

IN CASE OF TRANSPORTATION EMERGENCY CONTACT:

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1. IDENTIFICATION

PRODUCT NAME: TOLUENE
CHEMICAL FAMILY: AROMATIC HYDROCARBON
CAS #: 108-88-3
SYNONYMS: TOLUENE, TOLUOL, METHYLBENZENE

2. HAZARDS IDENTIFICATION

Emergency Overview

FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE.

MAY CAUSE RESPIRATORY TRACT, EYE AND SKIN IRRITATION. MAY BE HARMFUL IF SWALLOWED.
ASPIRATION HAZARD.

CAUSES DAMAGE TO THE FOLLOWING ORGANS: KIDNEYS, LIVER, HEART, RESPIRATORY TRACT, SKIN, EYES,
CENTRAL NERVOUS SYSTEM, BLOOD, LUNGS, BRAIN.

CANCER HAZARD. CONTAINS MATERIAL WHICH CAN CAUSE CANCER.

ROUTES OF ENTRY
ABSORBED THROUGH SKIN. EYE CONTACT. INHALATION. INGESTION

POTENTIAL ACUTE HEALTH EFFECTS:

Eyes May cause eye irritation.

Skin May cause skin irritation. Skin inflammation is characterized by itching, scaling, reddening or, occasionally, blistering. Prolonged or repeated contact can defat the skin and lead to irritation, cracking and/or dermatitis.

Inhalation May cause respiratory tract irritation. Can cause central nervous system (CNS) depression. Symptoms and signs include headache, dizziness, fatigue, muscular weakness, drowsiness and, in extreme cases, loss of consciousness. Excessive exposure may cause cardiac (heart) sensitization, which can be potentially fatal. May have an effect on your brain and may impair your ability to think clearly. May cause neuromuscular effects and impairment of speech, color vision and hearing at moderate/high doses.

Ingestion Aspiration hazard if swallowed. Can enter lungs and cause damage. Can cause gastrointestinal disturbances. Can cause central nervous system (CNS) depression.

Potential Chronic Health Effects

Toluene may cause chronic CNS effects, irritation to the eyes and upper respiratory system.

CARCINOGENIC EFFECTS:

Not listed as a carcinogen by OSHA, NTP or IARC. [Toluene]

Classified 2B (Possible for human.) by IARC, Classified A3 (Animal Carcinogen) by ACGIH [Ethylbenzene].

Benzene is a known human carcinogen.

TERATOGENIC EFFECTS: Studies suggest that toluene may cause developmental toxicity (may damage the developing fetus). However, studies are not conclusive due to many confounding variables. Increased rates of spontaneous abortion have been reported in several studies related to toluene exposure.

Classified Reproductive system/toxin/female, Reproductive system/toxin/male [PROVEN] [Benzene].

Medical Conditions Aggravated by Overexposure

Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

Overexposure /Signs/ Symptoms

Skin inflammation is characterized by itching, scaling, reddening or, occasionally, blistering. Symptoms and signs include headache, dizziness, fatigue, muscular weakness, drowsiness and, in extreme cases, loss of consciousness. Lack of coordination.

See Toxicological Information (Section 11)

3. COMPOSITION

Occupational exposure limits, if available, are listed in section 8

Substance Name:	CAS #	% By Weight
Toluene	108-88-3	>97
Ethylbenzene	100-41-4	<2
Benzene	71-43-2	0.2

4. FIRST AID MEASURES

EYE CONTACT:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.

SKIN CONTACT:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention.

INHALATION:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

INGESTION:

If swallowed, do not induce vomiting. Never give anything by mouth to an unconscious person. If potentially dangerous quantities of this material have been swallowed, call a physician immediately. Aspiration hazard if swallowed. Can enter lungs and cause damage. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention.

