Sources of Exposure

General Populations

- Acetone is present in the atmosphere due to its emission from combustion. Air concentrations of acetone tend to be higher in urban areas and indoors.
- People may be exposed when breathing air that contains background amounts of acetone.
- People may breathe in higher amounts of acetone when smoking cigarettes or using consumer products that contain acetone, such as nail polish remover.
- People may be exposed to acetone orally through food or drinking water. Acetone occurs naturally in many fruits and vegetables. Acetone levels in drinking water are usually very low, but may be higher for homes near landfills or hazardous waste sites that contain acetone.
- Acetone can cross the placenta and into breast milk. Therefore, fetuses and breast-feeding infants may be exposed to acetone.

Occupational Populations

- Workers in industries where acetone is used as an intermediate solvent (plastic and artificial fiber manufacturing, paint and coatings) or as part of a consumer product (beauty salons) may be exposed to higher levels of acetone compared to the general public.

Toxicokinetics and NHANES Biomonitoring

Toxicokinetics

- Acetone is absorbed into the blood stream before being distributed to all organs in the body.
- Acetone is metabolized into carbon dioxide in the liver.
- Acetone is excreted via expired breath, both in its unchanged form and, if it has been metabolized, as carbon dioxide. Very little acetone is excreted in the urine.

NHANES Biomonitoring

- The most recent NHANES dataset that contained acetone biomonitoring information is the NHANES III dataset, which was collected from 1988 to 1994.
- The mean concentration of acetone in blood from NHANES III was 2.1 mg/L.

Biomarkers/Environmental Levels

Biomarkers

- Acetone can be measured in breath, urine, or blood within 1–3 days of exposure.
- Acetone is also a biomarker of exposure to isopropyl alcohol.

Environmental Levels

- Air: Acetone levels tend to be higher in indoor air than outdoor air, especially in smoking homes and workplaces.
  - U.S. Outdoor air: 0.0–18.5 ppb
  - U.S. Indoor air: 1.2–8,732.3 ppb
- Water:
  - U.S. Surface water: 0–25,000 ppb
  - U.S Drinking water: 0.2–68.36 ppb
- Soil:
  - Non-hazardous waste sites: 6 ppb
  - Hazardous waste sites known to contain acetone: 9,500 ppb
- Food: Acetone occurs naturally in varying concentrations in foods such as milk, cheese, potatoes, nuts, meat, fruit, and legumes. Some examples include:
  - Beans: 880 ppb
  - Split peas: 530 ppb
  - Lentils: 230 ppb

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2022. Toxicological Profile for Acetone. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

ToxGuide™ for Acetone

CAS# 67-64-1

June 2022

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

Acetone is an Organic Solvent

- Acetone is also known as 2-propanone, propanone, or dimethyl ketone.
- Acetone is an organic solvent that is colorless, volatile, and highly flammable with a fruity odor.
- Acetone dissolves easily in water.
- Acetone is used as an intermediate in chemical manufacturing and as a solvent in many products, including paints and coatings, cleaning products, personal care products, lubricants, and plastics.
- Other man-made sources of acetone include vehicle exhaust, cigarettes, and landfills.
- Acetone also occurs naturally in the environment in plants, trees, insects, microbes, volcanic eruptions, and forest fires.
- Acetone is produced endogenously by the human body as a byproduct of metabolism.

Routes of Exposure

- Inhalation: The primary route of exposure for the general population and workers. Acetone is present at low levels in the atmosphere, and in higher amounts where it is used in manufacturing or as a consumer product.
- Oral: A minor route of exposure that may occur through ingestion of foods that have naturally occurring acetone or through ingestion of contaminated drinking water.
- Dermal: A potential route of exposure for those who use acetone-containing consumer products and for workers in industries where acetone is used.

Acetone in the Environment

- Acetone exists in the atmosphere as a vapor. The half-life of acetone in air has been estimated as 22 days.
- The half-life of acetone in water has been estimated as 7.8–16.2 hours. However, the exact rate at which acetone volatizes from water depends on solvent concentration and other ambient conditions.
- Absorption of acetone by soil is weak. Acetone in soil readily leaches into groundwater, where it dissolves readily.
- Acetone is not likely to bioaccumulate in animals.

Relevance to Public Health (Health Effects)

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

Minimal Risk Levels (MRLs)

Inhalation

- An acute-duration (<15 days) inhalation MRL of 8 ppm was derived for acetone.
- No intermediate- or chronic-duration inhalation MRLs were derived for acetone.

Oral

- An intermediate-duration (15–364 days) oral MRL of 0.6 mg/kg/day was derived for acetone.
- No acute- or chronic-duration oral MRLs were derived for acetone.

Health Effects

- The main targets of acetone toxicity in animals and humans include the neurological, hematological, ocular, renal, respiratory, and reproductive systems.
- Neurological effects observed in humans and animals include headaches, dizziness, unconsciousness, and coma.
- Hematological effects include increased white blood cell count in humans and non-regenerative anemia with reduced reticulocyte count in animals.
- In humans and animals, eye irritation has been observed following dermal exposure or eye-to-vapor contact.

Health Effects

- Renal effects observed in animals include kidney lesions and nephropathy. Human case studies have observed severe renal effects including moderate tubulointerstitial nephritis and renal failure.
- Respiratory effects from acetone exposure include nose, throat, trachea, and lung irritation. These effects have been observed in humans following high levels of inhalation exposure.
- High doses of acetone have been associated with changes in testicular function in male rats, but evidence for this effect is mixed. One human study of male workers observed changes in sperm composition.
- Neither the Department of Health and Human Services (HHS) nor the International Agency for Research on Cancer (IARC) have classified acetone regarding its carcinogenicity. The U.S. Environmental Protection Agency (EPA) states that "there is inadequate information to assess the carcinogenic potential" of acetone.

Children's Health

- Children exposed to acetone are expected to experience effects similar to those observed in adults.
- Acetone can undergo transplacental transfer to the fetus. In addition, acetone is distributed to mother's milk, and represents a source of exposure for infants.