Material Safety Data Sheet

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

Material Name	:	**Diisobutyl Ketone**
Product Code	:	S1226
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
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Emergency Telephone Number	:	+ (65) 6542 9595 (Alert-SGS)

2. COMPOSITION/INFORMATION ON INGREDIENTS

Material Formal Name	:	2, 6-dimethyl heptan-4-one
Synonyms	:	DIBK
CAS No.	:	108-83-8
INDEX No.	:	606-005-00-X
EINECS No.	:	203-620-1
Additional Information	:	Diisobutyl ketone is a mixture of the following isomers: [2,6-dimethyl, 4-heptanone, CAS # 108-83-8] and [4,6-dimethyl, 2-heptanone, CAS # 19549-80-5.] Refer to chapter 16 for full text of EC R-phrases.

3. HAZARDS IDENTIFICATION

Health Hazards	:	Irritating to respiratory system. Repeated exposure may cause skin dryness or cracking.
Signs and Symptoms	:	Defatting dermatitis signs and symptoms may include a burning sensation and/or a dried/cracked appearance. Respiratory irritation signs and symptoms may include a temporary burning sensation of the nose and throat, coughing, and/or difficulty breathing.
Safety Hazards	:	Vapours are heavier than air. Vapours may travel across the ground and reach remote ignition sources causing a flashback fire danger. May form flammable/explosive vapour-air mixture. Risk of explosion if heated under confinement. 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.

Environmental Hazards	:	Harmful to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

4. FIRST-AID MEASURES

Inhalation	:	Remove to fresh air. If rapid recovery does not occur, transport to nearest medical facility for additional treatment.
Skin Contact	:	Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available.
Eye Contact	:	Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.
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	:	Call a doctor or poison control center for guidance.

5. FIRE-FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

Specific Hazards	:	Carbon monoxide may be evolved if incomplete combustion occurs. Will float and can be reignited on surface water. The vapour is heavier than air, spreads along the ground and distant ignition is possible.
Suitable Extinguishing Media	:	Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only. Do not discharge extinguishing waters into the aquatic environment.
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. Immediately remove all contaminated clothing. 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. 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. Monitor area with combustible gas indicator.
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	:	See Chapter 13 for information on disposal. Notify authorities if any exposure to the general public or the environment occurs or is likely to occur. Vapour may form an explosive mixture with air.

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 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	:	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. Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. Handling Temperature: Ambient.
Storage	:	Keep away from aerosols, flammables, oxidizing agents, corrosives and from products harmful or toxic to man or to the environment. Must be stored in a well-ventilated area, away from sunlight, ignition sources and other sources of heat. Storage Temperature: Ambient.
Product Transfer	:	Keep containers closed when not in use. Do not use compressed air for filling, discharging or handling. Refer to guidance under Handling section.
Recommended Materials	:	For containers, or container linings use mild steel, stainless steel.
Unsuitable Materials	:	Aluminum Plastics. 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: 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).

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
2,6-dimethyl,4-heptanone	ACGIH	TWA	25 ppm		

Additional Information : Wash hands before eating, drinking, smoking and using the toilet.

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. Appropriate measures include: Adequate explosion-proof ventilation to control airborne concentrations below the exposure guidelines/limits. Eye washes and showers for emergency use.

Personal Protective Equipment : The following information, while appropriate for the product is general in nature. The selection of Personal Protective Equipment will vary depending on the conditions of use.

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)]. Select a filter suitable for organic gases and vapors [Type A 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.

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: Natural rubber. Butyl rubber. Nitrile rubber. 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.
Incidental contact/Splash protection: Neoprene rubber.
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 : Chemical splash goggles (chemical monogoggles).

Protective Clothing	:	Use protective clothing which is chemical resistant to this material. Safety shoes and boots should also be chemical resistant.
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/
Environmental Exposure Controls	:	Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapour.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Clear Liquid.
Odour	:	Esters
Odour threshold	:	Data not available. Data not available.
pH	:	Not applicable
Boiling point	:	163 - 173 °C / 325 - 343 °F
Flash point	:	47 °C / 117 °F(IP 170)
Upper / lower Flammability or Explosion limits	:	0.8 - 6.2 %(V)
Auto-ignition temperature	:	345 °C / 653 °F(ASTM D-2155)
Vapour pressure	:	160 Pa at 20 °C / 68 °F
Specific gravity	:	0.806 - 0.812 at 20 °C / 68 °F
Water solubility	:	0.5 g/l at 20 °C / 68 °F
n-octanol/water partition coefficient (log Pow)	:	2.9 - 3.1
Vapour density (air=1)	:	4.9 at 20 °C / 68 °F
Electrical 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.
Volatile organic carbon	:	59 % (EC/1999/13)
Evaporation rate (nBuAc=1)	:	0.2 (ASTM D 3539, nBuAc=1)
Decomposition temperature	:	Data not available.

