

Material Safety Data Sheet

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

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

Manufacturer/Supplier : **Shell South Africa Chemicals**
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South Africa

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2. COMPOSITION/INFORMATION ON INGREDIENTS

Material Formal Name : Benzene, methyl
Synonyms : Methyl benzol
Phenyl methane
Toluol

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; R48/20; R63; R65; R67	100,00 %

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. Moderately irritating to eyes. 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

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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. Electrostatic charges may be generated during pumping. Electrostatic discharge may cause fire.
- 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.

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

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- 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

Avoid contact with spilled or released material. Immediately remove all contaminated clothing. 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. Observe all relevant local and international regulations.

- 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.

7. HANDLING AND STORAGE

- General Precautions** : Avoid breathing of or contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. Use the

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- 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	50 ppm		
	ACGIH	SKIN_DES			Can be absorbed through the skin.

Material Toluene	Source ACGIH	Hazard Designation Not classifiable as a human carcinogen.
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- 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.

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according to EC directive 2001/58/EC

- 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** : Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.
- 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)] meeting EN141. 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.
- Hand Protection** : Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) 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.
- 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> Berufsgenossenschaftliches Institut für Arbeitssicherheit (BIA), Germany <http://www.hvbg.de/d/bia/pub/grl/grle.htm> L'Institut National de Recherche et de Sécurité, (INRS), France <http://www.inrs.fr/indexnosdoss.html>
- Environmental Exposure** : Local guidelines on emission limits for volatile substances must

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9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: Colourless. Liquid.
Odour	: Aromatic.
Odour threshold	: 1,74 ppm
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 - 8 %(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
Density	: Typical 871 kg/m ³ at 15 °C / 59 °F
Water solubility	: 0,515 kg/m ³
n-octanol/water partition coefficient (log Pow)	: 2,65
Kinematic viscosity	: 0,63 mm ² /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
Evaporation rate (nBuAc=1)	: 6,1 (DIN 53170, di-ethyl ether=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

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.

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 >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;

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	: 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.
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.

12. ECOLOGICAL INFORMATION

Acute Toxicity	
Fish	: Toxic: $1 < LC/EC/IC50 \leq 10$ mg/l
Aquatic Invertebrates	: Harmful: $10 < LC/EC/IC50 \leq 100$ 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.
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

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Local Legislation : to drum recoverer or metal reclaimer.
: Disposal should be in accordance with applicable regional, national, and local laws and regulations.

14. TRANSPORT INFORMATION**ADR**

Class : 3
Packing group : II
Classification code : F1
Hazard identification no. : 33
UN No. : 1294
Danger label (primary risk) : 3
Proper shipping name : Toluene

IMDG

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

IATA (Country variations may apply)

UN No. : 1294
Proper shipping name : Toluene
Class / Division : 3
Packing group : II

Additional Information : **Packaging and Transportation of Dangerous Goods is in compliance with Chapter VIII of the Regulations in terms of the National Road Traffic Act of 1996. This regulation is supported by SABS codes of practice SABS 0229 - Packaging of DG for Road Transport, SABS 0233 - IBC for DG and SABS 0232 Parts 1 & 3 - Emergency Response.**

15. REGULATORY INFORMATION

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

EC Label Name : TOLUENE
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

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EC Safety Phrases	:	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. S2 Keep out of reach of children. S36/37 Wear suitable protective clothing and gloves. S62 If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label. S46 If swallowed, seek medical advice immediately and show this container or label.
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.
National Legislation OE_HP	:	Listed.
Other Information	:	In compliance with the Occupational Health and Safety Act 85 of 1993 and satisfying the requirements of Regulation GN1179 being the Hazardous Chemicals Substancce Regulation. Ambient Air Quality Regulation (New)

16. OTHER INFORMATION

R-phras(e)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.

MSDS Version Number	:	3.1
MSDS Effective Date	:	24.11.2005
MSDS Revisions	:	A vertical bar () in the left margin indicates an amendment from the previous version.
MSDS Regulation	:	The content and format of this safety data sheet is in accordance with Commission Directive 2001/58/EC of 27 July 2001, amending for the second time Commission Directive 91/155/EEC.
Uses and Restrictions	:	Raw material for use in the chemical industry. Use as a solvent only in industrial manufacturing processes.

Material Safety Data Sheet

- MSDS 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 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.