



TotalEnergies Petrochemicals & Refining USA, Inc.

Product Summary: Mixed Xylenes, o-Xylene, and p-Xylene November 2021

Product Overview

Mixed Xylene is a mixture of 3 different forms (isomers) of xylenes (meta-xylene, ortho-xylene, and para-xylene) and ethylbenzene. The ethylbenzene content of xylene is typically less than 20% by weight. The distribution of isomers in xylene varies.

Ortho-xylene, also, called o-xylene, is a purified form of xylene typically containing greater than 99% ortho-xylene, and less than 1% meta-xylene, para-xylene, and ethylbenzene.

Para-xylene, also, called p-xylene, is a purified form of xylene typically containing greater than 99% para-xylene, and less than 1% ortho-xylene, meta-xylene, and ethylbenzene.

Xylene is a colorless, flammable liquid with a distinctive sweet odor. Xylene occurs naturally, but it is primarily a man-made chemical. Most commonly, it is manufactured from components isolated from crude oil in the petroleum industry, although it may also be isolated directly from crude oil.

Chemical Identity

Trade Name: Xylene

Also known as: Xylene Isomers, xylene mixture, xylene mixed isomers, ortho-xylene, meta-xylene, para-xylene; o-xylene, m-xylene, p-xylene, xylol, dimethylbenzenes

CAS¹ Registry Number: 1330-20-7 (xylenes or mixed xylene isomers)

CAS Registry Number: 95-47-6 (o-xylene)

CAS Registry Number: 108-38-3 (m-xylene)

CAS Registry Number: 106-42-3 (p-xylene)

Uses

Xylene is present in gasoline and is a component of some solvents. As a solvent, xylenes are used in some paints and coating applications. Specific isomers of xylene are used as a raw material to manufacture of industrial chemicals. Ortho-xylene is primarily used in the manufacture of phthalic anhydride. Para-xylene is used as starting material to manufacture chemicals which are used to make polyester fibers and polyethylene terephthalate (PET), which is commonly used for bottles and packaging.

Benefits of Products Manufactured from Xylene

Xylene is used to produce many valuable consumer products. Consumer products that may contain xylene include:

- Gasoline

¹ CAS Registry Number is a Registered Trademark of the American Chemical Society.

- Some glues and adhesives
- Some varnishes, paints, and paint thinners

Physical/chemical properties

Property	Mixed Xylenes	Ortho-Xylene	Para-Xylene
Specific Gravity	0.86-0.88 @ 20°C	0.88 @ 20°C	0.86 @ 20°C
Appearance	Colorless Liquid	Colorless Liquid	Colorless Liquid
Boiling Point	136 - 144°C (277 - 291°F)	144°C (291°F)	138°C (280°F)
Flash Point (closed cup)	25°C (77°F)	27 - 32°C (81 - 90°F)	25°C (77°F)
Autoignition Temperature	430 - 550 °C (806 - 1022°F)	463°C (865°F)	528°C (984°F)
Vapor Pressure	6 – 9 mm of Hg (@ 25°C)	6 – 9 mm of Hg (@ 25°C)	6 – 9 mm of Hg (@ 25°C)
Solubility in water	0.17 – 0.21 g/L at 25°C	0.17 – 0.21 g/L at 25°C	0.17 – 0.21 g/L at 25°C
Odor Threshold	0.2 – 40 ppm in air (based on odor recognition)		

Physical Hazards

Xylene is classified as a flammable liquid (GHS Flammable Liquid – Category 3) based on OSHA Hazard Communication regulations (29 CFR 1910.1200) and by the United States Department of Transportation (DOT). Xylene vapors are heavier than air, and travel across the ground. When released as a liquid, it will float on water. Care must be taken to prevent ignition of these vapors, even at normal working temperatures.

Health Effects

Xylene passes through body tissues, and may enter the body through the lungs, digestive system, or skin. After breathing xylene vapors, eating or drinking materials contaminated with xylene, or getting xylene on your skin, it may rapidly enter the bloodstream and travel throughout the body. Xylene is quickly converted in the body into other less harmful chemicals, and the resulting by-products are eliminated from the body primarily in the urine.

The three forms of xylene have very similar health effects. Short (also called acute) exposures to xylene in air may affect the central nervous system, causing narcosis: fatigue, drowsiness, staggering walk, and lack of coordination. Exposure to vapors may also cause irritation of the respiratory system, eyes, and mucous membranes. Skin exposure to the xylene may cause redness, dryness and defatting of the skin. When xylene is swallowed or vomited, it may enter the lungs (aspiration), causing damage and possible pneumonia.

Acute Toxicity Values for mixed xylenes, ortho-xylene, and para-xylene are provided in the table below.

