1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Piperylene 75%
Product code	:	X2163
CAS-No.	:	68477-35-0

Manufacturer or supplier's details

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	:	+65 6384 8269
Telefax	:	+65 6384 8454
Contact for Safety Data Sheet	:	If you have any enquiries about the content of this SDS please email sccmsds@shell.com 如果您有关于该SDS内容的任何质询，请发电邮联系 sccmsds@shell.com
Emergency telephone number	:	+86-532-83889090

Recommended use of the chemical and restrictions on use

Recommended use	:	Base chemical., Raw material for use in the chemical industry.
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

Emergency Overview

Appearance	Liquid.
Colour	Colourless to light coloured
Odour	strong
Health Hazards	Harmful if swallowed. Harmful in contact with skin. Causes skin irritation. Causes serious eye irritation. May be fatal if swallowed and enters airways. May cause heritable genetic damage May cause cancer. May cause respiratory irritation. May cause drowsiness and dizziness.

Safety Hazards	Highly flammable liquid and vapour.
Environmental Hazards	Toxic to aquatic life with long lasting effects.

GHS Classification

Flammable liquids	:	Category 2
Acute toxicity (Oral)	:	Category 4
Acute toxicity (Dermal)	:	Category 4
Skin irritation	:	Category 2
Eye irritation	:	Category 2
Aspiration hazard	:	Category 1
Germ cell mutagenicity	:	Category 2
Carcinogenicity	:	Category 1B
Specific target organ toxicity - single exposure	:	Category 3
Short-term (acute) aquatic hazard	:	Category 2
Long-term (chronic) aquatic hazard	:	Category 2

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : PHYSICAL HAZARDS:
H225 Highly flammable liquid and vapour.
HEALTH HAZARDS:
H302 Harmful if swallowed.
H312 Harmful in contact with skin.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H304 May be fatal if swallowed and enters airways.
H341 Suspected of causing genetic defects.
H350 May cause cancer.
H335 May cause respiratory irritation.
H336 May cause drowsiness or dizziness.
ENVIRONMENTAL HAZARDS:
H401 Toxic to aquatic life.
H411 Toxic to aquatic life with long lasting effects.

Precautionary statements :

Prevention:
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.

P241 Use explosion-proof electrical/ ventilating/ lighting equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash hands thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:
P301 + P312 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.
P302 + P352 IF ON SKIN: Wash with plenty of water and soap.
P303 + P361 + P353 IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P312 Call a POISON CENTER or doctor/ physician if you feel unwell.
P330 Rinse mouth.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P362 + P364 Take off contaminated clothing and wash it before reuse.
P370 + P378 In case of fire: Use appropriate media to extinguish.
P391 Collect spillage.

Storage:
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P235 Keep cool.
P405 Store locked up.

Disposal:
P501 Dispose of contents and container to appropriate waste site or reclaimer in accordance with local and national regulations.

Other hazards which do not result in classification

Highly flammable.This material is a static accumulator.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.Highly reactive.May form explosive peroxides.Will float and can be reignited on surface water.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.

Physical and chemical hazards	Highly flammable liquid and vapour.
Health Hazards	Inhalation: May cause respiratory tract irritation. May cause drowsiness and dizziness. Skin: Harmful in contact with skin. Causes skin irritation. Eyes: Causes serious eye irritation. Ingestion: Harmful if swallowed. May be fatal if swallowed and enters airways.
Environmental Hazards	Toxic to aquatic life with long lasting effects.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous components

Chemical name	CAS-No.	Classification	Concentration (% w/w)
penta-1,3-diene	504-60-9	Flam. Liq.2; H225	50 - 70
Cyclopentene	142-29-0	Flam. Liq.2; H225 Acute Tox.4; H302 Acute Tox.4; H312 Skin Irrit.2; H315 Asp. Tox.1; H304	20 - 30
2-Methyl-2-butene	513-35-9	Flam. Liq.1; H224 Acute Tox.4; H302 Skin Irrit.2; H315 Muta.2; H341 Carc.2; H351 STOT SE3; H336 Asp. Tox.1; H304 Aquatic Acute2; H411	5 - 15
cyclopentadiene	542-92-7	Flam. Liq.3; H226 Acute Tox.3; H301 Acute Tox.3; H311 Skin Irrit.2; H315 Eye Irrit.2; H319 STOT SE3; H335 Aquatic Acute3; H402	0.1 - < 1.5
Dicyclopentadiene	77-73-6	Flam. Liq.2; H225 Acute Tox.4; H302 Asp. Tox.1; H304 Acute Tox.2; H330	0.1 - < 1.5

