Material Safety Data Sheets

Revision 2

1. IDENTIFICATION

Product Name	**Toluene**
Other Names	Benzene, methyl; Methacide; Methylbenzene; Methylbenzol; Phenylmethane; Toluol
Code No	100-TU-2
Uses	Raw material for use in the chemical industry. Solvent.
Chemical Family	No Data Available
Chemical Formula	C_7H_8
Chemical Name	Toluene
Product Description	No Data Available
Contact Information	info@armansina.com www.armansina.com

2. HAZARD IDENTIFICATION

Hazard Categories	Highly Flammable
	Harmful
Risk Phrases	Highly flammable.
	Irritating to skin.
	Harmful : danger of serious damage to health by prolonged exposure through inhalation.
	Possible risk of harm to the unborn child.
	Harmful: may cause lung damage if swallowed.
	Vapours may cause drowsiness and dizziness.
Safety Phrases	Wear suitable protective clothing and gloves.
	If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

Symbol

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients

Chemical Entity	Formula	CAS Number	Proportion
Toluene	C_7H_8	108-88-3	100.0 %

4. FIRST AID MEASURES

Description of necessary measures according to routes of exposure

Swallowed	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 deg F (38.3 deg C), shortness of breath, chest congestion or continued coughing or wheezing. If vomiting occurs spontaneously, keep head below hips to prevent aspiration. Give nothing by mouth. Do not induce vomiting. Keep victim calm. Obtain medical treatment immediately.
Eye	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. Keep victim calm. Obtain medical treatment immediately.
Skin	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. Keep victim calm. Obtain medical treatment immediately.
Inhaled	DO NOT DELAY. Remove to fresh air. If rapid recovery does not occur, transport to nearest medical facility for additional treatment. Keep victim calm. Obtain medical treatment immediately.
Advice to Doctor	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.
Medical Conditions Aggravated by Exposure	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.

5. FIRE FIGHTING MEASURES

General Measures	Flame-proof equipment is necessary in all areas where this chemical is being used. Nearby equipment must be earthed.
Flammability Conditions	Flammable liquid.
Extinguishing Media	Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only. Do not use water in a jet. Keep adjacent containers cool by spraying with water.
Fire and Explosion Hazard	The vapour is heavier than air, spreads along the ground and distant ignition is possible. Will float and can be reignited on surface water.
Hazardous Products of Combustion	Carbon monoxide may be evolved if incomplete combustion occurs.
Special Fire Fighting Instructions	Clear fire area of all non-emergency personnel. Stay upwind. Keep out of low areas. Eliminate ignition sources. Move fire exposed containers from fire area if it can be done without risk. Do NOT allow fire fighting water to reach waterways, drains or sewers. Store fire fighting water for treatment. Please note: Structural fire fighters uniform will provide limited protection.
Personal Protective Equipment	Fire fighters should wear a positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots and gloves) or chemical splash suit.
Flash Point	4ºC
Lower Explosion Limit	1.2 %
Upper Explosion Limit	7.1 %
Auto Ignition Temperature	No Data Available
Hazchem Code	3YE

6. ACCIDENTAL RELEASE MEASURES

General Response Procedure	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. 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. 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.
Clean Up Procedures	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.
Containment	Stop leak if safe to do so.
Environmental Precautionary Measures	Do NOT let product reach drains or waterways. If product does enter a waterway, advise the Environmental Protection Authority or your local Waste Management. Use clean, non-sparking tools and equipment.
Evacuation Criteria	Evacuate all unnecessary personnel.

7. HANDLING AND STORAGE

Handling	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. 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. Keep containers closed when not in use. Do not use compressed air for filling, discharging or handling. Ensure that all local regulations regarding handling and storage facilities are followed.g or handling.
Storage	Store in a cool, dry, well-ventilated, fire-proof area. Keep containers tightly sealed when not in use. Inspect regularly for deficiencies such as damage or leaks. Protect against physical damage. Ground and bond storage containers. Store away from incompatible materials as listed in section 10. 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. Ensure that all local regulations regarding handling and storage facilities are followed. This product has a UN Classification of 1294 and a Dangerous Goods Class 3 (flammable) according to The Australian Code for the Transport of Dangerous Goods By Road and Rail.
Container	Container type/packaging must comply with all applicable local legislation. Store in original packaging as approved by manufacturer. 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

