



1. MATERIAL AND COMPANY IDENTIFICATION

Material Name : Toluene
Uses : Raw material for use in the chemical industry. Solvent.
Product Code : T1402, Q9138, Q9131, Q9250, Q9300, Q9308, X211H
Company : Shell Chemical LP
 PO Box 2463
 HOUSTON TX 77252-2463
 USA
MSDS Request : 1-800-240-6737
Customer Service : 1-866-897-4355

Emergency Telephone Number
Chemtrec Domestic (24 hr) : 1-800-424-9300
Chemtrec International (24 hr) : 1-703-527-3887

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No.	Concentration
Toluene	108-88-3	100.00 %

3. HAZARDS IDENTIFICATION

Emergency Overview	
Appearance and Odour	: Colourless. Liquid. Aromatic.
Health Hazards	: Vapours may cause drowsiness and dizziness. Irritating to eyes. Harmful: may cause lung damage if swallowed.
Safety Hazards	: Flammable. Vapours are heavier than air. Vapours may travel across the ground and reach remote ignition sources causing a flashback fire danger. Electrostatic charges may be generated during pumping. Electrostatic discharge may cause fire.
Environmental Hazards	: Toxic to aquatic organisms.

Health Hazards
Inhalation : Slightly irritating to respiratory system. Vapours may cause drowsiness and dizziness.
Skin Contact : Irritating to skin.
Eye Contact : Moderately irritating to eyes.
Ingestion : Harmful: may cause lung damage if swallowed.
Other Information : Possibility of organ or organ system damage from prolonged exposure; see Chapter 11 for details. Target organ(s): Central nervous system (CNS).
 Auditory system.
 Respiratory system.
 Visual system.



- Signs and Symptoms** : Eye irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blurred vision. Skin irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blisters. If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever. The onset of respiratory symptoms may be delayed for several hours after exposure. Breathing of high vapour concentrations may cause central nervous system (CNS) depression resulting in dizziness, light-headedness, headache, nausea and loss of coordination. Continued inhalation may result in unconsciousness and death. Auditory system effects may include temporary hearing loss and/or ringing in the ears. Visual system disturbances may be evidenced by decreases in the ability to discriminate between colours.
- Aggravated Medical Condition** : Pre-existing medical conditions of the following organ(s) or organ system(s) may be aggravated by exposure to this material: Auditory system. Central nervous system (CNS). Respiratory system. Eyes. Skin. Visual system. Kidney.
- Environmental Hazards** : Not classified as dangerous under EC criteria.

4. FIRST AID MEASURES

- General Information** : Keep victim calm. Obtain medical treatment immediately.
- Inhalation** : DO NOT DELAY. Remove to fresh air. If rapid recovery does not occur, transport to nearest medical facility for additional treatment.
- Skin Contact** : Remove contaminated clothing. Immediately flush skin with large amounts of water for at least 15 minutes, and follow by washing with soap and water if available. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.
- Eye Contact** : Immediately flush eyes with large amounts of water for at least 15 minutes while holding eyelids open. Transport to the nearest medical facility for additional treatment.
- Ingestion** : If swallowed, do not induce vomiting; transport to nearest medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent aspiration.
- Advice to Physician** : Potential for chemical pneumonitis. Consider: gastric lavage with protected airway, administration of activated charcoal. Potential for cardiac sensitisation, particularly in abuse situations. Hypoxia or negative inotropes may enhance these effects. Consider: oxygen therapy. Call a doctor or poison control center for guidance.

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

- Flash point** : 4 °C / 39 °F (Abel)

Explosion / Flammability limits in air	:	1.2 - 7.1 %(V)
Auto ignition temperature	:	480 - 536 °C / 896 - 997 °F (ASTM E-659)
Specific Hazards	:	The vapour is heavier than air, spreads along the ground and distant ignition is possible. Will float and can be reignited on surface water. Carbon monoxide may be evolved if incomplete combustion occurs.
Extinguishing Media	:	Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
Unsuitable Extinguishing Media	:	Do not use water in a jet.
Protective Equipment for Firefighters	:	Wear full protective clothing and self-contained breathing apparatus.
Additional Advice	:	Keep adjacent containers cool by spraying with water.

6. ACCIDENTAL RELEASE MEASURES

Observe all relevant local and international regulations. Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. See Chapter 13 for information on disposal.