		Skin Irrit.2; H315 Eye Irrit.2A; H319 STOT SE3; H335 Repr.2; H361 STOT RE2; H373 Aquatic Acute1; H400 Aquatic Chronic2; H411	
Isoprene	78-79-5	Flam. Liq.1; H224 Acute Tox.5; H303 Muta.2; H341 Carc.1B; H350 Aquatic Acute2; H401 Aquatic Chronic2; H411	0.1 - < 1
Other C5 Hydrocarbons	Not Assigned		1 - 5
Benzene	71-43-2	Flam. Liq.2; H225 Asp. Tox.1; H304 Skin Irrit.2; H315 Eye Irrit.2A; H319 Muta.1B; H340 Carc.1A; H350 STOT RE1; H372 Aquatic Acute2; H401 Aquatic Chronic3; H412	0 - <= 0.1
TBP (tert-butylphenol) - inhibitor	27178-34-3	Acute Tox.4; H302 Acute Tox.4; H312 Acute Tox.4; H332 Skin Corr.1B; H314 Aquatic Chronic2; H411	<= 0.01

For explanation of abbreviations see section 16.

4. FIRST-AID MEASURES

General advice : Not expected to be a health hazard when used under normal conditions.

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. Immediately flush skin with large amounts of water for at least 15 minutes, and follow by washing with soap and water if available. If needed, transport to the nearest medical facility for additional treatment.

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 : Call emergency number for your location / facility.
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° F (38.3°C), shortness of breath, chest congestion or continued coughing or wheezing.

Most important symptoms and effects, both acute and delayed : Respiratory irritation signs and symptoms may include a temporary burning sensation of the nose and throat, coughing, and/or difficulty breathing.
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.

Skin irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blisters.

Eye irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blurred vision.

Ingestion may result in nausea, vomiting and/or diarrhoea.
If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever.
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° F (38.3°C), shortness of breath, chest congestion or continued coughing or wheezing.

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 : IMMEDIATE TREATMENT IS EXTREMELY IMPORTANT!
Call a doctor or poison control center for guidance.
Potential for chemical pneumonitis.
Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable 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.

Specific hazards during firefighting : 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.
Flammable vapours may be present even at temperatures below the flash point.

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 all 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.
	:	Avoid contact with skin, eyes and clothing. Isolate hazard area and deny entry to unnecessary or unprotected personnel. Do not breathe fumes, vapour. Do not operate electrical equipment.
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.
Methods and materials for containment and cleaning up	:	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. 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

Observe all relevant local and international regulations.

Additional advice	:	For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet.

Risk of explosion. Inform the emergency services if liquid enters surface water drains.
For guidance on disposal of spilled material see Section 13 of this Safety Data Sheet.
Vapour may form an explosive mixture with air.

Local authorities should be advised if significant spillages cannot be contained.

7. HANDLING AND STORAGE

Handling

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 Section 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 inhaling vapour and/or mists.
Avoid contact with skin, eyes and clothing.
Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks.
The vapour is heavier than air. Beware of accumulation in pits and confined spaces.
Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols.
Bulk storage tanks should be diked (bunded).
Properly dispose of any contaminated rags or cleaning materials in order to prevent fires.
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.
Be aware of handling operations that may give rise to additional hazards that result from the accumulation of static charges.
These include but are not limited to pumping (especially turbulent flow), mixing, filtering, splash filling, cleaning and filling of tanks and containers, sampling, switch loading, gauging, vacuum truck operations, and mechanical movements.
These activities may lead to static discharge e.g. spark formation.
Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (≤ 1 m/s until fill pipe submerged to twice its diameter, then ≤ 7 m/s). Avoid splash filling.