5. FIRE FIGHTING MEASURES

FLAMMABILITY OF PRODUCT:

FLAMMABLE

AUTO-IGNITION TEMPERATURE:	480°C (896°F)
FLASH POINTS: F)	CLOSED CUP: 4.4°C (40°F). (Tagliabue.). OPEN CUP: 4°C (39.2°
FLAMMABLE LIMITS:	Lower: 1.1% Upper: 7.1%
PRODUCTS OF COMBUSTION:	These products are carbon oxides (CO, CO2)
FIRE HAZARDS IN PRESENCE OF VARIOUS SUBSTANCES:	Extremely flammable in presence of open flames and sparks
EXPLOSION HAZARDS IN PRESENCE OF VARIOUS SUBSTANCES: impact	Risks of explosion of the product in the presence of mechanical is not Expected Risk of explosion of the product in presence of static discharge IS expected
FIRE FIGHTING MEDIA AND INSTRUCTIONS:	Recommended: alcohol-resistant foam, CO2, powders, water spray
PROTECTIVE CLOTHING (FIRE)	Wear MSHA/NIOSH approved self-contained breathing apparatus or equivalent and full protective gear (Bunker gear)
SPECIAL REMARKS ON FIRE HAZARDS: on	Flammable liquid. Do not use near open flames, electric sparks, or hot surfaces. Evolves toxic fumes when heated.
SPECIAL REMARKS ON EXPLOSION HAZARDS:	May explode if ignited in an enclosed area. Flashback along vapor trail may occur.

6. ACCIDENTAL RELEASE MEASURES

SMALL SPILL AND LEAK

Absorb with an inert material and place in an appropriate waste disposal container. Warn personnel to move away. Eliminate ignition sources and ventilate area.

LARGE SPILL AND LEAK

Isolate the area. Flammable liquid, insoluble in water. Contain spill and safely stop the flow. Warn personnel to move away. Eliminate all sources of ignition. Ventilate. Absorb with DRY earth, sand or other non-combustible material. Dike spill area and do not allow product to reach sewage system or surface or ground water. Notify any reportable spill to authorities. (See section 12 for environmental risks and 13 for disposal information.) Do not allow any potentially contaminated water, including rain water, runoff from fire fighting or spills, to enter any waterway, sewer or drain.

7. HANDLING AND STORAGE

HANDLING

Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed.

Workers should wash hands and face before eating, drinking and smoking. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do

not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. 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. Empty containers retain product residue and can be hazardous. Do not reuse container.

STORAGE

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Take precautionary measures against static discharges. Ground all equipment containing material. All efforts should be made to prevent any leaks or spills. Storage tanks containing 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. Where spills or leaks are possible, a comprehensive response plan should be developed and implemented.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

ENGINEERING CONTROLS:

Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment

PERSONAL PROTECTION

EYES:	Safety glasses with side shields
BODY:	Flame retardant clothing covering the entire body
RESPIRATORY:	Be sure to use a MSHA/NIOSH approved respirator or equivalent at high concentrations
HANDS:	Chemical resistant gloves if contact is possible
FEET:	Shoes

PERSONAL PROTECTION IN CASE OF A LARGE SPILL

Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

PRODUCT NAME	EXPOSURE LIMITS
TOLUENE	OSHA PEL Z2 (United States, 11/2006). TWA: 200 ppm 8 hour(s). CEIL: 300 ppm AMP: 500 ppm 10 minute(s). NIOSH REL (United States, 6/2009). TWA: 100 ppm 10 hour(s). STEL: 150 ppm 15 minute(s). ACGIH TLV (United States, 3/2012). TWA: 20 ppm 8 hour(s).
ETHYLBENZENE	OSHA PEL (United States, 11/2006). TWA: 100 ppm 8 hour(s). NIOSH REL (United States, 6/2009). TWA: 100 ppm 10 hour(s). STEL: 125 ppm 15 minute(s). ACGIH TLV (United States, 3/2012). TWA: 20 ppm 8 hour(s).
BENZENE	NIOSH REL (United States, 6/2009). TWA: 0.1 ppm 10 hour(s). STEL: 1 ppm 15 minute(s). OSHA PEL (United States, 11/2006).

