Methyl Isobutyl Carbinol

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

Product name	:	Methyl Isobutyl Carbinol
Product code	:	S1216
CAS-No.	:	108-11-2
Synonyms	:	1,3-dimethyl 1-butanol, 4-methylpentan-2-ol, Methyl Amyl Alcohol, MIBC

Manufacturer or supplier's details

Manufacturer/Supplier	:	**SHELL EASTERN CHEMICALS (S)** A REGISTERED BUSINESS OF SHELL EASTERN TRADING (PTE) LTD (UEN:198902087C) 9 North Buona Vista Drive , #07-01 The Metropolis Tower 1 Singapore 138588 Singapore
Telephone	:	
Telefax	:	
Emergency telephone number	:	+ 971 4 366 2040 (Cupola Teleservices) for Middle East countries and +65 6542 9595 for Pakistan

Recommended use of the chemical and restrictions on use

Recommended use	:	Solvent.
Restrictions on use	:	This product must not be used in applications other than the above without first seeking the advice of the supplier.

2. HAZARDS IDENTIFICATION

Classification (REGULATION (EC) No 1272/2008)

Flammable liquids	:	Category 3
Eye irritation	:	Category 2
Specific target organ toxicity - single exposure	:	Category 3 (Respiratory system)

Label elements

Hazard pictograms :

Signal word : Warning

Hazard statements : PHYSICAL HAZARDS:
H226 Flammable liquid and vapour.
HEALTH HAZARDS:

H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
ENVIRONMENTAL HAZARDS:
Not classified as environmental hazard according to CLP criteria.

Precautionary statements : **Prevention:**
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response:
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P370 + P378 In case of fire: Use appropriate media to extinguish.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Disposal:
P501 Dispose of contents and container to appropriate waste site or reclaimer in accordance with local and national regulations.

Other hazards

Vapours are heavier than air. Vapours may travel across the ground and reach remote ignition sources causing a flashback fire danger. 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.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Chemical nature : Solvent

Hazardous components

Chemical name	CAS-No. EC-No. Registration number	Classification (67/548/EEC)	Classification (REGULATION (EC) No 1272/2008)	Concentration [%]
4-methylpentan-2-ol	108-11-2	R10 Xi; R36/37	Flam. Liq. 3; H226 Eye Irrit. 2; H319 STOT SE 3; H335	100

For explanation of abbreviations see section 16.

4. FIRST-AID MEASURES

General advice	:	In general no treatment is necessary, however, obtain medical advice.
If inhaled	:	Remove to fresh air. If rapid recovery does not occur, transport to nearest medical facility for additional treatment.
In case of skin contact	:	Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention.
In case of eye contact	:	Immediately flush eye(s) with plenty of water. Remove contact lenses, if present and easy to do. Continue rinsing. Transport to the nearest medical facility for additional treatment.
If swallowed	:	In general no treatment is necessary unless large quantities are swallowed, however, get medical advice.
Most important symptoms and effects, both acute and delayed	:	Eye irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blurred vision. Respiratory irritation signs and symptoms may include a temporary burning sensation of the nose and throat, coughing, and/or difficulty breathing.
Protection of first-aiders	:	When administering first aid, ensure that you are wearing the appropriate personal protective equipment according to the incident, injury and surroundings.
Notes to physician	:	Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Alcohol-resistant foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
Unsuitable extinguishing media	:	None
Specific hazards during firefighting	:	The vapour is heavier than air, spreads along the ground and distant ignition is possible. Carbon monoxide may be evolved if incomplete combustion occurs.
Specific extinguishing methods	:	Standard procedure for chemical fires. Clear fire area of all non-emergency personnel. Keep adjacent containers cool by spraying with water.
Special protective equipment for firefighters	:	Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained

Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Observe the relevant local and international regulations 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.
	:	Avoid contact with skin, eyes and clothing. Isolate hazard area and deny entry to unnecessary or unprotected personnel. Stay upwind and keep out of low areas.
Environmental precautions	:	Shut off leaks, if possible without personal risks. Remove all possible sources of ignition in the surrounding area. Use appropriate containment 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. Monitor area with combustible gas indicator.
Methods and materials for containment and cleaning up	:	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 labeled, 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	:	For guidance on selection of personal protective equipment see Chapter 8 of this Safety Data Sheet. For guidance on disposal of spilled material see Chapter 13 of this Safety Data Sheet.

7. HANDLING AND STORAGE

General Precautions	:	Avoid breathing of or direct 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 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. Ensure that all local regulations regarding handling and storage facilities are followed.
Advice on safe handling	:	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). Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. 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. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Do NOT use compressed air for filling, discharging, or handling operations.
Avoidance of contact	:	Strong oxidising agents.
Product Transfer	:	Refer to guidance under Handling section.