Protective measures	:	Isolate hazard area and deny entry to unnecessary or unprotected personnel. Stay upwind and keep out of low areas. Shut off leaks, if possible without personal risks. Remove all possible sources of ignition in the surrounding area. Use appropriate containment (of product and fire fighting water) to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers. Attempt to disperse the vapour or to direct its flow to a safe location for example by using fog sprays. Take precautionary measures against static discharge. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Ventilate contaminated area thoroughly.
Clean Up Methods	:	For large liquid spills (> 1 drum), transfer by mechanical means such as vacuum truck to a salvage tank for recovery or safe disposal. Do not flush away residues with water. Retain as contaminated waste. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely. For small liquid spills (< 1 drum), transfer by mechanical means to a labelled, sealable container for product recovery or safe disposal. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely.
Additional Advice	:	Notify authorities if any exposure to the general public or the environment occurs or is likely to occur. Local authorities should be advised if significant spillages cannot be contained. The vapour is heavier than air, spreads along the ground and distant ignition is possible. Vapour may form an explosive mixture with air. See Chapter 13 for information on disposal. U.S. regulations may require reporting releases of this material to the environment which exceed the reportable quantity (refer



to Chapter 15) to the National Response Centre at (800) 424-8802.

7. HANDLING AND STORAGE

- General Precautions** : Avoid breathing vapours or contact with material. Only use in well ventilated areas. Wash thoroughly after handling. On guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.
- Handling** : Avoid contact with skin, eyes, and clothing. Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. Electrostatic charges may be generated during pumping. Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (<= 1 m/sec until fill pipe submerged to twice its diameter, then <= 7 m/sec). Avoid splash filling. Do NOT use compressed air for filling, discharging, or handling operations. Handle and open container with care in a well-ventilated area.
- Storage** : Vapours from tanks should not be released to atmosphere. Breathing losses during storage should be controlled by a suitable vapour treatment system. Bulk storage tanks should be diked (bunded). Must be stored in a diked (bunded) well-ventilated area, away from sunlight, ignition sources and other sources of heat. Keep away from aerosols, flammables, oxidizing agents, corrosives and from other flammable products which are not harmful or toxic to man or to the environment. The vapour is heavier than air. Beware of accumulation in pits and confined spaces.
- Product Transfer** : Keep containers closed when not in use. Do not use compressed air for filling, discharging or handling.
- Recommended Materials** : For containers, or container linings use mild steel, stainless steel.
- Unsuitable Materials** : Natural, butyl, neoprene or nitrile rubbers.
- Container Advice** : Containers, even those that have been emptied, can contain explosive vapours. Do not cut, drill, grind, weld or perform similar operations on or near containers.
- Additional Information** : Ensure that all local regulations regarding handling and storage facilities are followed.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

Material	Source	Type	ppm	mg/m3	Notation
Toluene	ACGIH	TWA	20 ppm		
	OSHA Z1A	TWA	100 ppm	375 mg/m3	
	OSHA Z1A	STEL	150 ppm	560 mg/m3	



	SHELL IS	TWA	50 ppm		
	OSHA Z2	TWA	200 ppm		
	OSHA Z2	Ceiling	300 ppm		
	OSHA Z2	MAX. CONC	500 ppm		

Additional Information : Skin notation means that significant exposure can also occur by absorption of liquid through the skin and of vapour through the eyes or mucous membranes. SHELL IS is the Shell Internal Standard.

Exposure Controls : The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Use sealed systems as far as possible. Adequate ventilation to control airborne concentrations below the exposure guidelines/limits. Local exhaust ventilation is recommended. Firewater monitors and deluge systems are recommended. Eye washes and showers for emergency use.

Personal Protective Equipment : Hygiene measures:
Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers. See also the following information:

Respiratory Protection : If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for organic gases and vapours [boiling point >65 °C (149 °F)]. Where respiratory protective equipment is required, use a full-face mask. Where air-filtering respirators are unsuitable (e.g., airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus. Respirator selection, use and maintenance should be in accordance with the requirements of the OSHA Respiratory Protection Standard, 29 CFR 1920.134.

Hand Protection : Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739, AS/NZS:2161) made from the following materials may provide suitable chemical protection: Longer term protection: Viton. Incidental contact/Splash protection: Nitrile rubber. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care.



- Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.
- Eye Protection** : Chemical splash goggles (chemical monogoggles).
 - Protective Clothing** : Chemical resistant gloves/gauntlets. Where risk of splashing or in spillage clean up, use chemical resistant one-piece overall with integral hood.
 - Monitoring Methods** : Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate. Examples of sources of recommended air monitoring methods are given below or contact supplier. Further national methods may be available. National Institute of Occupational Safety and Health (NIOSH), USA: Manual of Analytical Methods, <http://www.cdc.gov/niosh/nmam/nmammenu.html>. Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods, <http://www.osha-slc.gov/dts/sltc/methods/toc.html>. Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances, <http://www.hsl.gov.uk/search.htm>.
 - Environmental Exposure Controls** : Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapour.