TWA: 1 ppm 8 hour(s).
STEL: 5 ppm 15 minute(s).
ACGIH TLV (United States, 3/2012). Absorbed through skin.
TWA: 0.5 ppm 8 hour(s).

CONSULT LOCAL AUTHORITIES FOR ACCEPTABLE EXPOSURE LIMITS

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State and Appearance	Liquid. (Liquid)
Color	Clear, colorless liquid with characteristic odor (model airplane glue).
Odor	Not available.
Odor Threshold	2.5 ppm
Molecular Weight	92.15
Molecular Formula	C6H5-CH3
Boiling/Condensation Point	110.56°C (231°F)
Melting/Freezing Point	-95°C (-139°F)
Critical Temperature	318.6°C (605.5°F)
Specific Gravity	0.866 (Water = 1)
Vapor Pressure	28.4 mm of Hg (@ 25°C)
Vapor Density	3.1 (Air = 1)
Volatility	100% (v/v).
Evaporation Rate	2.24 compared to Butyl acetate
VOC	100 (%)
Solubility in Water	5.1 mg/100 mL at 20°C

10. STABILITY AND REACTIVITY

STABILITY AND REACTIVITY:	The product is stable
CONDITIONS OF INSTABILITY:	No additional remark
INCOMPATIBILITY WITH VARIOUS SUBSTANCES:	Reactive or incompatible with the following materials: Oxidizing materials
HAZARDOUS DECOMPOSITION PRODUCTS:	Under normal conditions of storage and use, hazardous decomposition products should not be produced. In a fire, hazardous decomposition products may be produced.
HAZARDOUS POLYMERIZATION:	Under normal conditions of storage and use, hazardous polymerization

will not occur

11. TOXICOLOGICAL INFORMATION

TOXICITY TO ANIMALS

PRODUCT/INGREDIENT NAME	RESULT	SPECIES	DOSE	EXPOSURE
TOLUENE	LD50 Dermal	Rabbit	14100 uL/kg	-
	LD50 Intraperitoneal	Rat	1332 mg/kg	-
	LD50 Intravenous	Rat	1960 mg/kg	-
	LD50 Oral	Rat	636 mg/kg	-
	LD50 Unreported	Rat	6900 mg/kg	-
	LC50 Inhalation Vapor	Rat	49 gm/m ³	4 hours
ETHYLBENZENE	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Dermal	Rabbit	17800 uL/kg	-
	LD50 Oral	Rat	3500 mg/kg	-
	LC50 Inhalation Vapor	Rat	55000 mg/m ³	2 hours
BENZENE	LD50 Dermal	Rabbit	>9400 uL/kg	-
	LD50 Intraperitoneal	Rat	1100 ug/kg	-
	LD50 Oral	Rat	930 mg/kg	-
	LD50 Oral	Rat	1 mL/kg	-
	LD50 Oral	Rat	6400 mg/kg	-
	LD50 Oral	Rat	1800 mg/kg	-
	LC50 Inhalation Gas.	Rat	10,000 ppm	7 hours

CHRONIC EFFECTS ON HUMANS

Toluene may cause chronic CNS effects, irritation to the eyes and upper respiratory system.

CARCINOGENIC EFFECTS:

Not listed as a carcinogen by OSHA, NTP or IARC. [Toluene]

Classified 2B (Possible for human.) by IARC, Classified A3 (Animal Carcinogen) by ACGIH [Ethylbenzene].

Benzene is a known human carcinogen.

Reproductive effects have been reported in pregnant toluene inhalant abusers following very high (intentional abuse) exposures. Possible decreased ability to produce children and increased spontaneous abortion have also been reported in occupationally exposed female workers. No toluene-induced malformed offspring or significant effects on fertility have been observed in animal studies.

