

Sources of Exposure

Toxicokinetics and Normal Human Levels

Biomarkers/Environmental Levels

General Populations

- Significant exposure of the general population to 2-hexanone is not likely because it is no longer manufactured, processed, or used for commercial purposes in the United States.
- Exposure of the general population to 2-hexanone may occur through contaminated air, water, or soil near hazardous waste sites or near facilities where 2-hexanone is a waste product.
- Exposure to small amounts of 2-hexanone that is naturally occurring in some foods may occur, although these levels are very low.

Occupational Populations

- Workers in industries where 2-hexanone is waste product (wood pulping, coal gasification, and *in situ* oil shale operations) may be exposed.
- Occupational exposure is most likely to occur through inhalation or dermal contact.

Toxicokinetics

- 2-Hexanone is well absorbed through the respiratory tract, gastrointestinal tract, and skin.
- Absorbed 2-hexanone is distributed to the brain and liver.
- 2-Hexanone undergoes metabolism through reduction and oxidation reactions. The metabolite, 2,5-hexanedione, is toxicologically active.
- Urine and expired breath are the main routes of excretion for 2-hexanone and its metabolites in both humans and animals.

Normal Human Levels

- No information on blood levels of 2-hexanone in the U.S. population were identified.

Biomarkers

2,5-Hexanedione is a metabolite of 2-hexanone that can be measured in blood. However, it is not specific for 2-hexanone.

Environmental Levels

- Air:
 - Range 0.11–15 µg/m³
- Water:
 - Groundwater range 87–150 µg/L
- Soil:
 - Range 40–440 µg/kg
- Food:
 - Range 1–18 µg/kg

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2019. Toxicological Profile for 2-Hexanone. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

ToxGuide™ for 2-Hexanone



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U.S. Department of Health and
Human Services
Public Health Service
Agency for Toxic Substances
and Disease Registry
www.atsdr.cdc.gov



Chemical and Physical Information

Routes of Exposure

Relevance to Public Health (Health Effects)

2-Hexanone is a colorless liquid

- 2-Hexanone, also known as methyl n-butyl ketone or MBK.
- 2-Hexanone is a volatile organic liquid that is very soluble in water.
- It is a waste product of wood pulping, coal gasification, and *in situ* oil shale operations.

- Inhalation** – Inhalation exposure from 2-hexanone released into the atmosphere or volatilized from water may occur near hazardous waste sites or near industries where 2-hexanone is released. Inhalation is a primary route of exposure for the general population and workers.
- Oral** – A minor route of exposure may occur through ingestion of foods that have naturally occurring 2-hexanone or through ingestion of contaminated water.
- Dermal** – Dermal contact is a potential route of exposure for workers.

2-Hexanone in the Environment

- 2-Hexanone exists in the atmosphere as a vapor. The half-life of 2-hexanone in air has been estimated as 2.4 days.
- It easily volatilizes from water. The half-life of 2-hexanone in water has been estimated as 6 hours to 7 days.
- 2-Hexanone is likely to migrate through the soil and into groundwater since it is expected to have very high mobility in soils.
- Once in the environment, 2-hexanone may be degraded by atmospheric photooxidation and direct photolysis or degraded by biodegradation mediated by microorganisms found in most sediment, soils, and water.
- 2-Hexanone is not likely to bioaccumulate in fish or other aquatic species.

Health effects are determined by the dose (how much), the duration (how long), and the route of exposure.

Minimal Risk Levels (MRLs)

Inhalation

- No acute-, intermediate-, or chronic-duration inhalation MRLs were derived for 2-hexanone.

Oral

- No acute- or intermediate-duration oral MRLs were derived for 2-hexanone.
- A chronic-duration (≥ 365 days) oral MRL of 0.05 mg/kg/day was derived for 2-hexanone.

Health Effects

- Little information is available regarding the health effects of 2-hexanone in humans. A screening study of exposed workers shows that 2-hexanone produces neurotoxicity, including peripheral neuropathy characterized by axon and myelin disruption, axonal swellings involving motor and sensory nerves, alterations in nerve conduction velocity, ataxia, sensory deficits, and skeletal muscle weakness.
- In workers with moderate-to-severe neurotoxicity, weight loss was also observed.

Health Effects

- The main targets of 2-hexanone toxicity in animals include the nervous system, body weight, reproductive effects, and developmental effects.
- Neurotoxicity has been identified as the most sensitive effect of 2-hexanone exposure. Both peripheral and central nervous system toxicity have been observed in animals following oral and inhalation exposure.
- Decreased body weight gain was observed in several animal studies.
- Adverse effects to the male reproductive system have also been observed. These effects include atrophy of the germinal epithelium of male rats. Effects on fertility have not been assessed.
- One study in rats showed that exposure during pregnancy caused reduced birth weight, reduced number of offspring, and behavioral effects in offspring.
- Neither the Department of Health and Human Services (HHS) nor the International Agency for Research on Cancer (IARC) have classified 2-hexanone regarding its carcinogenicity. The EPA states that “there is inadequate information to assess the carcinogenic potential” of 2-hexanone.

Children’s Health

- Children exposed to 2-hexanone would be expected to experience effects similar to those expected in adults.