9. PHYSICAL AND CHEMICAL PROPERTIES

- Appearance : Colourless. Liquid.
- Odour : Aromatic.
- Odour threshold : 1.74 ppm
- pH : Not applicable.
- Boiling point : Typical 110 - 111 °C / 230 - 232 °F
- Melting / freezing point : Typical -95 °C / -139 °F
- Flash point : 4 °C / 39 °F (Abel)
- Explosion / Flammability limits in air : 1.2 - 7.1 %(V)
- Auto-ignition temperature : 480 - 536 °C / 896 - 997 °F (ASTM E-659)
- Vapour pressure : Typical 1 kPa at 0 °C / 32 °F
Typical 3 - 3.5 kPa at 20 °C / 68 °F
Typical 12 kPa at 50 °C / 122 °F
- Specific gravity : Data not available.
- Density : Typical 871 kg/m3 at 15 °C / 59 °F
- Water solubility : 0.515 kg/m3
- n-octanol/water partition coefficient (log Pow) : 2.65
- Kinematic viscosity : 0.63 mm2/s at 25 °C / 77 °F
- Vapour density (air=1) : 3.1
- Electrical conductivity : Typical 8 pS/m at 20 °C / 68 °F (ASTM D-4308)
- Dielectric constant : Typical 2.4
- Volatile organic carbon content : 100 %
- Evaporation rate (nBuAc=1) : 6.1 (DIN 53170, di-ethyl ether=1)



Surface tension : 2 (ASTM D 3539, nBuAc=1)
: Typical 28.5 mN/m at 20 °C / 68 °F (ASTM D-971)
Molecular weight : 92 g/mol

10. STABILITY AND REACTIVITY

Stability : Stable under normal conditions of use. Reacts violently with strong oxidising agents.
Conditions to Avoid : Avoid heat, sparks, open flames and other ignition sources. Prevent vapour accumulation.
Materials to Avoid : Strong oxidising agents.
Hazardous Decomposition Products : Thermal decomposition is highly dependent on conditions. A complex mixture of airborne solids, liquids and gases, including carbon monoxide, carbon dioxide and other organic compounds will be evolved when this material undergoes combustion or thermal or oxidative degradation.
Sensitivity to Static Discharge : Yes

11. TOXICOLOGICAL INFORMATION

Basis for Assessment : Information given is based on product data.
Acute Oral Toxicity : Low toxicity: LD50 >2000 mg/kg , Rat
Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.
Acute Dermal Toxicity : Low toxicity: LD50 >2000 mg/kg , Rabbit
Acute Inhalation Toxicity : Low toxicity: LC50>5000 ppm / 1 hours, Rat
High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea; continued inhalation may result in unconsciousness and/or death.
Skin Irritation : Irritating to skin.
Eye Irritation : Moderately irritating to eyes (but insufficient to classify).
Respiratory Irritation : Inhalation of vapours or mists may cause irritation to the respiratory system.
Sensitisation : Not a skin sensitiser.
Repeated Dose Toxicity : Central nervous system: repeated exposure affects the nervous system. Effects were seen at high doses only.
Respiratory system: repeated exposure affects the respiratory system. Effects were seen at high doses only.
Visual system: may cause decreased color perception. These subtle changes have not been found to lead to functional colour vision deficits.
Auditory system: prolonged and repeated exposures to high concentrations have resulted in hearing loss in rats. Solvent abuse and noise interaction in the work environment may cause hearing loss.
Mutagenicity : Not mutagenic.
Carcinogenicity : Not carcinogenic in animal studies.

Material	:	Carcinogenicity Classification
Toluene	:	ACGIH Group A4: Not classifiable as a human carcinogen.



Toluene	:	IARC 3: Classification not possible from current data.
Reproductive and Developmental Toxicity	:	Causes foetotoxicity in animals at doses which are maternally toxic. Many case studies involving abuse during pregnancy indicate that toluene can cause birth defects, growth retardation and learning difficulties. There are occupational studies which report an association between inhalation exposure to toluene and adverse effects on reproduction (including spontaneous abortions and birth defects). The methodology of these studies and the reliability of their results have been questioned. In a study in rats, inhalation of toluene did not have adverse effects on reproduction.
Additional Information	:	Exposure to very high concentrations of similar materials has been associated with irregular heart rhythms and cardiac arrest. Abuse of vapours has been associated with organ damage and death.

