SAFETY DATA SHEET (SDS)
TOLUENE

1. Identification

SDS Record Number	:	PCS95005	
Date of SDS	:	6 November 2015	
Identity of the substance	:	Toluene	
Product Description	:	Aromatic hydrocarbon.	
Other names/synonyms	:	Methyl benzene, Methyl benzol, Phenyl methane, Toluol	
Name of the supplier	:	Petrochemical Corporation of Singapore (Private) Limited	
Recommended uses	:	Solvent, diluent, chemical feedstock, or fuel.	
Contact detail of the supplier	:	100 Ayer Merbau Road, Singapore 628277 +65 68672102	
24-Hour Emergency contact	:	Asia Pacific	+65 3158 1074 (Singapore)
		China	+86 10 5100 3039 (Beijing)
		Europe, Israel & Americas	+44 (0) 1235 239 670 (UK)
		Middle East & Africa	+44 (0) 1235 239 671 (UK)

2. Hazards Identification

GHS Classification

Hazard Class	Hazard Category
• Flammable Liquid	2
• Acute Toxicity (Oral)	5
• Acute Toxicity (Inhalation)	4
• Skin Corrosion/Irritation	2
• Serious Eye Damage/Irritation	2B
• Toxic to Reproduction	1A
• STOST (Single Exposure)	1 (central nervous system)
• STOST (Single Exposure)	3 (respiratory tract rritation, narcotic effects)
• STOST (Repeated Exposure)	1 (central nervous system, kidneys, liver)
• Aspiration Hazard	1
• Acute hazards to Aquatic Environment	2

Pictograms

Signal Word: Danger

Hazard Statements

- Highly flammable liquid and vapour
- May be harmful if swallowed
- Harmful if inhaled
- Causes skin irritation and eye irritation
- May damage fertility or the unborn child
- Causes damage to organs
- May cause respiratory irritation
- May cause drowsiness or dizziness
- Causes damage to organs through prolonged or repeated exposure
- May be fatal if swallowed and enters airways
- Toxic to aquatic life

Precautionary Statements

Prevention

- Keep container tightly closed.
- Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
- Wear protective gloves/ eye protection/face protection.
- Ground/Bond container and receiving equipment
- Use explosion-proof electrical/ventilating/lighting equipment.
- Take precautionary measures against static discharge.
- Use only non-sparking tools.
- Wash thoroughly after handling.
- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Do not eat, drink or smoke when using this product.
- Avoid breathing dust/fume/gas/mist/vapours/spray.
- Use only outdoors or in a well-ventilated area.
- Avoid release to the environment

Response

- IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/ shower.
- In case of fire: Use appropriate media for extinction.
- Call a POISON CENTER/doctor/physician if you feel unwell.
- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take of contaminated clothing and wash before re-use.
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
- IF exposed or concerned: Get medical attention/advice.
- IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Do NOT induce vomiting.

Storage

- Store in cool/well-ventilated place. Keep cool.
- Store locked up.

Disposal

- Dispose of the contents in accordance to the local mandatory rules and regulations

3. Composition/Information On Ingredients

Chemical identification : Toluene
Common name(s) / synonym(s) : Methyl benzene, Methyl benzol, Phenyl methane, Toluol
CAS number / EC number : 108-88-3/203-625-9

Chemical Identification	Concentration
Toluene	> 98 %

4. First-Aid Measures

Eye: Irrigate immediately If this chemical contacts the eyes, immediately wash (irrigate) the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately.

Skin: Soap wash promptly If this chemical contacts the skin, promptly flushes the contaminated skin with soap and water. If this chemical penetrates the clothing, promptly remove the clothing and flush the skin with water. If irritation persists after washing, get medical attention.

Breathing: Respiratory support If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform artificial resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible.

Swallow: Medical attentions immediately if this chemical has been swallowed, DO NOT induce vomiting. Keep at rest. Get medical attention immediately.

5. Fire-Fighting Measures

Extinguishing media

Small Fires

- Dry chemical, CO2, water spray or regular foam.