General	The following exposure standard has been established by The Australian Safety and Compensation Council (ASCC); Toluene CAS 108-88-3: TWA = 50 ppm (191 mg/m3) STEL = 150 ppm (574 mg/m3) Sk Notice = Absorption through the skin may be a significant source of exposure (see Chapter 11). NOTE: The exposure value at the TWA is the average airborne concentration of a particular substance when calculated over a normal 8 hour working day for a 5 day working week. These exposure standards are guides to be used in the control of occupational health hazards. All atmospheric contamination should be kept to as low a level as is workable. These exposure standards should not be used as fine dividing lines between safe and dangerous concentrations of chemicals. They are not a measure of relative toxicity.
Exposure Limits	No Data Available

Biological Limits

Material	Determinant	Sampling time	BEI	Reference
Toluene	o-Cresol in urine	End of shift	0.5 mg/L	ACGIH (2003)

Hippuric acid in urine	End of shift	1.6 g/g creatinine	ACGIH (2003)
toluene in Blood	Sampling time: Prior to last shift of work week.	0.2 mg/L	ACGIH BEL (01 2010)
o-Cresol, with hydrolysis in Creatinine in urine	Sampling time: End of shift.	0.3 mg/g	ACGIH BEL (01 2010)
toluene in Urine	Sampling time: End of shift.	0.03 mg/L	ACGIH BEL (01 2010)

Engineering Measures

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.

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.

Environmental Exposure Controls: Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapour.

Personal Protection Equipment

RESPIRATOR: 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 deg C (149 deg F)]. Where air-filtering respirators are unsuitable (e.g., airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus (AS1715/1716).
EYES: Chemical splash goggles (chemical monogoggles) (AS1336/1337).
HANDS: Where hand contact with the product may occur the use of gloves approved to relevant standards 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 (AS2161).
CLOTHING: Chemical resistant gloves/gauntlets. Where risk of splashing or in spillage clean up, use chemical resistant one-piece overall with integral hood and safety footwear (AS3765/2210).

Special Hazards Precaustions

Personal Protective Equipment: Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

Work Hygienic Practices

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.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid
Appearance	Liquid
Odour	Aromatic
Colour	Colourless
pH	No Data Available
Vapour Pressure	29 hpa
Relative Vapour Density	3.1 Air = 1
Boiling Point	110.6ºC
Melting Point	-95ºC
Freezing Point	No Data Available
Solubility	0.515 Kg/m3
Specific Gravity	No Data Available

Flash Point	**4ºC**
Auto Ignition Temp	**No Data Available**
Evaporation Rate	**2 (ASTM D 3539, nBuAc=1)**
Bulk Density	**No Data Available**
Corrosion Rate	**No Data Available**
Decomposition Temperature	**No Data Available**
Density	**871 Kg/m3**
Specific Heat	**No Data Available**
Molecular Weight	**92 g/mol**
Net Propellant Weight	**No Data Available**
Octanol Water Coefficient	**log Pow = 2.65**
Particle Size	**No Data Available**
Partition Coefficient	**No Data Available**
Saturated Vapour Concentration	**No Data Available**
Vapour Temperature	**No Data Available**
Viscosity	**No Data Available**
Volatile Percent	**No Data Available**
VOC Volume	**No Data Available**
Additional Characteristics	**Solubility in other solvents: Soluble in hydrocarbons and acetone** **Electrical conductivity: Typical 8 pS/m at 20 deg C / 68 deg F (ASTM D-4308)** **Dielectric constant: Typical 2.4** **Surface tension: Typical 28.5 mN/m at 20 deg C / 68 deg F (ASTM D-971)**
Potential for Dust Explosion	**Product is a liquid.**
Fast or Intensely Burning Characteristics	**No Data Available**
Flame Propagation or Burning Rate of Solid Materials	**No Data Available**
Non-Flammables That Could Contribute Unusual Hazards to a Fire	**No Data Available**
Properties That May Initiate or Contribute to Fire Intensity	**No Data Available**
Reactions That Release Gases or Vapours	**No Data Available**
Release of Invisible Flammable Vapours and Gases	**No Data Available**

10. STABILITY AND REACTIVITY

General Information	**Flammable Liquid.**
Chemical Stability	**Stable under normal conditions of use.** **Sensitivity to Static Discharge: Yes, in certain circumstances product can ignite due to static electricity.**
Conditions to Avoid	**Avoid heat, sparks, open flames and other ignition sources. Prevent vapour accumulation.**
Materials to Avoid	**Strong oxidising agents. Reacts violently with 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.**
Hazardous Polymerisation	**No Data Available**