Do NOT use compressed air for filling, discharging, or handling operations.
Inhibitor levels should be maintained.
Protect against light.

Avoidance of contact : Strong oxidising agents.
Strong acids.
Strong bases.
Copper alloys

Product Transfer : If positive displacement pumps are used, these must be fitted with a non-integral pressure relief valve. Refer to guidance under Handling section.

Storage

Other data : 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.
Must be stored in a diked (bunded) well- ventilated area, away from sunlight, ignition sources and other sources of heat.
Must be kept inhibited during storage and shipment as material can polymerise.
Vapours from tanks should not be released to atmosphere.
Breathing losses during storage should be controlled by a suitable vapour treatment system.
Nitrogen blanket recommended.
Electrostatic charges will be generated during pumping.
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.
Reacts with atmospheric oxygen. Material contains a stabilizer to inhibit oxidative colour change.
Prolonged storage of the product can cause the stabiliser to lose its effectiveness.
The product is normally supplied in a stabilized form. If the permissible storage period and/or storage temperature is noticeably exceeded, the product may polymerise with heat evolution.

Packaging material : Suitable material: For containers, or container linings use mild steel, stainless steel.
Unsuitable material: Copper., Copper alloys.

Specific use(s) : Not applicable

See additional references that provide safe handling practices for liquids that are determined to be static accumulators: 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 AND PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
2-Methyl-2-butene	513-35-9	TWA	10 ppm	ACGIH
cyclopentadiene	542-92-7	TWA	0.5 ppm	ACGIH
cyclopentadiene		STEL	1 ppm	ACGIH
cyclopentadiene		TWA	75 ppm 200 mg/m3	OSHA Z-1
Dicyclopentadiene	77-73-6	PC-TWA	25 mg/m3	CN OEL
Dicyclopentadiene	77-73-6	TWA	0.5 ppm	ACGIH
Dicyclopentadiene		STEL	1 ppm	ACGIH
Isoprene	78-79-5	TWA	3 ppm 9.4 mg/m3	Shell Internal Standard (SIS) for 8-12 hour TWA.
Benzene	71-43-2	PC-TWA	3 mg/m3	CN OEL
	Further information: G1 - Carcinogenic to humans, Skin			
Benzene		PC-STEL	6 mg/m3	CN OEL
	Further information: G1 - Carcinogenic to humans, Skin			
Benzene	71-43-2	TWA	0.25 ppm 0.8 mg/m3	Shell Internal Standard (SIS) for 8-12 hour TWA.
Benzene		STEL	2.5 ppm 8 mg/m3	Shell Internal Standard (SIS) for 15 min (STEL)
Benzene	71-43-2	STEL	2.5 ppm	ACGIH
Benzene	71-43-2	TWA	0.5 ppm	ACGIH
Benzene		STEL	2.5 ppm	ACGIH
Benzene		PEL	1 ppm	OSHA CARC
Benzene		STEL	5 ppm	OSHA CARC
Benzene		TWA	10 ppm	OSHA Z-2
Benzene		CEIL	25 ppm	OSHA Z-2
Benzene		Peak	50 ppm	OSHA Z-2

Biological occupational exposure limits

Component	CAS-No.	Control parameters	Biological specimen	Sampling time	Permissible concentration	Basis
Benzene	71-43-2	S-phenylmercapturic acid（S-PMA）	Urine	After shift	47.micromoles per millimole creatinine	CN BEI
Benzene		S-	Urine	After shift	100.µg/g	CN BEI

		phenylmercapturic acid （S-PMA）			creatinine	
Benzene		t,t-muconic acid (tt-MA)	Urine	After shift	2.4.Millimoles per mole creatinine	CN BEI
Benzene		t,t-muconic acid (tt-MA)	Urine	After shift	3.mg/g creatinine	CN BEI

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.
GBZ 159 Specifications of air sampling for hazardous substances monitoring in the workplace.
GBZ/T 160 Determination of toxic substances in the air of workplace.
GBZ/T 192 Determination of dust in the air of workplace.
GBZ/T 300 Determination of toxic substances in the air of workplace

Engineering measures : 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.
Eye washes and showers for emergency use.
Firewater monitors and deluge systems are recommended.
Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.
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:

General Information:

Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment.
Clean/flush equipment, where possible, prior to maintenance.
Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when there is potential for inhalation; clear up spills immediately and dispose of wastes safely.Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.