Large Fires

- Water spray, fog or regular foam.
- Do not use straight streams.
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- **Always** stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if impossible, withdraw from area and let fire burn.
- Use water spray to cool fire exposed surfaces and to protect personnel.
- Shut off fuel to fire if possible to do so without hazard.
- If a leak or spill has not ignited use water spray to disperse the vapours.
- Either allow fire to burn out under controlled conditions or extinguish with foam or dry chemical.
- Try to cover liquid spills with foam.
- Avoid spraying water directly into storage containers due to danger of boilover.

Specific hazards arising from the chemical:

- **Hazardous Combustion Products**: Fumes, smoke, and carbon monoxide
- Flammable Liquid; may release vapours that form flammable mixtures at or above the flash point.
- Toxic gases will form upon combustion.
- This liquid is volatile and gives off invisible vapors.
- Either the liquid or vapor may settle in low areas or travel some distance along the ground or surface to ignition sources where they may ignite or explode.
  Special protective equipment and precautions for fire fighters
- A self-contained breathing apparatus (SCBA) is recommended for indoor fires and any significant outdoor fires. For small outdoor fires, which may easily be extinguished with a portable fire extinguisher, use of an SCBA is optional.
- Respiratory and eye protection required for fire fighting personnel.

Caution: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

6. Accidental Release Measures

Call Emergency Response Telephone Number On Shipping Paper First. If Shipping Paper not available or no answer, refer to appropriate telephone number.

- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.
- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

Land Spill:

- Eliminate source of ignition.
- Prevent additional discharge of material, if possible to do so without hazard.
- Prevent spills from entering sewers, watercourses or low areas.
- Contain spilled liquid with sand or earth.
- Do not use combustible materials such as sawdust.
- Recover by pumping (use an explosion proof motor or hand pump), or by using a suitable absorbent.

Water Spill:

- Eliminate sources of ignition.
- Warn occupants and shipping in downwind areas of fire and explosion hazard and request all to stay clear.
- Remove from surface by skimming or with suitable absorbents.
- If allowed by local authorities and environmental agencies, sinking and/or suitable dispersants may be used in unconfined waters.

Protective Clothing

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

Evacuation
Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.
- Evacuate danger area in large spill!
- Consult an expert in large spill! Remove all ignition sources.
- Ventilation.
- Collect leaking liquid in sealable containers.
- Absorb remaining liquid in sand or inert absorbent and remove to safe place.

7. Handling And Storage

- Keep container closed.
- Handle and open containers with care.
- Store in a cool, well-ventilated place away from incompatible materials.
- **Do not** handle or store near an open flame, heat, or other sources of ignition.
- Protect material from direct sunlight.
- Material will accumulate static charges, which may cause an electrical spark (ignition source).
- Use proper grounding procedures.
- **Do not** pressurize, cut, heat, or weld containers.
- Empty product containers may contain product residue.
- **Do Not** reuse empty containers without commercial cleaning or reconditioning.

- **Stora**ge to be Fireproof. Separated from strong oxidants

8. Exposure Controls/Personal Protection

- The use of local exhaust ventilation is recommended to control emissions near the source.
- Laboratory samples should be handled in a fume hood.
- Provide mechanical ventilation of confined spaces.
- Use explosion-proof ventilation equipment.

Personal Protective Equipment (PPE)
The selection of personal protective equipment varies depending upon conditions:

- Where prolonged and/or repeated skin and eye contact is likely to occur, wear safety glasses with side shields, long sleeves, and chemical resistant gloves.
- Where eye contact is unlikely, but may occur as a result of short and/or periodic exposures, wear safety glasses with side shields.
- Where concentrations in air may exceed the occupational exposure limits and where engineering, work practices or other means of exposure reduction are not adequate, approved respirators may be necessary to prevent overexposure by inhalation.
- Recommended Protective Clothing (NIOSH): 8 hr: PVA, Teflon, Viton, PE/EVAL, Barricade, CPF3, Responder, Trellchem, Tychem

Skin:
Prevent skins contact Wear appropriate personal protective clothing to prevent skin contact.
Eyes:
Prevent eye contact Wear appropriate eye protection to prevent eye contact.
Wash skin:
When contaminated the worker should immediately wash the skin when it becomes contaminated.
Remove:
When wet (flammable) Work clothing that becomes wet should be immediately removed due to its flammability hazard (i.e., for liquids with a flash point <100°F).

