

# Technical Factsheet on: XYLENES

## [List of Contaminants](#)

As part of the Drinking Water and Health pages, this fact sheet is part of a larger publication:  
**National Primary Drinking Water Regulations**

### Drinking Water Standards

MCLG: 10 mg/L

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HAL(child): 1 day: 40 mg/L; Longer-term: 40 mg/L

### Health Effects Summary

Acute: EPA has found xylenes to potentially cause the following health effects from acute exposures at levels above the MCL: disturbances in the central nervous system, such as changes in cognitive abilities, balance, and coordination.

Drinking water levels which are considered "safe" for short-term exposures: For a 10-kg (22 lb.) child consuming 1 liter of water per day: upto a 7-year exposure to 40 mg/L.

Chronic: Xylenes have the potential to cause the following health effects from long-term exposures at levels above the MCL: damage to the central nervous system, liver and kidneys. Compared with benzene and toluene, very much less is known of the human health hazards, particularly the chronic effects of xylenes, either as mixed xylenes, as individual isomers or in admixture with other alkylbenzenes.

Cancer: There is inadequate evidence to state whether or not xylenes have the potential to cause cancer from lifetime exposures in drinking water.

### Usage Patterns

The commercial product mixed xylenes (a technical product generally containing 20% each of o-xylene, p-xylene and ethylbenzene, as well as small quantities of toluene) analogously to toluene is an agent of major chemical and occupational significance.

It is produced in very large quantities and is extensively employed in a broad spectrum of applications, primarily as a solvent for which its use is increasing as a safe replacement for benzene, and in gasoline as part of the BTX component (benzene-toluene-xylene); xylenes are also frequently used in the rubber industry with other solvents such as toluene and benzene. Most consumption of xylene mixtures is to produce the individual isomers, particularly p-xylene. As individual isomers they are extensively employed in the synthesis of synthetic agents. For example, phthalic acid, isophthalic acid, terephthalic acid, and diethylterephthalate have very broad applications in the further preparation of phthalate ester plasticizers and components of polyester fiber, film and fabricated items.

Production of xylenes has increased: from about 5 billion lbs. in 1982 to 6.84 billion lbs in 1993. In 1982 it was estimated that industries consumed xylenes as follows: production of ortho-xylene, 15%; production of para-xylene, 60%; miscellaneous, 14%; exports, 11%.

### Release Patterns

Major environmental releases of xylenes are due to: emissions from petroleum refining, gasoline and diesel engines; emissions from its use as a solvent for alkyl resins, lacquers, enamels, rubber cement, pesticide sprays and in organic synthesis; leaks and evaporation losses during the transport and storage of gasoline and other fuels and from carburetor losses; agricultural spraying. Xylenes are a natural products of many plants, and are a component of petroleum and coal tar.

From 1987 to 1993, according to EPA's Toxic Chemical Release Inventory, xylene releases to land and water totalled nearly 4.8 billion lbs., of which about 81 percent was to land. These releases were primarily from petroleum industries which produce xylenes as by-products of gasoline refining. The largest releases occurred in Texas. The largest direct releases to water occurred in New Jersey and Georgia.

### **Environmental Fate**

Most of the xylenes are released into the atmosphere where they may photochemically degrade by reaction with hydroxyl radicals (half-life 1-18 hr).

The dominant removal process in water is volatilization. Xylenes are resistant to hydrolysis, since there are no hydrolyzable functions. Xylenes are volatile compounds with relatively high Henry's Law constant (0.22 for the ortho isomer and 0.32 for the m- and p- isomers). The half-life for evaporation from water is 3.2 hr for o-xylene and will be 2% higher for the m- and p-xylene.

Measures of the rate of evaporation of xylenes from a 1:1000 jet fuel:water mixture found that this rate averaged approximately 0.6 times the oxygen reaeration rate. Combining this ratio with oxygen reaeration rates for typical bodies of water, one estimates that the half-life for evaporation of xylenes from a typical river or pond is 29 and 144 hr, respectively.