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 AX 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: Viton. Incidental contact/Splash protection: Nitrile 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 chemical and cold resistant gloves/gauntlets, and boots, and apron.

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	:	Colourless to light coloured
Odour	:	strong
Odour Threshold	:	not determined
pH	:	Not applicable
	:	Data not available
Boiling point/boiling range	:	42 °C / 108 °F
Flash point	:	-29 °C / -20 °F
Evaporation rate	:	not determined
Flammability (solid, gas)	:	Data not available
Upper explosion limit	:	8.3 %(V)
Lower explosion limit	:	1 %(V)
Vapour pressure	:	45 kPa (20 °C / 68 °F)
Relative vapour density	:	2.35
Relative density	:	0.7 (15.6 °C / 60.0 °F) Method: ASTM D4052
Density	:	Typical 725 kg/m3 (20 °C / 68 °F) Method: ASTM D4052

Solubility(ies)

Water solubility	:	insoluble
Partition coefficient: n-octanol/water	:	log Pow: 2.2 - 5
Auto-ignition temperature	:	not determined
Decomposition temperature	:	Data not available
Viscosity		
Viscosity, kinematic	:	Data not available
Explosive properties	:	no data available
Oxidizing properties	:	Data not available
Surface tension	:	Data not available
Conductivity	:	Low conductivity: < 100 pS/m The conductivity of this material makes it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10,000 pS/m., Whether a liquid is nonconductive or semi-conductive, the precautions are the same., A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid
Particle size	:	Data not available

10. STABILITY AND REACTIVITY

Reactivity	:	Prolonged exposure to air may lead to peroxide formation., Reacts with strong oxidising agents.
Chemical stability	:	The product is normally supplied in a stabilized form. If the permissible storage period and/or storage temperature is noticeably exceeded, the product may polymerise with heat evolution. Reacts violently with: Nitric, sulphuric and chlorosulphuric acids. Oxidises on contact with air to form unstable peroxides. Polymerisation may occur at elevated temperatures. Normally stable under ambient conditions and if properly inhibited.
Possibility of hazardous reactions	:	Normally stable under ambient conditions and if properly inhibited.
Conditions to avoid	:	Heat, flames, and sparks. Exposure to air. Exposure to sunlight. In certain circumstances product can ignite due to static electricity.

Incompatible materials	:	Strong oxidising agents. Strong acids. Strong bases. Copper alloys
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 data obtained from similar substances. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

Acute toxicity

Product:

Acute oral toxicity	:	LD 50 Rat, male and female: > 300 - 2,000 mg/kg Method: Test(s) equivalent or similar to OECD Test Guideline 401 Remarks: Harmful if swallowed.
Acute inhalation toxicity	:	LC 50 Rat, male and female: > 20 mg/l Exposure time: 4 h Test atmosphere: vapour Method: Test(s) equivalent or similar to OECD Test Guideline 403 Remarks: Based on available data, the classification criteria are not met.
Acute dermal toxicity	:	LD 50 Rabbit, male: 1,183 mg/kg Method: Literature data Remarks: Harmful in contact with skin.

Components:

Dicyclopentadiene:

Acute oral toxicity	:	LD 50 Rat, male and female: >300-<=2000 mg/kg Method: OECD Test Guideline 401 Remarks: Harmful if swallowed.

Acute inhalation toxicity	:	LC 50 Rat, male and female: > 0.5 - <= 2 mg/l Exposure time: 6 h Test atmosphere: vapour Method: OECD Test Guideline 403 Remarks: Fatal if inhaled.
Acute dermal toxicity	:	LD 50 Rat, male and female: > 2,000 mg/kg Method: OECD Test Guideline 402 Remarks: Based on available data, the classification criteria are not met.

