

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

Material Name : Toluene

Uses : Solvent. Raw material for use in the chemical industry. Product Code : T1402, Q9138, Q9131, Q9250, Q9300, Q9308, X211H

Supplier : SHELL EASTERN CHEMICALS (S)

A REGISTERED BUSINESS OF SHELL EASTERN

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2. COMPOSITION/INFORMATION ON INGREDIENTS

Material Formal Name : Benzene, methyl

CAS No. : 108-88-3 INDEX No. : 601-021-00-3 EINECS No. : 203-625-9

Hazardous Components

Chemical Name	CAS	EINECS	Symbol(s)	R-phrase(s)	Conc.
Toluene	108-88-3	203-625-9	F, Xn	R11; R38;	100.00 %
				R48/20;	
				R63: R65:	

R63; R65; R67

Additional Information: Refer to chapter 16 for full text of EC R-phrases.

3. HAZARDS IDENTIFICATION

Health Hazards : Harmful: danger of serious damage to health by prolonged

exposure through inhalation. Vapours may cause drowsiness and dizziness. Slightly irritating to respiratory system. Irritating to skin. Slightly irritating to the eye. Harmful: may cause lung damage if swallowed. Possibility of organ or organ system damage from prolonged exposure; see Chapter 11 for details. Target organ(s): Auditory system. Central nervous system (CNS). Respiratory system. Visual system. Possible risk of harm

to the unborn child.

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.

Safety Hazards

Highly flammable. In use, may form flammable/explosive vapour-air mixture. This material is a static accumulator. Even with proper grounding and bonding, this material can still accumulate an electrostatic charge. If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur.

Not classified as dangerous under EC criteria.

4. FIRST AID MEASURES

Environmental Hazards

General Information

Inhalation

: Keep victim calm. Obtain medical treatment immediately.

: 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. If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical facility: fever greater than 101° F (38.3° C), shortness of breath, chest congestion or continued coughing or wheezing. Give nothing by

mouth.

Advice to Physician

Potential for chemical pneumonitis. 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.

guidance.



5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

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.

Protective measures : Avoid contact with spilled or released material. For guidance on

selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. 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. For guidance on



selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. For guidance on disposal of spilled material see Chapter 13 of this Material Safety Data Sheet.

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

Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. Avoid contact with skin, eyes and clothing. Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Bulk storage tanks should be diked (bunded). Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Even with proper grounding and bonding, this material can still accumulate an electrostatic charge. If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur. Be aware of handling operations that may give rise to additional hazards that result from the accumulation of static charges. These include but are not limited to pumping (especially turbulent flow), mixing, filtering, splash filling, cleaning and filling of tanks and containers, sampling, switch loading, gauging, vacuum truck operations, and mechanical movements. These activities may lead to static discharge e.g. spark formation. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (<= 1 m/s until fill pipe submerged to twice its diameter, then <= 7 m/s). 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. Electrostatic charges will be generated during pumping. Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment to reduce the risk. The vapours in the head space of the storage vessel may lie in the flammable/explosive range and hence may be flammable.

Product Transfer
Recommended Materials

Refer to guidance under Handling section.

For containers, or container linings use mild steel, stainless

steel.



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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.

See additional references that provide safe handling practices for liquids that are determined to be static accumulators:

American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practices on Static Electricity). CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

If the American Conference of Governmental Industrial Hygienists (ACGIH) value is provided on this document, it is provided for information only.

Occupational Exposure Limits

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

Biological Exposure Index (BEI)

Material	Determinant	Sampling time	BEI	Reference
Toluene	o-Cresol in urine	End of shift	0.5 mg/l	ACGIH (2003)
	Hippuric acid in	End of shift	1.6 g/g creatinine	ACGIH (2003)
	urine			
	o-Cresol, with	Sampling time: End	0.3 mg/g	ACGIH BEL (2011)
	hydrolysis in	of shift.		
	Creatinine in urine			
	toluene in Blood	Sampling time:	0.02 mg/l	ACGIH BEL (2011)
		Prior to last shift of		
		work week.		
	toluene in Urine	Sampling time: End	0.03 mg/l	ACGIH BEL (2011)
		of shift.		

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.

The level of protection and types of controls necessary will vary **Exposure Controls**

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 explosion-proof ventilation to control airborne concentrations below the exposure guidelines/limits. Local exhaust ventilation is recommended. Firewater monitors and

deluge systems are recommended.

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Personal Protective Equipment

Respiratory Protection

Personal protective equipment (PPE) should meet

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)] meeting EN14387. Where air-filtering respirators are unsuitable (e.g., airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus.

recommended national standards. Check with PPE suppliers.

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 Protective Clothing Chemical splash goggles (chemical monogoggles).

Chemical resistant gloves/gauntlets. Where risk of splashing or in spillage clean up, use chemical resistant one-piece overall with integral hood. Wear antistatic and flame retardant clothing.

