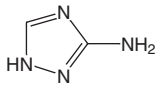
Amitrole
CAS No. 61-82-5

Reasonably anticipated to be a human carcinogen
First Listed in the *Second Annual Report on Carcinogens* (1981)



Carcinogenicity

Amitrole is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity in experimental animals (IARC 1974, 1982, 1986, 1987, 2001). When administered in the diet, amitrole increased the incidence of hepatocellular carcinomas and adenomas in mice of both sexes. When administered to weanling mice of both sexes by gavage and followed by dietary administration, amitrole induced tumors of the thyroid and increased the incidence of tumors of the liver. When mice of both sexes were nursed by dams fed diets containing amitrole, the incidence of hepatocellular carcinomas and adenomas was increased in males, but not females. When administered topically, amitrole did not induce skin tumors in mice of both sexes. One study of transplacental exposure to amitrole by mice yielded inconclusive results. When administered in the diet, amitrole induced malignant and benign tumors of the thyroid in rats of both sexes, and benign pituitary tumors in female rats. When administered in the drinking water, amitrole induced follicular cell carcinomas of the thyroid in female rats. When administered in the diet, no carcinogenic effect was observed in hamsters of both sexes (IARC 1974, 1986, 2001).

No adequate data were available to evaluate the carcinogenicity of amitrole in humans. In a small cohort study of Swedish railroad workers who had sprayed herbicides, there was a statistically significant excess of all cancers among those exposed to both amitrole and chlorophenoxy herbicides, but not among those exposed mainly to amitrole (IARC 1974, 1986, 2001).

Properties

Amitrole occurs as colorless to white crystals or as a crystalline powder. It is odorless and has a bitter taste. It is readily soluble in water, methanol, ethanol, and chloroform, and insoluble in hydrocarbons, acetone, and ether. Amitrole forms salts with most acids or bases and is a powerful chelating agent. It is corrosive to aluminum, iron, and copper (IPCS 1994, HSDB 2001). The technical grade amitrole contains a minimum of 95% active ingredient and is formulated as a solution of 250 g/L in water, typically with an equimolar concentration of ammonium thiocyanate, or as a 400 g/kg wettable powder, generally in combination with other herbicides (IPCS 1994).

Use

Amitrole was first patented for use in the United States in 1954 (NCI 1985). Amitrole is primarily used as a post-emergent non-selective herbicide and has a wide spectrum of activity against annual and perennial broad leaf and grass type weeds. Approved uses of amitrole on soil are either for non-crop land prior to sowing, or for inter-row weed control in tree and vine crops, where contact to food plants is avoided. It is also used for the control of pondweeds (IPCS 1994).

Production

Amitrole is currently manufactured or formulated in several countries; although its use in the United States has declined, amitrole remains a widely used herbicide (IPCS 1994). Chem Sources (2001) identified 15 U.S. suppliers of amitrole. It was not reported to be produced commercially in the United States in 1982; however, imports that year were reported to be 456,000 lb, which is a low value compared to the 1.2 million lb imported into the U.S. in 1978 (HSDB 2001).

Exposure

The primary routes of potential human exposure to amitrole are inhalation and dermal contact. For the general population, exposure may occur mainly through ingestion of contaminated food or drinking water or inhalation of contaminated air near areas of high usage, such as herbicidal spraying (HSDB 2001). No residues of amitrole, however, have been detected in food and water following recommended use (IPCS 1994).

Particulates containing amitrole may be released during its production. Atmospheric levels ranging up to 100 mg/m^3 and river concentrations from 0.5 to 2 mg/L have been measured near one industrial facility (IPCS 1994). After application, amitrole can persist in soil for several weeks and in water for more than 200 days. The potential for exposure to amitrole exists during its manufacture or packaging and during its application as an herbicide. According to the National Institute for Occupational Safety and Health (NIOSH), approximately 83 workers were possibly exposed to amitrole in 1984, but no data were available on the number of people who potentially are exposed during its application or on the possible exposure levels in the public (HSDB 2001).

EPA's Toxic Chemical Release Inventory (TRI) lists 1999 emissions of amitrole at three facilities in the United States. Two of the three facilities reported a total release of 7 lb to air; one plant reported a 1 lb surface water discharge. Two plants reported a total offsite release of 168 lb (TRI99 2001).

Regulations

EPA

Comprehensive Environmental Response Compensation and Liability Act
- Reportable Quantity (RQ) = 10 lb

Emergency Planning and Community Right-to-Know Act
- Toxics Release Inventory: Listed substance subject to reporting requirements

Resource Conservation and Recovery Act
- Listed Hazardous Waste: Waste codes in which listing is based wholly or partly on substance - U011
- Listed as a Hazardous Constituent of Waste

Guidelines

ACGIH

Threshold Limit Value - Time-Weighted Average Limit (TLV-TWA) = 0.2 mg/m^3

NIOSH

Recommended Exposure Limit (time-weighted-average workday) = 0.2 mg/m^3
Listed as a potential occupational carcinogen

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