11. TOXICOLOGICAL INFORMATION

General Information	**Acute Oral Toxicity: Low toxicity: LD50 >2000 mg/Kg, Rat**

	Acute Dermal Toxicity: Low toxicity: LD50 >2000 mg/Kg, Rabbit Acute Inhalation Toxicity: Low toxicity: LC50 >20 mg/L / 4 hours, Rat 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: Not mutagenic. Carcinogenicity: Not carcinogenic in animal studies. Toluene: Not classifiable as a human carcinogen (ACGIH) 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.
Eyelrritant	Moderately irritating to eyes (but insufficient to classify).
Ingestion	Harmful: May cause lung damage if swallowed. Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.
Inhalation	Harmful: danger of serious damage to health by prolonged exposure through inhalation. Vapours may cause drowsiness and dizziness. 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. Inhalation of vapours or mists may cause irritation to the respiratory system.
SkinIrritant	Irritating to skin. Not a skin sensitiser.
Carcinogen Category	No Data Available

12. ECOLOGICAL INFORMATION

Ecotoxicity	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 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) 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.
Persistence/Degradability	Readily biodegradable meeting the 10 day window criterion. Oxidises rapidly by photo-chemical reactions in air.
Mobility	Floats on water. If product enters soil, it will be highly mobile and may contaminate groundwater.
Environmental Fate	Do NOT let product reach waterways, drains and sewers.
Bioaccumulation Potential	Does not bioaccumulate significantly.
Environmental Impact	No Data Available

13. DISPOSAL CONSIDERATIONS

General Information	Dispose of in accordance with all local regulations. All empty packaging should be disposed of in accordance with Local Regulations or recycled/reconditioned at an approved facility.
Special Precautions for Land Fill	Contact a specialist disposal company or the local waste regulator for advice. 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

Land Transport

Proper Shipping Name	TOLUENE
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
ERG	130 Flammable Liquids (Non-Polar / Water-Immiscible / Noxious)
UN Number	1294
Hazchem	3YE
Pack Group	II
Special Provision	No Data Available

Sea Transport
IMDG

Proper Shipping Name	TOLUENE
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
UN Number	1294
Hazchem	3YE
Pack Group	II
Special Provision	No Data Available
EMS	F-E,S
Marine Pollutant	No

Air Transport
IATA

Proper Shipping Name	TOLUENE
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
UN Number	1294
Hazchem	3YE
Pack Group	II
Special Provision	No Data Available

15. OTHER INFORMATION

Revision	2
Key/Legend	< Less Than > Greater Than atm Atmosphere CAS Chemical Abstracts Service (Registry Number) cm Square Centimetres CO2 Carbon Dioxide COD Chemical Oxygen Demand Degrees Celcius Degrees Farenheit

g Grams
g/cm Grams per Cubic Centimetre
g/l Grams per Litre
HSNO Hazardous Substance and New Organism
IDLH Immediately Dangerous to Life and Health
immiscible Liquids are insoluable in each other.
inHg Inch of Mercury
inH2O Inch of Water
K Kelvin
kg Kilogram
kg/m Kilograms per Cubic Metre
lb Pound
LC50 LC stands for lethal concentration. LC50 is the concentration of a material in air which causes the death of 50% (one half) of a group of test animals. The material is inhaled over a set period of time, usually 1 or 4 hours. (one half) of a group of test animals.
LD50 LD stands for Lethal Dose. LD50 is the amount of a material, given all at once, which causes the death of 50%
ltr or L Litre
m Cubic Metre
mbar Millibar
mg Milligram
mg/24H Milligrams per 24 Hours
mg/kg Milligrams per Kilogram
mg/m Milligrams per Cubic Metre
Misc or Miscible Liquids form one homogeneous liquid phase regardless of the amount of either component present.
mm Millimetre
mmH2O Millimetres of Water
mPa.s Millipascals per Second
N/A Not Applicable
NIOSH National Institute for Occupational Safety and Health
NOHSC National Occupational Heath and Safety Commission
OECD Organisation for Economic Co-operation and Development
Oz Ounce
PEL Permissible Exposure Limit
Pa Pascal
ppb Parts per Billion
ppm Parts per Million
ppm/2h Parts per Million per 2 Hours
ppm/6h Parts per Million per 6 Hours
psi Pounds per Square Inch
R Rankine
RCP Reciprocal Calculation Procedure
STEL Short Term Exposure Limit
TLV Threshold Limit Value
tne Tonne
TWA Time Weighted Average
ug/24H Micrograms per 24 Hours
UN United Nations
wt Weight