10. STABILITY AND REACTIVITY

Stability	:	Stable under normal conditions of use. Reacts with strong oxidising agents.
Conditions to Avoid	:	Avoid heat, sparks, open flames and other ignition sources.
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.
Hazardous Polymerisation	:	No
Sensitivity to Mechanical Impact	:	No
Sensitivity to Static Discharge	:	Yes, in certain circumstances product can ignite due to static electricity.

11. TOXICOLOGICAL INFORMATION

Basis for Assessment	:	Information given is based on product testing.
Acute Oral Toxicity	:	Low toxicity: LD50 >5000 mg/kg , Rat
Acute Dermal Toxicity	:	Low toxicity: LD50 >2000 mg/kg , Rabbit
Acute Inhalation Toxicity	:	Low toxicity: No deaths at highest tested dose. Rat
Skin corrosion/irritation	:	Expected to be non-irritating to skin.
Serious eye damage/irritation	:	Vapours may be irritating to the eye.
Respiratory Irritation	:	Inhalation of vapours or mists may cause irritation to the respiratory system.
Sensitisation	:	Not a skin sensitiser.
Repeated Dose Toxicity	:	Repeated exposure may cause skin dryness or cracking.
Germ cell mutagenicity	:	No evidence of mutagenic activity.
Carcinogenicity	:	Not expected to be carcinogenic.

Material	:	**Carcinogenicity Classification**
2-Heptanone, 4,6-dimethyl-	:	GHS / CLP: No carcinogenicity classification
2,6-dimethyl,4-heptanone	:	GHS / CLP: No carcinogenicity classification

Reproductive and Developmental Toxicity	:	Not expected to impair fertility. Not a developmental toxicant.

12. ECOLOGICAL INFORMATION

Information given is based on product testing.

Acute Toxicity		
Fish	:	Harmful: LL/EL/IL50 >10 - <=100 mg/l
Aquatic crustacea	:	Harmful: LL/EL/IL50 >10 - <=100 mg/l
Algae/aquatic plants	:	Harmful: LL/EL/IL50 >10 - <=100 mg/l
Microorganisms	:	Practically non toxic: LL/EL/IL50 > 100 mg/l
Mobility	:	If product enters soil, one or more constituents will be mobile and may contaminate groundwater. Floats on water.
Persistence/degradability	:	Readily biodegradable. Oxidises rapidly by photo-chemical reactions in air.
Bioaccumulation	:	Does not have the potential to bioaccumulate significantly.

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. Local regulations may be more stringent than regional or national requirements and must be in compliance.

14. TRANSPORT INFORMATION

Land (as per ADR classification): Regulated

Class	:	3
Packing group	:	III
Hazard identification no.	:	30
UN number	:	1157
Danger label (primary risk)	:	3
UN proper shipping name	:	DIISOBUTYL KETONE
Environmental hazards	:	No

IMDG

Identification number	UN 1157
UN proper shipping name	DIISOBUTYL KETONE
Class / Division	3
Packing group	III
Marine Pollutant:	No

IATA (Country variations may apply)

UN number	:	1157
UN proper shipping name	:	Diisobutyl ketone
Class / Division	:	3
Packing group	:	III

15. REGULATORY INFORMATION

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

EC Label Name	:	DI-ISOBUTYL KETONE
EC label/EC Number	:	203-620-1
EC Classification	:	Irritant. Flammable.
EC Annex I Number	:	606-005-00-X
EC Symbols	:	Xi Irritant.
EC Risk Phrases	:	R10 Flammable.

		R37 Irritating to respiratory system.
EC Safety Phrases	:	S2 Keep out of the reach of children. S23 Do not breathe gas/fumes/vapour/spray.

Chemical Inventory Status

AICS	:	Listed.	
DSL	:	Listed.	
INV (CN)	:	Listed.	
ENCS (JP)	:	Listed.	(2)-2475
ISHL (JP)	:	Listed.	2-(8)-153
TSCA	:	Listed.	
EINECS	:	Listed.	203-620-1
KECI (KR)	:	Listed.	KE-10907

16. OTHER INFORMATION

R-phrase(s)

R10	Flammable.
R37	Irritating to respiratory system.

SDS Version Number	:	2.1
SDS Effective Date	:	17.04.2014
SDS Revisions	:	A vertical bar (|) in the left margin indicates an amendment from the previous version.
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