

Sources of Exposure

Toxicokinetics and Biomonitoring Levels

Biomarkers/Environmental Levels

General Populations

- *n*-Hexane is a naturally occurring chemical produced by plants, forest fires, and volcanos.
- It is also an anthropogenic chemical originating from refining crude oil.
- Vapors and emissions from petroleum products are the primary sources of *n*-hexane exposure to the general population.
- The general population may also be exposed to *n*-hexane that is used as a solvent in some types of glues or adhesives such as rubber cement.
- Other household products such as oils, paint thinners, general purpose solvents, degreasing agents, and lubricants may also be a source of exposure for the general population.

Occupational Populations

- Workers in facilities that manufacture or use solvents and adhesives containing *n*-hexane are expected to be exposed to higher than background levels.
- Workers exposed to heating and motor fuel may also be exposed to high levels of *n*-hexane.

Toxicokinetics

- *n*-Hexane is readily absorbed in the lungs. Absorption by oral and dermal routes has not been well characterized.
- It is widely distributed throughout the body, with higher levels in body fat >> liver, brain, muscle > kidneys, heart, lungs > blood.
- *n*-Hexane is metabolized by mixed function oxidases in the liver to several metabolites, including the neurotoxicant, 2,5-hexanedione.
- Approximately 10–20% of absorbed *n*-hexane is excreted unchanged in exhaled air; 2,5-hexanedione is the primary urinary metabolite.

NHANES Levels

n-Hexane blood levels have been measured in NHANES samples beginning in 2009–2010; however, the levels were below the detection limit of 0.122 ng/mL.

Biomarkers

- Levels of *n*-hexane and its primary metabolite, 2,5-hexanedione, can be measured in urine. Because *n*-hexane and its metabolites are cleared from the body in a few days, these levels are only biomarkers of recent exposure.
- Animal studies suggest that serum, urine, and hair pyrrole adduct levels can be used as a biomarker of *n*-hexane exposure and *n*-hexane-induced peripheral neuropathy.

Environmental Levels

Air

- The average ambient air level of *n*-hexane in samples taken from 90 location in the United States in 2022 was 0.29 ppbv.

Water

- There are limited data on levels of *n*-hexane in water or groundwater.

Sediment and Soil

- There are limited data on levels of *n*-hexane in water or groundwater.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2024. Toxicological Profile for *n*-Hexane (Draft for Public Comment). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

ToxGuide™

for

n-Hexane

C₆H₁₄

CAS# 110-54-31

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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



ATSDR
AGENCY FOR TOXIC SUBSTANCES
AND DISEASE REGISTRY

Chemical and Physical Information

Routes of Exposure

Relevance to Public Health (Health Effects)

n-Hexane is a Liquid

- *n*-Hexane is a very volatile substance that is a constituent of the paraffin fraction of crude oil and natural gas.
- *n*-Hexane is flammable, and the vapor may be an explosion hazard.
- It is used as an industrial chemical and laboratory solvent. It is mainly used as an edible oil extractant for seed crops, such as soybeans, cottonseed, flax, rape seed, peanuts, safflower seed, and corn germ.
- *n*-Hexane is also used as a special purpose solvent and cleaning agent in several industries including textile manufacturing, shoe and leather making, and furniture manufacturing. It is also used in various glues, adhesives, and leather dressing preparations especially those used in assembling shoes.

- Inhalation – Likely route of exposure for the general population and primary route of exposure for occupational population.
- Oral – Minor route of exposure for the general population.
- Dermal – Minor route of exposure for the general and occupational populations.

n-Hexane in the Environment

- In air, *n*-hexane is degraded primarily by reaction with free radicals and hydroxyl radicals, with an estimated half-life of 2.9 days.
- In water, *n*-hexane will primarily volatilize.
- *n*-Hexane present near the soil surface will likely volatilize.

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

Minimal Risk Levels (MRLs)

Inhalation

- A provisional acute-duration (≤ 14 days) inhalation MRL of 6 ppm was derived for *n*-hexane.
- A provisional intermediate-duration (15–364 days) inhalation MRL of 0.4 ppm was derived for *n*-hexane.
- No chronic-duration inhalation MRL was derived for *n*-hexane.

Oral

- No MRLs were derived for acute- or chronic-duration oral exposure to *n*-hexane.
- A provisional intermediate-duration (15–364 days) oral MRL of 0.1 mg/kg/day was derived for *n*-hexane.

Health Effects

- The primary health effect observed in humans exposed to high levels of *n*-hexane via inhalation exposure is peripheral neuropathy. Other effects observed in humans include symptoms of respiratory tract irritation and decreased lung function.

- Peripheral neuropathy has also been reported in laboratory animals exposed to *n*-hexane via inhalation or oral exposure. Impaired performance on tests of learning and memory have been reported following oral exposure.
- Damage to the nasal olfactory epithelium was observed in mice exposed to inhaled *n*-hexane.
- Other effects observed in laboratory animals include developmental effects such as decreases in fetal/litter weight and number of live fetuses and increases in skeletal malformation and reproductive effects such as damage to the testis and epididymis.
- The U.S. Environmental Protection Agency (EPA) has determined that there is inadequate information to assess the carcinogenic potential of *n*-hexane. The Department of Health and Human Services (HHS) and the International Agency for Research on Cancer (IARC) have not assessed the carcinogenicity of *n*-hexane.

Children's Health

- A study in weanling and young adult animals suggested that weanlings may be less sensitive to the neurotoxicity of *n*-hexane. It is not known if this would also be true in humans.