Isoprene:

Acute oral toxicity	:	LD 50 Rat, male: > 2,000 mg/kg Method: Acceptable non-standard method. Remarks: Based on available data, the classification criteria are not met.
Acute inhalation toxicity	:	LC 50 Rat: > 20 mg/m3 Exposure time: 4 h Test atmosphere: vapour Method: Literature data Remarks: Based on available data, the classification criteria are not met.
Acute dermal toxicity	:	LD 50 Rat, male and female: > 2,000 mg/kg Method: Test(s) equivalent or similar to OECD Test Guideline 402 Remarks: Based on available data, the classification criteria are not met.

Benzene:

Acute oral toxicity	:	LD 50 Rat, male: > 2,000 mg/kg Method: Test(s) equivalent or similar to OECD Test Guideline 401 Remarks: Based on available data, the classification criteria are not met.
Acute inhalation toxicity	:	LC 50 Rat, female: > 20 mg/l Exposure time: 4 h Test atmosphere: vapour Method: Test(s) equivalent or similar to OECD Test Guideline 403 Remarks: Based on available data, the classification criteria are not met. High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea; continued inhalation may result in unconsciousness and/or death.
Acute dermal toxicity	:	LD 50 Rabbit: > 2,000 mg/kg Method: Test(s) equivalent or similar to OECD Test Guideline

402
Remarks: Based on available data, the classification criteria are not met.

Skin corrosion/irritation

Product:

Species: Rabbit
Method: OECD Test Guideline 404
Remarks: Causes skin irritation.

Components:

Dicyclopentadiene:
Species: Rabbit
Method: OECD Test Guideline 404
Remarks: Causes skin irritation.

Isoprene:
Species: Rabbit
Method: Literature data
Remarks: Based on available data, the classification criteria are not met., Slightly irritating to skin.

Benzene:
Species: Rabbit
Method: OECD Test Guideline 404
Remarks: Causes skin irritation.

Serious eye damage/eye irritation

Product:

Species: Rabbit
Method: Literature data
Remarks: Causes serious eye irritation.

Components:

Dicyclopentadiene:
Species: Rabbit
Method: OECD Test Guideline 405
Remarks: Causes serious eye irritation.

Isoprene:
Method: Literature data
Remarks: Based on available data, the classification criteria are not met., Slightly irritating to the eye.

Benzene:
Species: Rabbit
Method: Literature data
Remarks: Causes serious eye irritation.

Respiratory or skin sensitisation

Product:

Species: Guinea pig
Method: Test(s) equivalent or similar to OECD Test Guideline 406
Remarks: Based on available data, the classification criteria are not met.

Components:

Dicyclopentadiene:
Species: Guinea pig
Method: OECD Test Guideline 406
Remarks: Based on available data, the classification criteria are not met.

Isoprene:
Species: Guinea pig
Method: OECD Test Guideline 406
Remarks: Based on available data, the classification criteria are not met.

Benzene:
Species: Mouse
Method: Literature data
Remarks: Based on available data, the classification criteria are not met.

Germ cell mutagenicity

Product:

Genotoxicity in vitro	:	Method: Test(s) equivalent or similar to OECD Test Guideline 473 Remarks: Suspected of causing genetic defects., Contains Isoprene, CAS # 78-79-5., Mutagenic; positive in in-vivo and in-vitro assays.
	:	Method: Literature data Remarks: Suspected of causing genetic defects., Contains Isoprene, CAS # 78-79-5., Mutagenic; positive in in-vivo and in-vitro assays.
	:	Test species: MouseMethod: OECD Test Guideline 474 Remarks: Suspected of causing genetic defects., Contains Isoprene, CAS # 78-79-5., Mutagenic; positive in in-vivo and in-vitro assays.
		Test species: MouseMethod: Test(s) equivalent or similar to OECD Test Guideline 474 Remarks: Suspected of causing genetic defects., Contains Isoprene, CAS # 78-79-5., Mutagenic; positive in in-vivo and in-vitro assays.
Germ cell mutagenicity-Assessment	:	This product does not meet the criteria for classification in categories 1A/1B.

Components:

Dicyclopentadiene:

Genotoxicity in vitro	:	Method: OECD Test Guideline 471 Remarks: Based on available data, the classification criteria are not met.
	:	Method: Acceptable non-standard method. Remarks: Based on available data, the classification criteria are not met.
	:	Method: OECD Test Guideline 476 Remarks: Based on available data, the classification criteria are not met.
	:	Test species: MouseMethod: OECD Test Guideline 474 Remarks: Based on available data, the classification criteria are not met.
Germ cell mutagenicity-Assessment	:	This product does not meet the criteria for classification in categories 1A/1B.