OTHER TOXIC EFFECTS ON HUMANS

Intentional misuse involving repeated and prolonged inhalation exposure to high concentrations of vapor can result in central nervous system damage and eventually death.

Toluene may cause central nervous system (CNS) effects, respiratory tract irritation, eye and skin irritation and intoxication at high doses. Toluene may have an effect on your brain and may impair your ability to think clearly. From animal and human data, toluene can be characterized as a neurotoxic chemical at moderate/high doses, inducing neuromuscular effects and impairment of speech, color vision and hearing. Excessive exposure to toluene may cause cardiac (heart) sensitization, which can be potentially fatal.

Based on the weight-of-evidence, toluene exposure does not appear to affect the immune system in either animals or humans.

Toluene has not demonstrated genotoxic activity, and animal studies indicate that inhalation of toluene does not cause systemic cancer.

12. ECOLOGICAL INFORMATION

ECOTOXICITY

PRODUCT/INGREDIENT NAME	RESULT	SPECIES	EXPOSURE
TOLUENE	LC50 (fish). 5.5 mg/L	FISH	96 hours
	EC50 3.78 mg/L	DAPHNIA MAGNA	48 hours
	IC50 10 mg/L	ALGAE	72 hours

BIODEGRADABLE/OECD

Does not significantly hydrolyze in soil or water under normal environmental conditions. Biodegrades in groundwater and soil. Does not significantly adsorb to sediment or bioconcentrate in aquatic organisms.

MOBILITY

When released into soil, it will be lost by evaporation from near-surface soil and by leaching into the groundwater. Biodegradation occurs in soil and groundwater, but it moves slowly at high concentrations (possibly toxic to microorganisms). The presence of acclimated microbial populations may allow rapid Biodegradation. When released into water, it will evaporate and biodegrade. This may occur rapidly or take several weeks, depending on temperature, mixing conditions, and acclimation of microorganisms. If released to the atmosphere, it will degrade by reaction with photochemically produced hydroxyl radicals (half-life 3 hr to slightly over 1 day) or be washed out in rain. It is not subject to direct photolysis.

13. DISPOSAL CONSIDERATIONS

WASTE INFORMATION: Recycle to process, if possible. Recover free liquid. Transfer to safe disposal area in accordance with federal, state and local regulations

WASTE STREAM The classification of the product may meet the criteria for a hazardous waste.

Consult your local authorities

14. TRANSPORT INFORMATION

DOT Classification for Bulk Shipments (non bulk shipments may differ) 3

PROPER SHIPPING NAME/DESCRIPTION: UN 1294, Toluene, 3, RQ, PG II

UN NUMBER UN 1294

PACKING GROUP: II

MARINE POLLUTANT: not listed in Appendix B to 49CFR172.101

HAZARDOUS SUBSTANCES REPORTABLE QUANTITY: TOLUENE: 1000 lbs (454 kg)
ETHYLBENZENE: 1000 lbs (454 kg)
BENZENE: 10 lbs (4.54 kg)

Special Provisions for Transport

TDG Classification	3
IMO/IMDG Classification	3
ICAO/IATA Classification	3

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Product name: Toluene
 Pollution category: Y
 MARPOL 73/78 and the IBC Code Ship type 2G

HCS Classification Flammable liquid
 Target organ effects

U.S. Federal Regulations

TSCA 8(a) PAIR: toluene

United States inventory (TSCA 8b): All components are listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: To the best of our knowledge, there are no substances that would be at reportable levels for this regulation in this product.

SARA 302/304 emergency planning and notification: toluene; ethylbenzene; benzene

SARA 302/304/311/312 hazardous chemicals: toluene; ethylbenzene; benzene

SARA 311/312 MSDS distribution - chemical inventory - hazard identification: toluene: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard

SARA 313 Supplier Notification

This product contains the following EPCRA section 313 chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (40 CFR 372 -Table 372.65).