Xylenes are moderately mobile in soil and may leach into groundwater where they are known to persist for several years, despite some evidence that they biodegrade in both soil and groundwater. This evidence includes standard biodegradability tests using various inocula including sewage, activated sludge and sea water, where mixtures are completely degraded in 8 days in groundwater with an acclimation period of 3-4 days.

Xylenes have low to moderate adsorption to soil based on the KOC of o-xylene(48-68) and similar chemicals. Xylenes have been observed to pass through soil at a dune-infiltration site on the Rhine River and to leach into groundwater under a rapid infiltration site.

Bioconcentration is not expected to be significant. Based on the log octanol/water partition coefficient of 3.12-3.20 for the individual isomers and using a regression relation, the log BCF for fish is calculated to be 2.14-2.20. The log BCF for eels is 1.3.

The primary source of exposure is from air, but, xylenes are a low level contaminant of both ground and surface public water supplies.

### **Chemical/Physical Properties**

CAS Number: 1330-20-7

Color/ Form/Odor: Clear liquid with a sweet odor; The commercial product "mixed xylenes" generally contains approximately 40% m-xylene and 20% each of o-xylene, p-xylene, and ethylbenzene, as well as small quantities of toluene

M.P.: N/A B.P.: 137-140 C

Vapor Pressure: N/A

Octanol/Water Partition (Kow): Log Kow = 3.12-3.20

Density/Spec. Grav.: 0.864 at 20 C

Solubility: N/A; Insoluble in water

Henry's Law Coefficient: 0.22 to 0.32 atm-cu m/mole;

Odor/Taste Thresholds: Odor threshold in air is  $5 \times 10^{-5}$  mg/L

Soil sorption coefficient: Koc = 48 -68; high to moderate mobility in soil

Bioconcentration Factor: Log BCF=2.14 in fish (calc.); not expected to bioconcentrate in aquatic organisms.

Trade Names/Synonyms: Dimethyl benzene, Xylol, Methyltoluene, Violet 3

### Other Regulatory Information

Monitoring:

-- For Ground/Surface Water Sources:

Initial Frequency- 4 quarterly samples every 3 years

Repeat Frequency- Annually after 1 year of no detection

-- Triggers - Return to Initial Freq. if detect at  $> 0.0005$  mg/L

### Analysis

Reference Source  
EPA 600/4-88-039

Method Numbers  
502.2; 524.2

**Treatment/Best Available Technologies:** Granular Activated Charcoal and Packed Tower Aeration

**Toxic Release Inventory - Releases to Water and Land, 1987 to 1993 (in pounds):**

<b>TOTALS (in pounds)</b>	<b>Water</b>	<b>Land</b>
<b>Top Ten States*</b>	<b>875,943</b>	<b>3,897,738</b>
TX	2,099,734	
NJ	280,759	
IL	206,990	
IN	145,079	
AL	59,022	
CA	91,500	
MI	86,774	
GA	15,000	
VA	33,000	
WA	52,360	
<b>Major Industries*</b>		
Petroleum refining	131,817	2,678,958

Metal barrels, drums	5	289,542
Textile finishing, misc.	278,454	0
Misc. Industrial chems.	95,706	69,696
Extruded Aluminum prod.	1,265	138,798
Furniture, fixtures	0	91,500
Cotton fabric finishing	68,310	15,000
Wood office furniture	0	67,677
Pharmaceuticals	52,285	3,100
Paper mills	52,480	2,122

\* Water/Land totals only include facilities with releases greater than a certain amount - usually 1000 to 10,000 lbs.

### **For Additional Information**

EPA can provide further regulatory or other general information:  
EPA Safe Drinking Water Hotline - 800/426-4791

Other sources of toxicological and environmental fate data include:  
Toxic Substance Control Act Information Line - 202/554-1404  
Toxics Release Inventory, National Library of Medicine - 301/496-6531  
Agency for Toxic Substances and Disease Registry - 404/639-6000