	Mixed Xylenes	Ortho-Xylene	Para-Xylene
LD50 (oral, rat)	3,500 - 4,300 mg/kg ²	3,567 – 3,608 mg/kg ³	3,810 – 5,000 mg/kg ⁴

² **LD50 (oral, rat) > 3,500 mg/kg:** ECHA Study Report - EU Method B.1 (Acute Toxicity (Oral)) 1986 M/F Rat F344/N; **LD50 (oral, rat) = 4,300 mg/kg:** AMA Archives of Industrial Health. (Chicago, IL) V.11-21, 1955-60. For publisher information, see AEHLAU. 14,387,1956

³ **LD50 (oral, rat) = 3,567 mg/kg** "Vrednie chemichescie veshstva, galogenproisvodnie uglevodorodov". (Hazardous substances: Galogenated hydrocarbons) Bandman A.L. et al., Chimia, 1990.); **LD50 oral, rat = 3,608 mg/kg** Smyth HF

LD50 (dermal, rabbit)	> 4,200 mg/kg ⁵	> 4,200 mg/kg [†]	> 4,200 mg/kg [†]
LC50 (inhalation, rat)	21.7 – 29.1 mg/l/4h ⁶	19.1 mg/l/6h ⁷	> 20 mg/l/4h ⁸

[†] Based on mixed xylenes

Long-term (also called chronic) exposure to xylene vapors may cause fatigue, headache, and irritate eyes and the upper respiratory system. Chronic exposure to xylene may cause nervous system effects.

Many governmental and non-governmental agencies rate the cancer-causing potential (carcinogenicity) of select chemicals. Some results for xylene include:

Agency	Carcinogenicity of xylene
International Agency for Research on Cancer (IARC)	Classified as 3 (not classifiable as to its carcinogenicity to humans)
American Conference of Governmental Industrial Hygienists (ACGIH)	Classified A4 (not classifiable as a human carcinogen)
Occupational Safety and Health Administration (OSHA)	Not a known carcinogen

Some xylene products may contain ethylbenzene or cumene. There is limited evidence that ethylbenzene and cumene may be carcinogens. Additionally, some xylene products may contain toluene. Toluene is generally classified as a reproductive hazard.

The GHS health hazard classifications based on OSHA Hazard Communication regulations (29 CFR 1910.1200)⁹ for mixed xylenes, ortho-xylene, para-xylene are provided in the table below. For additional information including GHS hazard statements, precautionary statements, and information on specific target organ toxicity (STOT), the safety data sheet for the specific product should be consulted.

Jr, Carpenter CP, Weil CS, Pozzani UC, & Striegel JA (1962) Range-finding toxicity data: List VI. Am Ind Hyg Assoc J, 23: 95-107

⁴ **LD50 (oral, rat) = 3,810 mg/kg** "Vrednie chemichescie veshstva, galogenproisvodnie uglevodorodov". (Hazardous substances: Galogenated hydrocarbons) Bandman A.L. et al., Chimia, 1990; **LD50 (oral, rat) = 5,000 mg/kg** Gekkan Yakuji. Pharmaceuticals Monthly. (Yakugyo Jihosha, Inaoka Bldg., 2-36 Jinbo-cho, Kandu, Chiyoda-ku, Tokyo 101, Japan) V.1- 1959

⁵ **LD50 (dermal, rabbit) > 4,280 mg/kg** Hine CH, Zuidema HH Hine CH, Zuidema HH, 1970, Industrial Medicine 39, 215-200

⁶ **LC50 (inhal, rat) = 21.7 mg/L/4h**: Raw Material Data Handbook, Vol.1: Organic Solvents, 1974. (National Assoc. of Printing Ink Research Institute, Francis McDonald Sinclair Memorial Laboratory, Lehigh Univ., Bethlehem, PA 18015) 1,123,1974; **LC50 (inhal, rat) = 29.1 mg/L/4h**: Carpenter CP, Kinkead ER, Geary DJ, et al., 1975, Toxicol Appl Pharmacol 33:543-558, Petroleum hydrocarbon toxicity studies: V. Animal and human response to vapors of mixed xylene.

⁷ **LC50 (inhal, rat) = 19.1 mg/L/6h** Bonnet P, Morel Y, Raoult G, Zissu D, & Gradiski D (1982) Détermination de la concentration léthale₅₀ des principaux hydrocarbures aromatiques chez le rat. Arch Mal Prof, 43: 261-265

⁸ **LC50 (inhal, rat) = 20.0 mg/L/4h**: "Biological Reactive Intermediates, Formation, Toxicity and Inactivation, Proceedings of the International Conference, Turku, Finland, 1975," Jollow, D.J., et al., eds., New York, Plenum Pub. Corp., 1977

⁹ OSHA does not provide GHS hazard classifications for a chemical or a substance. OSHA places the responsibility of GHS hazard classification upon the manufacturers (or importers) of the chemical (see 21 CFR 1910.1200(d)). Therefore, GHS hazard classification in the United States may differ from manufacturer (or importer) to manufacturer (or importer). Additionally, these GHS hazard classifications may differ from other internationally established GHS classifications, such as those in the Europe Union or Japan.

The provided GHS classifications are current as of the date of this document. However, the GHS classifications are subject to change as new information is obtained. The user should always refer to the most recent product SDS to confirm the GHS classifications.

