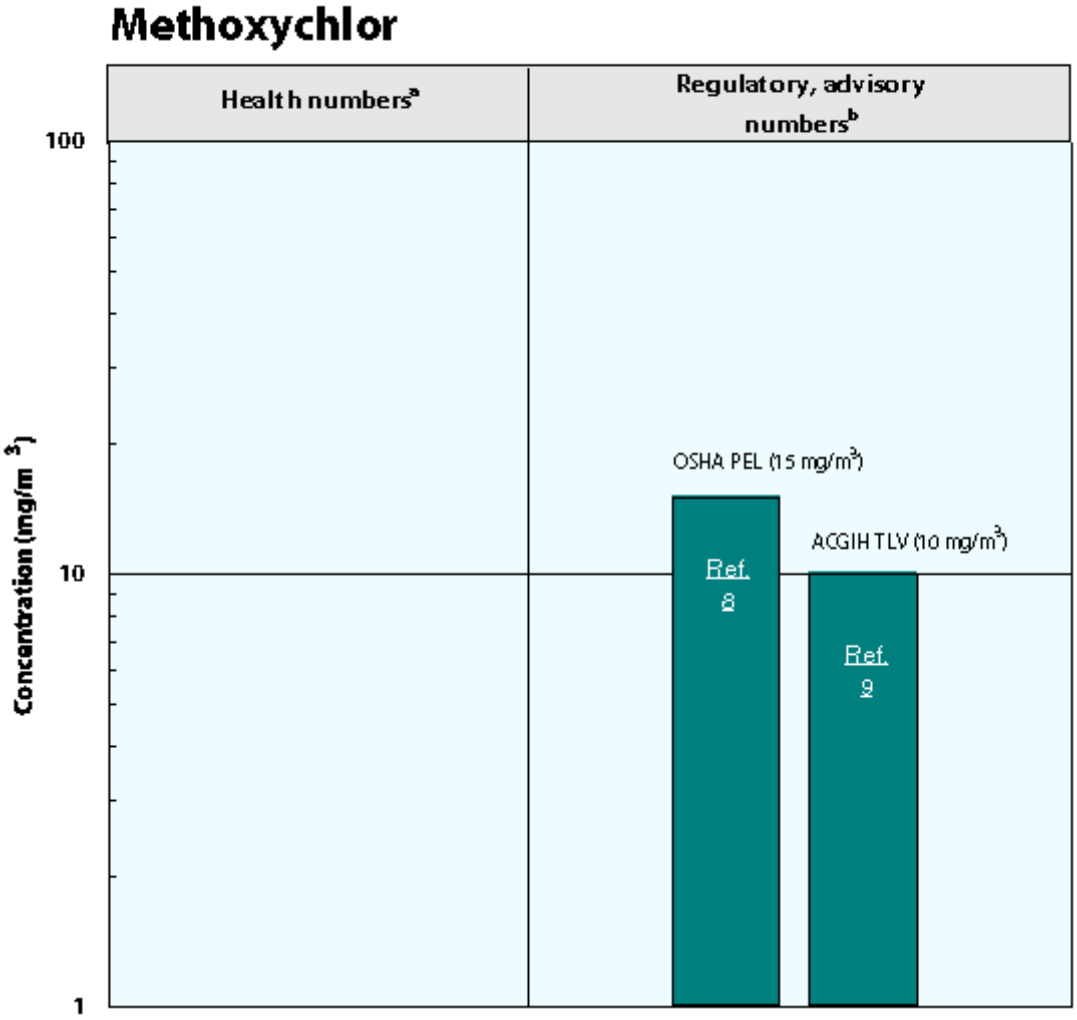
- No human studies are available on the carcinogenicity of methoxychlor.
- A number of animal cancer studies have been carried out on methoxychlor, with both positive and negative results. EPA considers the data to be inconclusive, based on problems with the data and interpretation of the results. (6)
- EPA has classified methoxychlor as a Group D, not classifiable as to human carcinogenicity, based on the fact that human data are unavailable and animal evidence is inconclusive. (6)

Physical Properties

- The chemical formula for methoxychlor is $C_{16}H_{15}Cl_3O_2$, and its molecular weight is 345.65 g/mol. (4)
- Methoxychlor occurs as white to pale yellow dimorphic crystals that are practically insoluble in water. (1,2,4)
- Methoxychlor has a slightly fruity odor; the odor threshold has not been established. (3,4)
- The log octanol/water partition coefficient (log K_{ow}) for methoxychlor is about 4.68 to 5.08. (4)

Conversion Factors:
To convert concentrations in air (at 25°C) from ppm to mg/m^3: mg/m^3 = (ppm) × (molecular weight of the compound)/(24.45). For methoxychlor: 1 ppm = 14.1 mg/m^3.

Health Data from Inhalation Exposure



ACGIH TLV--American Conference of Governmental and Industrial Hygienists' threshold limit value expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effects.
OSHA PEL--Occupational Safety and Health Administration's permissible exposure limit expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effect averaged over a normal 8-h workday or a 40-h workweek.

The health and regulatory values cited in this factsheet were obtained in December 1999.

[a] Health numbers are toxicological numbers from animal testing or risk assessment values developed by EPA.

[b] Regulatory numbers are values that have been incorporated in Government regulations, while advisory numbers are nonregulatory values provided by the Government or other groups as advice. OSHA numbers are regulatory, whereas ACGIH numbers are advisory.

References

Summary created in April 1992, updated January 2000

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