Technical Factsheet on: ATRAZINE

What's New - Atrazine

In 2003 EPA issued an Interim Reregistration Eligibility Decision on atrazine which included an updated risk assessment. Under the six year review of regulated contaminants required by the Safe Drinking Water Act, EPA has begun the process of revisiting the National Primary Drinking Water Regulation (NPDWR) for atrazine to determine if a revision is appropriate. As a result of the upated risk assessment, some of the information on this fact sheet may change.

For additional new information about atrazine and the revised risk assessment, please visit the Office of Pesticides' Atrazine site.

NOTE: The information contained in this fact sheet is based upon previous EPA risk assessments.

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: 0.003 mg/L
MCL: 0.003 mg/L
HAL(child): 1- to 10-day: 0.1 mg/L; Longer-term: 0.05 mg/L

Health Effects Summary

Acute: EPA has found atrazine to potentially cause a variety of acute health effects from acute exposures at levels above the MCL. These effects include: congestion of heart, lungs and kidneys; hypotension; antidiuresis; muscle spasms; weight loss; adrenal degeneration.

Drinking water levels which are considered "safe" for short-term exposures: For a 10-kg (22 lb.) child consuming 1 liter of water per day, a one- to ten-day exposure to 0.1 mg/L or upto a 7-year exposure to 0.05 mg/L.

Chronic: Atrazine has the potential to cause weight loss, cardiovascular damage, retinal and some muscle degeneration, and mammary tumors from a lifetime exposure at levels above the MCL.

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

Usage Patterns

Atrazine is a widely used herbicide for control of broadleaf and grassy weeds in corn, sorghum, rangeland, sugarcane, macadamia orchards, pineapple, turf grass sod, asparagus, forestry, grasslands, grass crops, and roses. It also was used until 1993 for control of vegetation in fallow and in noncrop land.

Atrazine was estimated to be the most heavily used herbicide in the United States in 1987/89, with its most extensive use for corn and soybeans in Illinois, Indiana, Iowa, Kansas, Missouri, Nebraska, Ohio, Texas, and Wisconsin.

Effective in 1993, use for non-crop vegetation control was eliminated, and use was restricted by a requirement for a buffer zone between application sites and surface water.

Release Patterns

Atrazine may be released to the environment through effluents from manufacturing facilities and through its use as a herbicide. Atrazine was the second most frequently detected pesticide in EPA's National Survey of Pesticides in Drinking Water Wells. EPA's Pesticides in Ground Water Database indicates numerous detections of atrazine at concentrations above the MCL in ground water in several States, including Delaware, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska and New York.

Environmental Fate

Microbial activity possibly accounts for significant degradation of atrazine in soil. The effect of atrazine on these organisms seems to be negligible. Photodegradation and volatilization are of little significance under most field conditions.

Atrazine does not hydrolyze in soils when uncatalyzed even at elevated temperatures. However, the rate of hydrolysis was found to drastically increase upon small additions of sterilized soil, humic acid, and fulvic acid, indicating atrazine hydrolysis could be catalyzed. Atrazine was completely hydrolyzed within 3-4 days at extreme pHs. Alkaline hydrolysis proceeds twice as rapid as acidic hydrolysis.

The average Koc value for 4 soils was determined to be 122. Based on the Koc values for soils, atrazine is expected to maintain a high to medium mobility class in soils. However atrazine may also strongly absorb to colloidal materials in the water column. Atrazine is more readily adsorbed on muck or clay soils than on soils of low clay & organic content. The downward movement or leaching is limited by its adsorption to certain soil constituents. Adsorption is not irreversible, and desorption often occurs readily, depending on such factors as temperature, moisture, and pH.

Photolysis of atrazine did not occur in water at wavelengths > 300 nm. At wavelengths greater than or equal to 290 nm, the photolysis half-life of atrazine at a concentration of 10 mg/l in aqueous solution at 15 deg C was 25 hr as compared to a half-life of 4.9 hr for identical conditions with an acetone sensitizer added at a concentration of 1 ml/100 ml.

Based upon a water solubility of 30 mg/l at 20 deg C and a vapor pressure of 2.78X10-7 mm Hg at 20 deg C, the Henry's Law Constant for atrazine can be calculated to be 2.63X10-9 atm-cu m/mole, which indicates volatilization of atrazine from water will not be environmentally important.

Reactions with photochemically produced hydroxyl radicals in the atmosphere may be important, with reports of an atmospheric half-life of about 2.6 hr at an atmospheric concentration of 5X10+5 hydroxyl radicals per cu cm.

Experimental log BCF values of 2.0 to 0.3 have been reported for atrazine in six fish species. Atrazine levels in the tissues of Brook trout were below the detectable limit after 44 weeks of exposure at a mean concentration of 0.74 mg/l. Based on these measures of BCF and uptake, atrazine is not expected to bioconcentrate. The bioconcentration factor predicted from water solubility = 86 (calculated); predicted from soil adsorption coefficient = 7 (calculated).

Chemical/ Physical Properties

CAS Number: 1912-24-9

Color/ Form/Odor: Available as suspension concentrate; wettable powder; water-dispersible granules.

M.P.: 171-174 C B.P.: N/A

Vapor Pressure: 3x10-7 mm Hg at 20 C

Density/Spec. Grav.: 1.19 g/mL at 20 C

Octanol/Water Partition (Kow): Log Kow = 2.75

Solubility: 0.03 g/L of water at 20 C

Odor/Taste Thresholds: N/A

Soil sorption coefficient: Koc average is 122; medium to high mobility in soil

Bioconcentration Factor: Log BCF ranges from 0.3 to 2.0 in fish; low bioconcentration potential

Henry's Law Coefficient: 2.63x10-9 atm-cu m/mole (calculated);

Trade Names/Synonyms: Aatrex; Actinite PK; Akticon; Argezin; Atazinax; Atranex; Atrataf; Atred; Candex; Cekuzina-T; Chromozin; Crisatrina; Cyazin; Fenamin; Fenatrol; Gesaprim; Griffex; Hungazin; Inakor; Pitezin; Primatol; Radazin; Strazine; Vectal; Weedex A; Wonuk; Zeapos; Zeazine

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 > 0.001 mg/L

Analysis:

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

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