Respirator Recommendations (NIOSH)

Up to 500 PPM**:**

(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

9. Physical And Chemical Properties

Property	Value, Description
Appearance (physical state, colour etc);	Clear, colorless liquid.
Odour;	Aromatic odor.
Odour threshold;	Not available
pH;	Not applicable
Melting point	-60 deg C
Initial boiling point and boiling range;	110 to 111 deg C
Flash point;	7deg C (TCC Typical)
Evaporation rate;	2.24 (Butyl Acetate = 1)
Upper/lower flammability or explosive limits;	Lower : 1.2 vol% to Upper: 7.1 vol%
Vapour pressure;	6.266 kPa at 20 deg C Approximate
Vapour density;	3.2 (Air = 1)
Relative density;	0.87 at 15.5 deg C
Solubility(ies);	0.05% at 25 deg C
Partition coefficient: n-octanol/water;	Not available
Auto-ignition temperature;	552g C Approximate
Decomposition temperature;	Not available
Viscosity.	0.69 cST at 25 deg C Approximate
Molecular Weight	92

10. Stability And Reactivity

Reactivity/Chemical Stability: This product is stable

Possibility Of Hazardous Reactions: Hazardous polymerization will not occur. Reacts violently with strong oxidants causing fire and explosion hazard.

Incompatible Materials: Strong oxidizing agents, concentrated nitric or sulphuric acid, halogens, or molten sulphur.

Hazardous Decomposition Products: None

11. Toxicological Information

Inhalation:
High vapour/aerosol concentrations (greater than approximately 1000 ppm) are irritating to the eyes and the respiratory tract, and may cause headaches, dizziness, anaesthesia, drowsiness, unconsciousness, central nervous system effects, brain damage and possibly death.

Eye Contact:
Irritating, but will not injure eye tissue.

Skin Contact:
Frequent or prolonged contact may irritate the skin and cause a skin rash (dermatitis). Brief contact with the liquid will not result in significant irritation unless evaporation is prevented. Skin contact may aggravate an existing dermatitis condition.

Ingestion: Small amounts of liquid aspirated into the respiratory system during ingestion or from vomiting may cause mild to severe pulmonary injury and possibly death.

Chronic:
Warning: Concentrated, prolonged or deliberate inhalation of this product may cause brain and nervous system damage. Prolonged and repeated exposure of pregnant animals to toluene (levels greater than approximately 1500 ppm) has been reported to cause adverse foetal developmental effects.

Special Health Precautions: Health studies have shown that many petroleum hydrocarbons pose potential human health risks, which may vary, from person to person. As a precaution, exposure to liquids, vapours, mists or fumes should be minimised.

Occupational Exposure Limit
ACGIH Recommends: For Toluene (skin), 50 ppm (188 mg/m3).

- The former OSHA standard for toluene was 200 ppm as an 8-hour TWA limit, with a 300-ppm ceiling (not to be exceeded for more than 10 minutes in any eight-hour period), and a 500-ppm peak.
- The ACGIH has an exposure limit for toluene of 100 ppm as an 8-hour TWA and 150 ppm as a 15-minute STEL;
- NIOSH recommends a 100-ppm 8-hour TWA and a 10-minute ceiling of 200 ppm. The proposed PELs were 100 ppm as an 8-hour TWA and 150 ppm as a STEL; NIOSH (Ex. 8-47, Table N1) concurs with these limits, which are established in the final rule. Toluene is a flammable, colorless liquid with an aromatic hydrocarbon odor.
The acute toxicity of toluene in animals is greater than that of benzene. Patty (1963b, as cited in ACGIH 1986/Ex.1-3, p. 578) reports that the lethal doses of toluene and benzene in mice are 10,000 and 14,000 ppm, respectively. The oral LD (50) for toluene in rats is 7.53 ml/kg (Smyth, Carpenter, Weil et al. 1969/Ex. 1-442). Exposure of rats to 2500 or 5000 ppm of toluene caused a temporary decrease in white cell count but no evidence of damage to the blood-forming organs or the liver. Fairhall (1957d, as cited in ACGIH 1986/Ex.1-3, p. 578) stated that severe toluene exposure can cause a marked drop in the red blood cell count and partial destruction of the blood-forming elements of the bone marrow, but other researchers report that numerous animal studies indicate that toluene is not a bone marrow toxin (Gerarde 1960c, as cited in ACGIH 1986/Ex.1-3, p. 578).