12. ECOLOGICAL INFORMATION

Acute Toxicity	:	
Fish	:	Toxic: 1 < LC/EC/IC50 <= 10 mg/l
Aquatic Invertebrates	:	Harmful: 10 < LC/EC/IC50 <= 100 mg/l
Algae	:	Low toxicity: LC/EC/IC50 > 100 mg/l
Mobility	:	Floats on water. If product enters soil, it will be highly mobile and may contaminate groundwater.
Persistence/degradability	:	Readily biodegradable meeting the 10 day window criterion. Oxidises rapidly by photo-chemical reactions in air.
Bioaccumulation	:	Does not bioaccumulate significantly.
Other Adverse Effects	:	In view of the high rate of loss from solution, the product is unlikely to pose a significant hazard to aquatic life.

13. DISPOSAL CONSIDERATIONS

Material Disposal	:	Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses. Waste product should not be allowed to contaminate soil or water.
Container Disposal	:	Drain container thoroughly. After draining, vent in a safe place away from sparks and fire. Residues may cause an explosion hazard. Do not, puncture, cut, or weld uncleaned drums. Send to drum recoverer or metal reclaimer.
Local Legislation	:	Disposal should be in accordance with applicable regional, national, and local laws and regulations.



14. TRANSPORT INFORMATION

US Department of Transportation Classification (49CFR)

Identification number	UN 1294
Proper shipping name	Toluene
Class / Division	3
Packing group	II
Hazardous subst./material RQ:	TOLUENE/1,000 LB
Emergency Response Guide No .	130

IMDG

Identification number	UN 1294
Proper shipping name	TOLUENE
Class / Division	3
Packing group	II
Marine pollutant:	No

IATA (Country variations may apply)

Identification number	UN 1294
Proper shipping name	Toluene
Class / Division	3
Packing group	II

15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

Federal Regulatory Status

Notification Status

AICS	Listed.
DSL	Listed.
INV (CN)	Listed.
ENCS (JP)	Listed. (3)-2
TSCA	Listed.
EINECS	Listed. 203-625-9
KECI (KR)	Listed. 97-1-298
KECI (KR)	Listed. KE-33936
PICCS (PH)	Listed.

Comprehensive Environmental Release, Compensation & Liability Act (CERCLA)

Toluene (108-88-3)	Reportable quantity: 1,000 lbs
Toluene (108-88-3)	Reportable quantity: 1,000 lbs
Benzene (71-43-2)	Reportable quantity: 10 lbs



Clean Water Act (CWA) Section 311

Toluene (108-88-3)	Reportable quantity: 1,000 lbs
Toluene (108-88-3)	Reportable quantity: 1,000 lbs
Benzene (71-43-2)	Reportable quantity: 10 lbs

SARA Hazard Categories (311/312)

Delayed (Chronic) Health Hazard.
Immediate (Acute) Health Hazard. Fire Hazard.

SARA Toxic Release Inventory (TRI) (313)

Toluene (108-88-3)	100.00%
Benzene (71-43-2)	0.09%

State Regulatory Status

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)

Known to the State of California to cause birth defects or other reproductive harm.
Known to the state of California to cause cancer.

Toluene (108-88-3) 100.00%	Developmental toxin. Carcinogenic. Developmental toxin. Male reproductive toxin.
Benzene (71-43-2) 0.09%	

New Jersey Right-To-Know Chemical List

Toluene (108-88-3) 100.00%	Listed. Listed.
Benzene (71-43-2) 0.09%	

Pennsylvania Right-To-Know Chemical List

Toluene (108-88-3) 100.00%	Environmental hazard. Listed. Special hazard. Environmental hazard. Listed.
Benzene (71-43-2) 0.09%	

16. OTHER INFORMATION



Material Safety Data Sheet

HMIS Rating (Health, Fire, Reactivity) : 2, 3, 0

NFPA Rating (Health, Fire, Reactivity) : 2, 3, 0

MSDS Version Number : 19.2

MSDS Effective Date : 05/08/2009

MSDS Revisions : A vertical bar (|) in the left margin indicates an amendment from the previous version.

MSDS Regulation : The content and format of this MSDS is in accordance with the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Uses and Restrictions : Raw material for use in the chemical industry.
Use as a solvent only in industrial manufacturing processes.

MSDS Distribution : The information in this document should be made available to all who may handle the product

Disclaimer : The information contained herein is based on our current knowledge of the underlying data and is intended to describe the product for the purpose of health, safety and environmental requirements only. No warranty or guarantee is expressed or implied regarding the accuracy of these data or the results to be obtained from the use of the product.