PRODUCT NAME	CAS #	CONCENTRATION (%)
TOLUENE	108-88-3	>97
ETHYLBENZENE	100-41-4	<2
BENZENE	71-43-2	0.2

CLEAN WATER ACT (CWA) 307: TOLUENE

CLEAN WATER ACT (CWA) 311: TOLUENE

INTERNATIONAL REGULATIONS

WHMIS (CANADA)

Class B-2: Flammable liquid

Class D-2A: Material causing other toxic effects (Very toxic).

Class D-2B: Material causing other toxic effects (Toxic).

CEPA Toxic substances: None of the components are listed.]

Canadian ARET: None of the components are listed.

Canadian NPRI: The following components are listed: Toluene

Alberta Designated Substances: None of the components are listed.

Ontario Designated Substances: None of the components are listed.

Quebec Designated Substances: None of the components are listed

EINECS: 203-625-9

DSCL (EEC)

R11- Highly flammable.

R63- Possible risk of harm to the unborn child.

R48/20- Harmful: danger of serious damage to health by prolonged exposure through inhalation.

R65- Harmful: may cause lung damage if swallowed.

R38- Irritating to skin.

R67- Vapors may cause drowsiness and dizziness.

CEPA DSL/NDL: All components are listed or exempted

INTERNATIONAL LISTS

Australia inventory(AICS): All components are listed or exempted.
China inventory (IECSC): All components are listed or exempted.
Japan inventory (ENCS): All components are listed or exempted.
Japan inventory (ISHL): Not determined.
Korea inventory (KECI): All components are listed or exempted.
New Zealand Inventory of Chemicals (NZIoC): All components are listed or exempted.
Philippines inventory (PICCS): All components are listed or exempted.

STATE REGULATIONS:

Massachusetts Substances: The following components are listed: TOLUENE; ETHYL BENZENE
New Jersey Hazardous Substances: The following components are listed: TOLUENE; ETHYL BENZENE; BENZENE
New York Acutely Hazardous Substances: The following components are listed: Toluene; Ethylbenzene; Benzene
Pennsylvania RTK Hazardous Substances: The following components are listed: BENZENE, METHYL-; BENZENE, ETHYL-;
BENZENE

WARNING: This product contains a chemical or chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

15. REGULATORY INFORMATION

LABEL REQUIREMENTS:

FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE.
MAY CAUSE RESPIRATORY TRACT, EYE AND SKIN IRRITATION. MAY BE HARMFUL IF SWALLOWED.
ASPIRATION HAZARD.
CAUSES DAMAGE TO THE FOLLOWING ORGANS: KIDNEYS, LIVER, HEART, RESPIRATORY TRACT, SKIN, EYES,
CENTRAL NERVOUS SYSTEM, BLOOD, LUNGS, BRAIN.
CANCER HAZARD. CONTAINS MATERIAL WHICH CAN CAUSE CANCER.

HAZARDOUS MATERIAL INFORMATION SYSTEM (USA)

HEALTH	2
FIRE HAZARD	3
REACTIVITY	0

The information contained in this Material Safety Data Sheet (MSDS) / Safety Data Sheet (SDS) is believed by CISCO to be accurate on the date issued. However, materials may present unknown hazards and should be used with caution. Final determination of suitability and use of any material is the sole responsibility of the user. Neither CISCO nor any of its subsidiaries or affiliated companies assumes any liability whatsoever for the accuracy or completeness of the information contained herein or reliance thereto. If the material is repackaged, the user is responsible and must ensure that proper health, safety and other necessary information is included with the material and/or on the container. NO WARRANTIES OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANT ABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE MADE REGARDING THE MATERIALS OR THE INFORMATION CONTAINED IN THIS SDS. ALTERATION OF THIS DOCUMENT IS STRICTLY PROHIBITED.

16. OTHER INFORMATION

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