Storage

Conditions for safe storage	:	The vapour is heavier than air. Beware of accumulation in pits and confined spaces. Refer to section 15 for any additional specific legislation covering the packaging and storage of this product.
Packaging material	:	Suitable material: For containers, or container linings use mild steel, stainless steel. Unsuitable material: 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.
Specific use(s)	:	Not applicable Ensure that all local regulations regarding handling and storage facilities are followed. See additional references that provide safe handling practices: 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).

IEC/TS 60079-32-1: Electrostatic hazards, guidance

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Biological occupational exposure limits

No biological limit allocated.

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.
Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory.
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

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 explosion-proof 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.
Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.

General Information:
Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned.
Practice good housekeeping.
Define procedures for safe handling and maintenance of controls.
Educate and train workers in the hazards and control

measures relevant to normal activities associated with this product.
Ensure appropriate selection, testing and maintenance of equipment used to control exposure, e.g. personal protective equipment, local exhaust ventilation.
Drain down system prior to equipment break-in or maintenance.
Retain drain downs in sealed storage pending disposal or subsequent recycle.

Personal protective equipment

Protective measures

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 unsuitable (e.g. airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter.
If air-filtering respirators are suitable for conditions of use: Select a filter suitable for organic gases and vapours [Type A boiling point >65°C (149°F)].

Hand protection
Remarks : 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: Butyl rubber. Nitrile rubber. Incidental contact/Splash protection: PVC or neoprene rubber gloves. For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same, but recognize that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time maybe acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material. Glove thickness should be typically greater than 0.35 mm depending on the glove make and model. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, 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 : Wear goggles for use against liquids and gas.
Wear full face shield if splashes are likely to occur.

Skin and body protection : Wear antistatic and flame retardant clothing if a local risk assessment deems it so.
Skin protection is not required under normal conditions of use.
For prolonged or repeated exposures use impervious clothing over parts of the body subject to exposure.
If repeated and/or prolonged skin exposure to the substance is likely, then wear suitable gloves tested to relevant Standard, and provide employee skin care programmes.

Thermal hazards : Not applicable

Hygiene measures : Wash hands before eating, drinking, smoking and using the toilet.
Launder contaminated clothing before re-use.

Environmental exposure controls

General advice : Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapour.
Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.
Information on accidental release measures are to be found in section 6.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Liquid.
Colour	:	clear
Odour	:	sweet
Odour Threshold	:	Data not available
pH	:	Not applicable
Melting / freezing point	:	Data not available
Boiling point/boiling range	:	130 - 133 °C / 266 - 271 °F
Flash point	:	41 °C / 106 °F Method: IP 170
Evaporation rate	:	0,3 Method: ASTM D 3539, nBuAc=1
Flammability (solid, gas)	:	Not applicable
Upper explosion limit	:	upper flammability limit

		5,5 %(V)
Lower explosion limit	:	Lower flammability limit 1 %(V)
Vapour pressure	:	420 Pa (20 °C / 68 °F)
Relative vapour density	:	3,5
Relative density	:	0,81 (20 °C / 68 °F)
Density	:	806 - 808 kg/m3 (20 °C / 68 °F) Method: ASTM D4052
Solubility(ies)		
Water solubility	:	16 g/l (20 °C / 68 °F)
Partition coefficient: n-octanol/water	:	log Pow: < 3
Auto-ignition temperature	:	305 °C / 581 °F Method: ASTM E-659
Decomposition temperature	:	Data not available
Viscosity		
Viscosity, dynamic	:	5,2 mPa.s (20 °C / 68 °F)
Viscosity, kinematic	:	Data not available
Explosive properties	:	Not applicable
Oxidizing properties	:	Data not available
Surface tension	:	22,7 mN/m, 20 °C / 68 °F
Conductivity	:	Electrical conductivity: > 10,000 pS/m A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid, This material is not expected to be a static accumulator.
Molecular weight	:	102,18 g/mol

10. STABILITY AND REACTIVITY

Reactivity	:	The product does not pose any further reactivity hazards in addition to those listed in the following sub-paragraph.

Chemical stability	:	No hazardous reaction is expected when handled and stored according to provisions
Possibility of hazardous reactions	:	Reacts with strong oxidising agents.
Conditions to avoid	:	Avoid heat, sparks, open flames and other ignition sources. Prevent vapour accumulation. In certain circumstances product can ignite due to static electricity.
Incompatible materials	:	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, sulphur oxides and unidentified 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 testing.
Information on likely routes of exposure	:	Inhalation is the primary route of exposure although absorption may occur through skin contact or following accidental ingestion.