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 exposure measurement methods are given below or contact the 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/ Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods http://www.osha.gov/ Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances, http://www.hse.gov.uk/ Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA), Germany, http://www.dguv.de/inhalt/index.jsp L'Institut National de Recherche et de Securité, (INRS), France

http://www.inrs.fr/accueil

Environmental Exposure Controls

Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapour. Information on accidental release measures are to be found in

section 6.



9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Colourless Liquid.

Odour Aromatic Odour threshold 1.74 ppm Not applicable

Boiling point Typical 110 - 111 °C / 230 - 232 °F

: Typical -95 °C / -139 °F Melting / freezing point Flash point 4 °C / 39 °F(Abel) : 1.2 - 7.1 %(V)

Explosion / Flammability

limits in air

480 - 536 °C / 896 - 997 °F(ASTM E-659) Auto-ignition temperature

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

2.65

Water solubility 0.515 kg/m3

n-octanol/water partition

coefficient (log Pow)

Kinematic viscosity : 0.63 mm2/s at 25 °C / 77 °F

Vapour density (air=1) 3.1

Electrical conductivity Low conductivity: < 100 pS/m

> The conductivity of this material makes it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10 000 pS/m., Whether a liquid is nonconductive or semi-conductive, the precautions are the same., A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly

influence the conductivity of a liquid.

Dielectric constant : Typical 2.4

: 6.1 (DIN 53170, di-ethyl ether=1) Evaporation rate (nBuAc=1)

2 (ASTM D 3539, nBuAc=1)

Surface tension Typical 28.5 mN/m at 20 °C / 68 °F(ASTM D-971)

Molecular weight 92 g/mol

Decomposition temperature : Data not available.

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 Thermal decomposition is highly dependent on conditions. A

Decomposition Products 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, in certain circumstances product can ignite due to static

electricity.



11. TOXICOLOGICAL INFORMATION

Basis for Assessment Acute Oral Toxicity

: Information given is based on product data.

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
Acute Inhalation Toxicity

Low toxicity: LD50 >2000 mg/kg , Rabbit Low toxicity: LC50 >20 mg/l / 4 hours, Rat

Classified as harmful by the European Commission. High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea; continued inhalation may result in unconsciousness and/or

death.

Skin corrosion/irritation

Serious eye damage/irritation Respiratory Irritation

Sensitisation

Irritating to skin.

Moderately irritating to eyes (but insufficient to classify).

Inhalation of vapours or mists may cause irritation to the

respiratory system. 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.

Germ cell mutagenicity

Carcinogenicity

: Not mutagenic.

: Not carcinogenic in animal studies.

Material	:	Carcinogenicity Classification
Toluene	:	ACGIH Group A4: Not classifiable as a human carcinogen.
Toluene	:	IARC 3: Not classifiable as to carcinogenicity to humans.
Toluene	:	GHS / CLP: No carcinogenicity classification

Reproductive and Developmental Toxicity

: Causes foetotoxicity in animals at doses which are maternally

toxic.

Does not impair fertility.

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 crustacea : Harmful: 10 < LC/EC/IC50 <= 100 mg/l

Algae/aquatic plants : Practically non toxic: LL/EL/IL50 > 100 mg/l

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Chronic Toxicity

Fish : NOEC/NOEL > 1.0 - <=10 mg/l (based on test data)
Aquatic crustacea : NOEC/NOEL > 1.0 - <=10 mg/l (based on test data)

Mobility : Floats on water.

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

IMDG

Identification number UN 1294 UN proper shipping name TOLUENE

Class / Division 3
Packing group II
Marine Pollutant: No

IATA (Country variations may apply)

UN number : 1294 UN 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.

EC Label Name : TOLUENE

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EC label/EC Number : 203-625-9

EC Classification : Highly flammable. Harmful.

EC Annex I Number : 601-021-00-3 EC Symbols : F Highly flammable.

Xn Harmful.

EC Risk Phrases : R11 Highly flammable.

R38 Irritating to skin.

R48/20 Harmful: danger of serious damage to health by

prolonged exposure through inhalation.
R63 Possible risk of harm to the unborn child.
R65 Harmful: May cause lung damage if swallowed.
R67 Vapours may cause drowsiness and dizziness.

EC Safety Phrases : S2 Keep out of reach of children.

S36/37 Wear suitable protective clothing and gloves.

S46 If swallowed, seek medical advice immediately and show

this container or label.

S62 If swallowed, do not induce vomiting: seek medical advice

immediately and show this container or label.

Chemical Inventory 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.

16. OTHER INFORMATION

R-phrase(s)

R11 Highly flammable. R38 Irritating to skin.

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

inhalation.

R63 Possible risk of harm to the unborn child.
 R65 Harmful: May cause lung damage if swallowed.
 R67 Vapours may cause drowsiness and dizziness.

SDS Version Number : 3.1

SDS Effective Date : 11.01.2013

SDS Revisions : A vertical bar (|) in the left margin indicates an amendment from

the previous version.

Uses and Restrictions : Raw material for use in the chemical industry.

Use only in industrial processes.

SDS Distribution : The information in this document should be made available to all

who may handle the product

Disclaimer : This information is based on our current knowledge and is

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intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.