

The ToxGuide™ is developed to be used as a pocket guide. Tear off at perforation and fold along lines.

Sources of Exposure

Toxicokinetics and Normal Human Levels

Biomarkers/Environmental Levels

ToxGuide™ for Xylenes C_8H_{10}

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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

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General Populations

- The highest exposure levels for the general population result from contact with consumer products containing xylenes.
- Very small amounts of xylenes are also present in cigarette smoke.
- Exposure may rise from ingestion of contaminated drinking water, painting, pumping gasoline, scale model building, using cleaning solvents, lacquers, and paint thinners/removers.
- People who work or live near industrial settings may receive a higher exposure to xylenes.
- Small amounts of xylene are commonly found in indoor air.

Occupational Populations

- Painters (or paint industry workers), and laboratory workers appear to be most frequently affected.
- Workers involved in distillation and purification of xylene, employed in industries using xylene as a raw material, or employed in the petroleum industry, may be at higher risk of exposure.
- Increased exposures have been observed for wood processing plant workers, painters, gas station employees, metal workers, and furniture refinishers.

Toxicokinetics

- Xylenes, because of their lipophilic properties, are rapidly absorbed by all routes of exposure, rapidly distributed throughout the body, and, if not metabolized, quickly eliminated in exhaled air.
- In humans, absorption has been estimated as >50% through the lungs following inhalation exposure and <50% through the gastrointestinal tract.
- The major pathway for metabolism involves mixed function oxidases in the liver, resulting mainly in the formation of isomers of methylhippuric acid that are eliminated in the urine.

Normal Human Levels

- There are no data on background concentrations of xylene in blood or urine.

Biomarkers

- Measurement of blood levels of xylene is limited by the rapid metabolism of xylene.
- Detection of methylhippuric acid in the urine is the most widely used indicator of xylene exposure, but measures of this metabolite are only valid soon after exposures.

Environmental Levels

Air

- Typical concentrations of xylene in indoor air range from 1 to 10 ppb.
- Typical concentrations in outdoor air range from 1 to 30 ppb.

Sediment and Soil

- No data are available on levels of xylene in soil.

Water

- Xylene has been detected in <5% of groundwater samples. Median xylene concentrations of ≤2 ppb have been reported in urban and rural drinking water wells or monitoring wells in the United States.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for Xylenes. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

Chemical and Physical Information

Routes of Exposure

Relevance to Public Health (Health Effects)

Xylene is a colorless liquid

- Xylene is a colorless, flammable liquid with a somewhat sweet odor.
- Xylene evaporates and burns easily.
- Xylenes (mixtures of *ortho*-, *meta*-, and *para*-isomers) are used as industrial solvents, synthetic intermediates, and solvents in commercial products such as paints, coatings, adhesive removers, and paint thinners; they are also a component of gasoline.
- Xylene occurs naturally in petroleum and coal tar and is formed during forest fires.

- Inhalation – Primary route of exposure for general and occupational populations.
- Oral – Minor route of exposure.
- Dermal – Minor route of exposure.

Xylenes in the Environment

- Xylene released to the atmosphere is quickly transformed by photooxidation with a half-life of approximately 8–14 hours.
- When released to soil or surface water, xylene volatilizes into the atmosphere, where it is quickly degraded.
- Xylene that does not volatilize quickly may undergo biodegradation in the soil or water.
- Xylene may also leach into groundwater, where degradation by microbes becomes the primary removal process.

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

Minimal Risk Levels (MRLs)

Inhalation

- An MRL of 2 ppm has been derived for acute-duration inhalation exposure (≤ 14 days).
- An MRL of 0.6 ppm has been derived for intermediate-duration inhalation exposure (15–364 days).
- An MRL of 0.05 ppm has been derived for chronic-duration inhalation exposure (≥ 1 year).

Oral

- An MRL of 1 mg/kg/day has been derived for acute-duration oral exposure (≤ 14 days).
- An MRL of 0.4 mg/kg/day has been derived for intermediate-duration oral exposure (15–364 days).
- An MRL of 0.2 mg/kg/day has been derived for chronic-duration oral exposure (≥ 1 year).

Health Effects

- The primary effects of xylene exposure involve the nervous system by all routes of exposure, the respiratory tract by inhalation exposure, and, at higher oral exposure levels, hepatic, renal, and body weight effects.
- The nervous system effects include subjective symptoms of intoxication at higher concentrations and impaired performance on tests of short-term memory, reaction time, and equilibrium at lower concentrations.
- Humans have reported signs of nose, eye, and throat irritation during exposure to xylene vapors.
- Dermal exposure of humans to xylene causes skin irritation, dryness and scaling of the skin, and vasodilation.
- Exposures to high concentrations of xylene may also be associated with developmental effects based on animal studies.

Children's Health

- No data are available regarding the effects of exposure to xylenes in children, but it is expected that children would experience the same effects as exposed adults.
- Children exposed to xylenes by inhalation may be more sensitive to respiratory impairment than exposed adults because of their narrower airways.