Acute toxicity

Product:

Acute oral toxicity	:	LD50 Rat: > 2000 - <=5000 mg/kg Remarks: May be harmful if swallowed.
Acute inhalation toxicity	:	Rat: Remarks: Low toxicity by inhalation. No deaths at highest tested dose.
Acute dermal toxicity	:	LD50 Rabbit: > 2000 - <=5000 mg/kg Remarks: May be harmful in contact with skin.

Skin corrosion/irritation

Product:

Remarks: Causes mild skin irritation.

Serious eye damage/eye irritation

Product:

Remarks: Causes serious eye irritation.

Respiratory or skin sensitisation

Product:

Remarks: Not a sensitiser.
Based on available data, the classification criteria are not met.

Germ cell mutagenicity

Product:

Remarks: No evidence of mutagenic activity.

Carcinogenicity

Product:

Remarks: Not a carcinogen., Based on available data, the classification criteria are not met.

Material	GHS/CLP Carcinogenicity Classification
4-methylpentan-2-ol	No carcinogenicity classification.

Reproductive toxicity

Product:

Remarks: Not a developmental toxicant., Based on available data, the classification criteria are not met., Does not impair fertility.

STOT - single exposure

Product:

Remarks: May cause respiratory irritation.

STOT - repeated exposure

Product:

Remarks: Based on available data, the classification criteria are not met.

Aspiration toxicity

Product:

Not an aspiration hazard.

Further information

Product:

Remarks: Classifications by other authorities under varying regulatory frameworks may exist.

12. ECOLOGICAL INFORMATION

Basis for assessment : Information given is based on product testing.

Ecotoxicity

Product:

Toxicity to fish (Acute toxicity)	:	Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to crustacean (Acute toxicity)	:	Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to algae/aquatic plants (Acute toxicity)	:	Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to fish (Chronic toxicity)	:	Remarks: Data not available
Toxicity to crustacean (Chronic toxicity)	:	Remarks: NOEC/NOEL expected to be > 10 - <= 100 mg/l
Toxicity to microorganisms (Acute toxicity)	:	Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l

Persistence and degradability

Product:

Biodegradability	:	Remarks: Readily biodegradable., Oxidises rapidly by photo-chemical reactions in air.

Bioaccumulative potential

Product:

Bioaccumulation	:	Remarks: Does not bioaccumulate significantly.
Partition coefficient: n-octanol/water	:	log Pow: < 3

Mobility in soil

Product:

Mobility	:	Remarks: Dissolves in water.

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	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. Disposal should be in accordance with applicable regional, national, and local laws and regulations. Local regulations may be more stringent than regional or national requirements and must be complied with.
Contaminated packaging	:	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.

14. TRANSPORT INFORMATION

International Regulations

IATA-DGR

UN/ID No.	:	UN 2053
Proper shipping name	:	Methyl isobutyl carbinol
Class	:	3
Packing group	:	III
Labels	:	3

IMDG-Code

UN number	:	UN 2053
Proper shipping name	:	METHYL ISOBUTYL CARBINOL
Class	:	3
Packing group	:	III
Labels	:	3
Marine pollutant	:	no

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Pollution category	:	Z
Ship type	:	3
Product name	:	Methyl amyl alcohol

Special precautions for user

Remarks	:	Special Precautions: Refer to Chapter 7, Handling & Storage, for special precautions which a user needs to be aware of or needs to comply with in connection with transport.

Additional Information **:** This product may be transported under nitrogen blanketing.

Nitrogen is an odourless and invisible gas. Exposure to nitrogen enriched atmospheres displaces available oxygen which may cause asphyxiation or death. Personnel must observe strict safety precautions when involved with a confined space entry.

15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture

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

Other international regulations

The components of this product are reported in the following inventories:

AICS	:	Listed
DSL	:	Listed
IECSC	:	Listed
ENCS	:	Listed
KECI	:	Listed
PICCS	:	Listed
EINECS/ELINCS/EC	:	Listed
TSCA	:	Listed
TCSI	:	Listed

16. OTHER INFORMATION

Full text of R-Phrases

R10	Flammable.
R36/37	Irritating to eyes and respiratory system.

Full text of H-Statements

H226	Flammable liquid and vapour.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.

Full text of other abbreviations

Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
STOT SE	Specific target organ toxicity - single exposure

Abbreviations and Acronyms : The standard abbreviations and acronyms used in this document can be looked up in reference literature (e.g. scientific dictionaries) and/or websites.

SDS Regulation :

Further information

Training advice : Provide adequate information, instruction and training for operators.

Other information	:	A vertical bar (|) in the left margin indicates an amendment from the previous version.
Sources of key data used to compile the Safety Data Sheet	:	The quoted data are from, but not limited to, one or more sources of information (e.g. toxicological data from Shell Health Services, material suppliers' data, CONCAWE, EU IUCLID date base, EC 1272 regulation, etc).

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.