Technical Factsheet on: ALDICARB AND METABOLITES

List of Contaminants

As part of the Drinking Water and Health pages, this fact sheet is part of a larger publication:
National Primary Drinking Water Regulations

Drinking Water Standards (in mg/L)

	MCLG	MCL	HAL(child)
Aldicarb	0.001	0.003	none
Aldicarb Sulfone	0.001	0.003	none
Aldicarb Sulfoxide	0.001	0.004	none

NOTE: The MCLs for aldicarb and its metabolites are presently stayed.

Health Effects Summary

Acute: EPA has found aldicarb to potentially cause nausea, diarrhea and relatively minor neurological symptoms resulting from acute exposures at levels above the MCL. These effects appear to be rapidly and completely reversible after exposure. No Health Advisories have been established for short-term exposures.

Chronic: Aldicarb has the potential to cause neurological effects such as sweating, pupillary constriction and leg weakness from chronic exposure at levels above the MCL. These effects are associated with the inhibition of cholinesterase in blood and nerve tissue.

Cancer: There is inadequate evidence to state whether or not either aldicarb or its metabolites have the potential to cause cancer from lifetime exposures in drinking water.

Usage Patterns

Aldicarb is applied to the soil for control of chewing & sucking insects (aphids, whiteflies, leaf miners, soil-dwelling insects), spider mites, and nematodes. It is used in glasshouse & outdoor ornamentals, and on the following crops; cotton, sugar beet, fodder beet, strawberries, potatoes, onions, hops, vine nurseries, tree nurseries, groundnuts, soya beans, citrus fruit, bananas, coffee, sorghum, pecans, sweet potatoes & other crops. Cotton crops account for 83% of aldicarb use.

As the result of the aldicarb contamination of drinking water wells, Union Carbide Corporation excluded the use of aldicarb products in Suffolk County, Long Island, New York. The company also limited the use of aldicarb products to once every two years and only after plant emergency in the States of Maine and Wisconsin and the Counties of Hartford in Connecticut, Kent and New Castle in Delaware, Franklin and Hampshire in Massachusetts, Worchester in Maryland,

Atlantic, Burlington, Cumberland, Monmouth and Salem in New Jersey, Newport and Washington in Rhode Island, and Accomack and Northampton in Virginia.

Aldicarb may be applied at planting at the 1 lb active ingredient/acre rate for aphid control in the State of Maine.

Release Patterns

Release of aldicarb to the environment will occur due to its manufacture and use as a systemic insecticide, acaricide and nematocide for soil use.

Environmental Fate

If aldicarb is released to the soil it should not bind to the soil. It will be susceptible to chemical and possibly biological oxidation to form its metabolites, aldicarb sulfoxide and aldicarb sulfone. Hydrolysis is both acid and base catalyzed with examples of hydrolysis half-lives in soil at 15 deg C of 9.9 days at pH 6.34 and 7.0, 23 days at pH 7.2, and 3240 days at pH 5.4. Half-lives in soil have been reported to be 7 days in loam soil under field conditions, a few days in green house soil; a general range of persistence in soil of 1-15 days has been reported. Aldicarb degraded faster in soil which had been previously treated with carbofuran.

If aldicarb is released to water it should not adsorb to sediments or bioconcentrate in aquatic organisms. Aldicarb does not degrade in groundwater under aerobic conditions unless relatively high pH (pH 8.5) exists; reported half-lives in groundwater under anaerobic conditions at pH 7.7-8.3 were 62-1300 days. Aldicarb has been shown to be formed from aldicarb sulfoxide in groundwater under aerobic conditions and under anaerobic conditions in groundwater to which glucose had been added. Aldicarb may volatilize from soil with the rate of its evaporation increasing with the rate of evaporation for water. Aldicarb may leach to the groundwater in some soils where the rates of hydrolysis and oxidation are relatively slow, as in the slow hydrolysis of aldicarb reported at pH's around 5.4. It will be subject to hydrolysis which is both acid and base catalyzed with examples of half-lives of 131 days at pH 3.95 and 6 days at pH 8.85 at 20 deg C, and 3240 days at pH 5.5 and 15 deg C.

No information on biodegradation in natural waters was found. It is susceptible to photolysis when irradiated at 254 nm, but may not be photolyzed by light >290 nm. Volatilization from water should not be an important fate process. Half-life is 5 days in lake and pond water.

If aldicarb is released to the atmosphere it will be subject to reaction with hydroxyl radicals with an estimated vapor phase half-life of 3.49 days. No information on photolysis at environmentally significant wavelengths was found.

The propensity of aldicarb for bioaccumulation and biomagnification was tested in a model ecosystem with a terrestrial-aquatic interface and a seven-element food chain. Aldicarb was shown to have a high degree of persistence and a low potential for biodegradability.

A BCF of 42 for an unspecified species of fish in a microcosm study has been reported. A BCF of 4 has been estimated from water solubility. Based on the reported and estimated BCF, aldicarb should not bioconcentrate in aquatic organisms.

Chemical/ Physical Properties

CAS Number: 116-06-3

Color/ Form/Odor: White crystals with slightly sulfurous odor; Available in granular formulations containing 5 to 15% aldicarb

M.P.: 99-100 C B.P.: N/A

Vapor Pressure: 1x10-4 mm Hg at 25 C

Octanol/Water Partition (Kow): Log Kow = 1.13

Density/Spec. Grav.: 1.2 at 25 C

Solubility: 17 ug/L of water at 25 C

Soil sorption coefficient: Koc ranges from 8-37; high to very high mobility in soil

Odor/Taste Thresholds: N/A

Bioconcentration Factor: 42 in fish; not expected to bioconcentrate in aquatic organisms.

Henry's Law Coefficient: 1.5x10-9 atm-cu m/mole;

Trade Names/Synonyms: Temik; Carbamyl; Carbanolate; Sulfone aldoxycarb; Union Carbide 21149

Other Regulatory Information

NOTE: The MCLs for aldicarb and its metabolites are presently stayed. Systems must monitor for these contaminants by December 31, 1995.

Monitoring For Ground/Surface Water Sources:

Initial Frequency- 4 quarterly samples
Repeat Frequency- none
Triggers - none

Analysis:

Reference Source	**Method Numbers**
EPA 600/4-88-039	531.1

Standard Methods 6610

Treatment- Best Available Technologies:
Granular Activated Charcoal

For Additional Information:

EPA can provide further regulatory and other general information:
EPA Safe Drinking Water Hotline - 800/426-4791

Other sources of toxicological and environmental fate data include:
Toxic Substance Control Act Information Line - 202/554-1404
Toxics Release Inventory, National Library of Medicine - 301/496-6531
Agency for Toxic Substances and Disease Registry - 404/639-6000
National Pesticide Hotline - 800/858-7378