ACETONE

HAZARDTEXT(R) - Hazard Management

11.0 ENVIRONMENTAL HAZARD MANAGEMENT

11.1 POLLUTION HAZARD

A. Acetone may be released into the environment as stack emissions, fugitive emissions, and in wastewater during its production and use. Acetone may also leach into groundwater sources from municipal and industrial landfills. Acetone is a product of the photo-oxidation of some alkanes and alkenes found in urban air. It can be released from volcanoes, in forest fires, and as a metabolic product of plants and animals. Additionally, acetone is found in onions, apples, beans, peas, grapes, cauliflower, tomato, morning glory, and wild mustard (ATSDR, 1994; Howard, 1990).
B. Humans are exposed to acetone through dermal contact with solvents containing this compound; through inhaling its vapors; as well as by exposure to auto exhaust, solvents, tobacco smoke, and fireplaces (Howard, 1990). Drinking water may also contain acetone because of leaching from polyethylene distribution pipes (ATSDR, 1994).
    1. Workers in certain industries, such as paint, plastic, artificial fiber, and shoe factories; professional painters; and commercial and household cleaners are exposed to higher levels of acetone than the general population (ATSDR, 1994).

11.2 ENVIRONMENTAL FATE

11.2.1 AIR

A. In the air, acetone is lost by photolysis and reaction with photochemically produced hydroxyl radicals. The estimated half-lives from these combined processes is 22 days with shorter estimates in summer and longer in winter (Howard, 1990). This relatively long half-life allows acetone to be transported long distances from its emission source (ATSDR, 1994). Acetone is also expected to be washed out by rain (Howard, 1990).
B. Photo-oxidiation Half-life (Howard, 1991)
    1. High: 2790 hours (116 days)
    2. Low: 279 hours (11.6 days)

11.2.2 WATER

A. Acetone is expected to biodegrade in water. Volatilization, with an estimated half-life of 20 hours, is expected to occur. Acetone does not significantly adsorb to sediment due to its high water solubility (ATSDR, 1994; Howard, 1990).
B. Half-life Surface Water (Howard, 1991)
    1. High: 168 hours (7 days)
    2. Low: 24 hours (1 day)
C. Half-life Groundwater (Howard, 1991)
    1. High: 336 hours (14 days)
    2. Low: 48 hours (2 days)
D. Photo-oxidation half-life (Howard, 1991)
    1. High: 3.97 x 10(6) hours (453 years)
    2. Low: 9.92 x 10(4) hours (11.3 years)

11.2.3 SOIL

A. Acetone will leach into the ground where it is expected to rapidly biodegrade. This compound is also expected to readily volatilize from the soil surface due to its miscibility in water, low adsorption to soil, and high vapor pressure (Howard, 1990).
B. Half-life (Howard, 1991)
    1. High: 168 hours (7 days)

2. Low: 24 hours (1 day)

11.4 ABIOTIC DEGRADATION

A. This compound has a UV absorption band at 270 nm that extends to approximately 330 nm, but ranks low in photochemical reactivity based on criteria such as ozone production. Trichloromethane can be produced when water containing this compound is treated with chlorine for disinfection purposes because the acetone reacts with the hypochlorite ion formed by chlorine hydrolysis. This reaction is heavily dependent on pH and is expected to have an effect at pHs of 6 to 7 (Howard, 1990).

11.5 BIODEGRADATION

A. Although acetone readily biodegrades in both aerobic and anaerobic conditions, it is thought to be toxic to microorganisms at high concentrations (Howard, 1990).
B. Aerobic half-life (Howard, 1991)
    1. High: 168 hours (14 days)
    2. Low: 24 hours (1 day)
C. Anaerobic half-life (Howard, 1991)
    1. High: 672 hours (28 days)
    2. Low: 96 hours (4 days)
D. Removal/Secondary Treatment (Howard, 1991)
    1. High: 75%
    2. Low: 54%

11.6 BIOACCUMULATION

11.6.7 BIOCONCENTRATION FACTOR

A. Acetone has a BCF of 0.69 (in adult haddock at 7 to 9 degrees C), hence, its bioconcentration in fish is negligible (Howard, 1990).

11.7 ENVIRONMENTAL TOXICITY

A. Ecotoxicity Values (HSDB, 1997)
    1. LC50 (ORAL) Japanese quail: greater than 40,000 ppm
    2. LC50 (ORAL) Ring-necked pheasant: greater than 40,000 ppm
    3. LC50 Salmo gairdneri (rainbow trout): 5540 mg/L/96H at 12 degrees C
    4. LD100 Asellus aquaticus: 3 mL/L (within three days of exposure)
    5. LD100 Gammarus fossarum: 10 mL/L (within 48 hours)
    6. LC50 Pimephales promelas: 8120 mg/L/96H
    7. TLm Daphnia magna: 10 mg/L/24, 48H
    8. TLm Brine shrimp: 2100 mg/L/24, 48H
    9. TLm Mosquito fish: 13,000 mg/L/24, 48, and 96H
    10. LC50 Lepomis macrochirus (bluegill sunfish): 8300 mg/L/96H
    11. LD50 Goldfish: 5000 mg/L/24H
    12. LC50 Poecilia reticulata (guppy): 7032 ppm/14D
    13. LC50 Mexican axolotl: 20.0 mg/L/48H (3 to 4 weeks after hatching)
    14. LC50 Clawed toad: 24.0 mg/L/48H (3 to 4 weeks after hatching)