Technical Factsheet on: ALACHLOR

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
MCLG: zero mg/L
MCL: 0.002 mg/L
HAL(child): 1 day: 0.1 mg/L; 10-day: 0.1 mg/L

Health Effects Summary

Acute: EPA has found alachlor to potentially cause slight skin and eye irritation from acute exposures at levels above the MCL.

Drinking water levels which are considered "safe" for short-term exposures: For a 10-kg child consuming 1 liter of water per day, upto a ten-day exposure to 0.1 mg/L.

Chronic: Alachlor has the potential to cause damage to the liver, kidney, spleen, nasal mucosa and eye from long-term exposure at levels above the MCL.

Cancer: There is some evidence that alachlor may have the potential to cause cancer from a lifetime exposure at levels above the MCL.

Usage Patterns

Alachlor is a herbicide used for preemergent control of annual grasses and broadleaf weeds in crops, primarily on corn and sorghum (57%) and soybeans (43%). Application to peanuts, cotton, vegetables and forage crops contributes to less than 1% of its use. Alachlor is the second most widely used herbicide in the United States, with particularly heavy use on corn and soybeans in Illinois, Indiana, Iowa, Minnesota, Nebraska, Ohio, and Wisconsin.

Release Patterns

The major source of environmental release of alachlor is through its manufacture and use as a herbicide. Alachlor was detected in rural domestic well water by EPA's National Survey of Pesticides in Drinking Water Wells. EPA's Pesticides in Ground Water Database reports detections of alachlor in ground water at concentrations above the MCL in at least 15 States.

Environmental Fate

In soil, alachlor is transformed to its metabolites primarily by biodegradation. The half-life of alachlor disappearance from soil is about 15 days, although very little mineralization has been observed. The biodegradation of alachlor in soil under spill conditions will be very slow due to toxicity. Photodegradation in soil is slow.

Log Koc values for alachlor have largely been in the range 2.08-2.28, indicating that alachlor would have a high to medium mobility in soil, and that the leaching of alachlor from soil is high to medium. The adsorption of alachlor increases with an increase in organic content, clay content and surface area of soil. Alachlor was not detected in groundwater from a soil with high organic and clay content. This is probably

due to longer residence time in this soil allowing the degradation of alachlor before it reached the water table. The presence of continuous pores or channels in soil will increase the mobility of alachlor in soil.

The evaporation of alachlor from soil will increase as the moisture content and temperature of the soil is increased. Increase in alachlor sorption in soil will decrease evaporation as evidenced by slower evaporation with the increase in clay and organic matter content of soil. It has been concluded that the loss of alachlor from soil will be moderate and an estimated 3.5-6.5 kg/ha/yr or more alachlor will be lost from treated field. The estimated half-life of alachlor evaporation from soil is in the range 12 to >200 days.

In water, both photolysis and biodegradation are important for the loss of alachlor, although the role of photolysis becomes important in shallow clean water, particularly in the presence of sensitizers.

The mineralization of alachlor in groundwater aquifers was slow and <1% mineralization was observed in 30 days. The disappearance of alachlor in groundwater free of aquifer materials (e.g., sand) was very slow and the half-life was in the range 808-1518 days. Between alachlor concentrations of 1-5 ppb, the disappearance rate was faster at higher temperatures, and in groundwater taken from shallower depths. The lower biotransformation rates in anaerobic groundwater compared to aerobic groundwater may be due to less microbial activity or the absence of alachlor degraders in anaerobic samples. The measured and estimated Henry's Law constant (H) for alachlor at ambient temperatures is in the range 3.2X10-8 to 1.2X10-10 atm-cu m/mole, so volatilization of alachlor from water will not be important.

The half-life of alachlor due to reaction with hydroxyl radicals in the atmosphere has been estimated to be 2.1 hrs. Partial removal of alachlor will also occur as a result of dry and wet deposition.

The bioconcentration of alachlor in aquatic organisms is not important. Whole body bioconcentration factor (BCF) for alachlor in fathead minnow (Pimephales promelas) was measured to be 6. Alachlor was rapidly eliminated upon transfer of fish in uncontaminated water with 81% and 98% being eliminated after 24 hr and 14 days, respectively. The BCF value for alachlor vapor in azalea plant leaves was experimentally determined in greenhouse experiments to be 2.8X10+5, with elimination of alachlor from the leaves starting at 15 days.

Chemical/ Physical Properties

CAS Number: 15972-60-8

Color/ Form/Odor: Available in granular, emulsifiable concentrate and flowable formulations

M.P.: 40-41 C B.P.: N/A

Vapor Pressure: Negligible

Density/Spec. Grav.: 1.133 at 25 C

Octanol/Water Partition (Kow): Log Kow = 2.63 and 3.53

Solubility: 0.14 g/L of water at 23 C; Slightly soluble in water

Soil sorption coefficient: Koc = 2.08 to 2.28; medium to highmobility in soil

Odor/Taste Thresholds: N/A

Bioconcentration Factor: BCF = 6 in fish; not expected to bioconcentrate in aquatic organisms.

Henry's Law Coefficient: 3.2x10-8 to 1.2x10-10 atm-cu m/mole;

Trade Names/Synonyms: Alochlor; Lasagrin; Lassagrin; Lasso; Lazo; Metachlor; Pillarzo; Alanox; Alanex; Chimichlor

Other Regulatory Information

Monitoring For Ground/Surface Water Sources:

Initial Frequency- 4 quarterly samples every 3 years
Repeat Frequency- If no detections during initial round:
2 quarterly per year if serving >3300 persons;
1 sample per 3 years for smaller systems
Triggers - Return to Initial Freq. if detect at >0.0002 mg/L

Analysis:

Reference Source	Method Numbers
EPA 600/4-88-039	505; 507; 525.2; 508.1

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