OSHA GHS Health Hazard Classifications	Mixed Xylenes	Ortho-Xylene	Para-Xylene
Skin corrosion/irritation	Cat. 2	Cat. 2	Cat. 2
Serious eye damage/eye irritation	Cat. 2B	Cat. 2B	Cat. 2B
Carcinogenicity	Cat 2 [‡]	Cat 2 ^{**}	Cat 2 [‡]
Reproductive toxicity	Cat. 2 [*]	-	-
STOT (Single Exposure) – Respiratory irritation	Cat. 3	Cat. 3	Cat. 3
STOT (Single Exposure) – Narcotic effects	Cat. 3	Cat. 3	Cat. 3
STOT (Repeated Exposure)	Cat. 1 / Cat. 2	Cat. 1 / Cat. 2	Cat. 1 / Cat. 2
Aspiration Hazard	Cat. 1	Cat. 1	Cat. 1

‡ Classification based on ethylbenzene content ≥ 0.1%

**Classification based on cumene content ≥ 0.1%

* Classification based on toluene content ≥ 0.1%

Potential for Exposure

Environmental Exposure

Xylene is harmful or toxic to many aquatic organisms, but it is not expected to accumulate in the food chain. Xylene has low solubility in water, and if released as a liquid, most of it will rapidly evaporate from soil and the water surface to the air. Xylene will degrade naturally at different rates in the environment depending on the conditions to which it is exposed. The federal government has set limits for the allowable amount of xylene in water through the EPA's Clean Water Act.

Industrial Worker Exposure

The risk of occupational exposure to xylene is expected to be highest among workers in the petroleum industry, and occupations where xylene is used in solvents, paints, and coatings. Xylene is a recognized toxic substance with established limits, or standards, for workplace exposure. In the U.S., OSHA regulates the exposure to xylene. Ventilation must be provided for industrial workers in order to keep exposure levels below established standards. If inhalation above established standards is possible, an appropriate respirator must be worn. Additionally, workers are required to wear splash goggles, safety glasses, fire retardant clothing covering the entire body, and chemical resistant gloves, as appropriate for the work being done.

Consumer/General Public Exposure

The largest sources of xylene released to the environment are from gasoline and other products in which xylene is used as a solvent. Gasoline, automobile emissions, solvents, varnishes, coatings and paints are potential sources for xylene exposure. While trace amounts may be present in water or food, it is uncommon for this to be a significant source of exposure. Exposure to xylene occurs primarily through inhaling contaminated air, and it is present in low levels in rural as well as urban air. Air levels of xylene are higher in locations where fumes from gasoline or automobile emissions are present in greater concentrations, such as fuel stations, highways and parking lots. Xylene levels may be higher indoors than outdoors due to xylene released from household products such as varnishes, paints, and newly installed carpeting. Cigarette smoke has also been shown to contain xylene.

Potential exposure to xylene containing solvents and paints used in consumer products can be minimized by using these consumer products only with adequate ventilation and wearing chemical resistant gloves.

Gloves should be changed frequently.

Storing and Transporting Xylene

Bulk quantities of xylene should be stored in tanks equipped with floating roofs to reduce emissions. Storage containers for xylene should be made of steel. Storage tanks should be engineered to prevent contact with water resources, as this material could contaminate the water resources. Surface spills can reach groundwater through porous soil or cracked surfaces. The storage tanks should be monitored regularly for leaks. Facilities which store these products should have a comprehensive response plan for spills or leaks. Small containers may be made of glass. Plastic storage containers should not be used.

Xylene is transported mainly by sea or inland waterway and is subject to a number of international guidelines for safe handling of cargoes. These include the International Maritime Dangerous Goods (IMDG) from the International Maritime Organization (IMO), the International Safety Guidelines for Oil Tankers and Terminals (ISGOTT) and the ADNR (Accord europeen relatif au transport international des marchandises Dangereuses par voie de Navigation interieure au Rhine) regulations. In the US, marine transport must comply with the US Coast Guard regulations. Xylene may also be transported commercially by rail, truck, and pipeline, which are regulated by the USDOT.

Static charges can accumulate during shipping, unloading, pouring, or transferring operations. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material.

Product Stewardship Contact Information:

TotalEnergies Petrochemicals & Refining USA, Inc.
P O Box 674411
Houston, TX 77267-4411
product.stewardship@totalenergies.com

Additional Information

TotalEnergies Petrochemicals & Refining USA, Inc. Material Safety Data Sheets for Xylene
<https://corporate.totalenergies.us/product-stewardship>

Agency for Toxic Substances and Disease Registry (ATSDR) summary for xylene
<https://wwwn.cdc.gov/TSP/ToxProfiles/ToxProfiles.aspx?id=296&tid=53>

The National Institute for Occupational Safety and Health (NIOSH) overview: Xylene
<https://www.cdc.gov/niosh/topics/xylene/default.html>

CEDRE Xylene Chemical Response Guide
<http://wwz.cedre.fr/en/content/download/2757/140162/file/Extract-xylene.pdf>

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