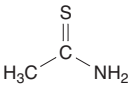
Thioacetamide

CAS No. 62-55-5

Reasonably anticipated to be a human carcinogen

First listed in the *Third Annual Report on Carcinogens* (1983)



Carcinogenicity

Thioacetamide is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity from studies in experimental animals.

Cancer Studies in Experimental Animals

Oral exposure to thioacetamide caused tumors in two rodent species and at two different tissue sites. Dietary administration of thioacetamide caused liver cancer (hepatocellular carcinoma) in mice of both sexes and in female rats and tumors of the bile duct (cholangiocellular tumors) in rats of both sexes (IARC 1974). Since thioacetamide was listed in the *Third Annual Report on Carcinogens*, an additional study has been identified, which found that thioacetamide administered in the diet also caused liver cancer (hepatocellular carcinoma and papillary adenocarcinoma) in male rats (Kuroda *et al.* 1987).

Cancer Studies in Humans

No epidemiological studies were identified that evaluated the relationship between human cancer and exposure specifically to thioacetamide

Properties

Thioacetamide is a thioamide compound that exists at room temperature as colorless to yellow crystals with a slight odor of mercaptans (IARC 1974, HSDB 2009). It is soluble in water and ethanol, miscible with benzene and petroleum ether, and sparingly soluble in ether. It is hydrolyzed by acids or bases and reacts with salts of heavy metals. Physical and chemical properties of thioacetamide are listed in the following table.

Property	Information
Molecular weight	75.1[a]
Specific gravity	1.336 g/cm^3[b]
Melting point	113°C to 114°C[a]
Log K_{ow}	–0.26[a]
Water solubility	163 g/L at 25°C[a]
Vapor pressure	15.2 mm Hg at 25°C[c]
Dissociation constant (pK_a)	13.4[a]

Sources: [a]HSDB 2009, [b]Akron 2009, [c]ChemIDplus 2009.

Use

Thioacetamide has been used as an organic solvent in the leather, textile, and paper industries, as an accelerator in the vulcanization of buna rubber (synthetic polybutadiene), and as a stabilizer of motor fuel. However, there is no evidence that it is currently used for any of these purposes. Currently, thioacetamide is used only as a replacement for hydrogen sulfide in qualitative analyses (IARC 1974, HSDB 2009) and as a reactant in making metal salt nanoparticles (Zhang *et al.* 2002, Liddell and Summers 2004, Liu *et al.* 2004, Jin *et al.* 2006, Yang *et al.* 2006, Zhou *et al.* 2006).

Production

Synthesis of thioacetamide in the United States was first reported in 1921 (IARC 1974). U.S. production in 1977 was at least 1,000 lb; however, there was no evidence of commercial production in 1982 (HSDB 2009). In 2009, thioacetamide was produced by seven manufacturers in India and one manufacturer in East Asia (SRI 2009) and was available from 45 suppliers, including 26 U.S. suppliers (ChemSources 2009). No information was found on U.S. imports or exports of thioacetamide.

Exposure

The primary routes of potential human exposure to thioacetamide are inhalation and dermal contact (HSDB 2009). Consumers could have been exposed to thioacetamide residues through contact with products for which it was used as a solvent in the manufacturing process. According to the U.S. Environmental Protection Agency's Toxics Release Inventory, 500 lb of thioacetamide was released to the environment in 1988. Since then, releases have not exceeded 264 lb, and no releases were reported for three years. In 2007, one facility released 10 lb of thioacetamide to an off-site hazardous-waste landfill (TRI 2009).

Occupational exposure may occur during production and use of thioacetamide (HSDB 2009). The National Occupational Hazard Survey (conducted from 1972 to 1974) estimated that 1,130 workers potentially were exposed to thioacetamide (NIOSH 1976). Clinical laboratory technicians are at greatest risk of exposure according to the National Occupational Exposure Survey (conducted from 1981 to 1983), which estimated that 786 workers, including 592 women, potentially were exposed to thioacetamide (NIOSH 1990).

Regulations

Environmental Protection Agency (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 code for which the listing is based wholly or partly on the presence of thioacetamide = U218.

Listed as a hazardous constituent of waste.

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