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. Oxidizes rapidly by photochemical 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

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.

Disposal should be in accordance with applicable regional, national, and local laws and regulations.

14. Transport Information

UN Number: 1294
UN Proper Shipping Name: Toluene
WHMIS Information:
Class B, Division 2: Flammable Liquids
Class D, Division 2, Subdivision B: Toxic Material
Packing Group: II
Primary TDG: Class 3
Subsidiary TDG: Class 9.2
F symbol
Xn symbol
R: 11-38-48/20-63-65-67
S: 2-36/37-46-62
UN Hazard Class: 3
UN Packing Group: II
Transport Emergency Card: TEC (R)-30S1294

Transport in Bulk (Annex II of MARPOL 73/78 and the IBC code)
Pollution Category : Y
Ship Type : 3
Product Name : Toluene

15. Regulatory Information

Permissible Exposure Level (Long Term) in Singapore: 50ppm (188mg/m^3)
ICSC # 0078
CAS # 108-88-3
UN # 1294
EC # 601-021-00-3
TLV: 50 ppm as TWA; (skin); A4; BEI issued; (ACGIH 2004).
MAK: 50 ppm, 190 mg/m^3; H;
Peak limitation category: II(4); Pregnancy risk group: C; (DFG 2004).
OSHA PEL: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)
NIOSH REL: TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3)
NIOSH IDLH: 500 ppm
NFPA Code: H 2; F 3; R 0

16. Other Information

Prepared By: Material Safety Committee
SDS Prepared on: 1/10/2010
Reviewed 1 on 1/10/2013
Revised 2 on 11/2/2015
Revised 3 on 6/11/2015

Revision (2) Notes	
1	Sect. 14: Added information for Transport in Bulk according to MARPOL 73/78 Annex II

Revision (3) Notes	
1	Sect. 3: Added information on Toluene purity

CAUTION: The information given above ("**the Information**") relates only to the substance or mixture listed herein. The Information may not be valid when used in combination with any other substance or mixture or in any process. If the substance or mixture is to be used for a purpose other than that stated herein or under conditions other than specified herein, the Information cannot be relied upon as being complete or accurate, and the user is advised to consult the supplier before using the substance or mixture for such other purpose or under such other conditions. The Information is given based on information available at the indicated date of preparation and no representation or warranty is given that it will be correct as of any time after the indicated date of preparation.

GHS Label

Toluene



DANGER

Hazard Statements

- Highly flammable liquid and vapour
- May be harmful if swallowed
- Harmful if inhaled
- Causes skin irritation & eye irritation
- May damage fertility or the unborn child
- Causes damage to organs
- May cause respiratory irritation
- May cause drowsiness or dizziness
- Causes damage to organs through prolonged or repeated exposure
- May be fatal if swallowed and enters airways
- Toxic to aquatic life

Precautionary Statements

- Keep container tightly closed.
- Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
- Wear protective gloves/ eye protection/face protection.
- Ground/Bond container and receiving equipment
- Use explosion-proof electrical/ventilating/lighting equipment.
- Take precautionary measures against static discharge.
- Use only non-sparking tools.
- Avoid breathing dust/fume/gas/mist/vapours/spray.
- Use only outdoors or in a well-ventilated area.
- Avoid release to the environment

For further information on this product, refer to Manufacturer's Safety Data Sheet

Contact detail of the supplier : 100 Ayer Merbau Road, Singapore 628277
Emergency contact : +65 68672102