Isoprene:

Genotoxicity in vitro	:	Method: Literature data Remarks: Suspected of causing genetic defects.
	:	Test species: MouseMethod: Test(s) equivalent or similar to OECD Test Guideline 474 Remarks: Suspected of causing genetic defects.
Germ cell mutagenicity-Assessment	:	This product does not meet the criteria for classification in categories 1A/1B.

Benzene:

Genotoxicity in vitro	:	Method: OECD Test Guideline 471 Remarks: May cause genetic defects.
	:	Method: Other guideline method. Remarks: May cause genetic defects.
	:	Method: Literature data Remarks: May cause genetic defects.
	:	Test species: MouseMethod: Test(s) equivalent or similar to OECD Test Guideline 474 Remarks: May cause genetic defects.
Germ cell mutagenicity-Assessment	:	May cause genetic defects.

Carcinogenicity

Product:

Species: Mouse, (male and female)
Application Route: Inhalation
Method: Other guideline method.
Test substance: Isoprene
Remarks: May cause cancer., Contains Isoprene, CAS # 78-79-5., Causes cancer in laboratory animals.

Species: Rat, (male and female)

Application Route: Inhalation
Method: Test(s) equivalent or similar to OECD Test Guideline 453
Test substance: Isoprene
Remarks: May cause cancer., Contains Isoprene, CAS # 78-79-5., Causes cancer in laboratory animals.

Carcinogenicity - Assessment : May cause cancer.

Components:

Dicyclopentadiene:
Carcinogenicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

Isoprene:
Species: Mouse, (male and female)
Application Route: Inhalation
Method: Other guideline method.
Remarks: May cause cancer.

Species: Rat, (male and female)
Application Route: Inhalation
Method: Test(s) equivalent or similar to OECD Test Guideline 453
Remarks: May cause cancer.

Carcinogenicity - Assessment : May cause cancer.

Benzene:
Species: Rat, (male and female)
Application Route: Oral
Method: Other guideline method.
Remarks: May cause cancer., Known human carcinogen., May cause leukaemia (AML - acute myelogenous leukaemia).

Species: Mouse, (male and female)
Application Route: Inhalation
Method: Literature data
Remarks: May cause cancer., Known human carcinogen., May cause leukaemia (AML - acute myelogenous leukaemia).

Carcinogenicity - Assessment : May cause cancer.

Material	GHS/CLP Carcinogenicity Classification
penta-1,3-diene	No carcinogenicity classification.
Cyclopentene	No carcinogenicity classification.
2-Methyl-2-butene	Carcinogenicity Category 2
cyclopentadiene	No carcinogenicity classification.
Dicyclopentadiene	No carcinogenicity classification.

Isoprene	Carcinogenicity Category 1B
Other C5 Hydrocarbons	No carcinogenicity classification.
Benzene	Carcinogenicity Category 1A
TBP (tert-butylphenol) - inhibitor	No carcinogenicity classification.

Material	**Other Carcinogenicity Classification**
Isoprene	IARC: Group 2B: Possibly carcinogenic to humans
Benzene	IARC: Group 1: Carcinogenic to humans

Reproductive toxicity

Product:

: Species: Rat
Sex: male and female
Application Route: Inhalation

Method: OECD Test Guideline 422
Remarks: Based on available data, the classification criteria are not met.

Effects on foetal development : Species: Rat, male and female
Application Route: Inhalation
Method: OECD Test Guideline 422
Remarks: Based on available data, the classification criteria are not met.

Reproductive toxicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

Components:

Dicyclopentadiene:

: Species: Rat
Sex: male and female
Application Route: Oral

Method: Equivalent or similar to OECD Test Guideline 416
Remarks: Suspected of damaging fertility or the unborn child.

Effects on foetal development : Species: Rat, female
Application Route: Oral
Method: Other guideline method.
Remarks: Suspected of damaging fertility or the unborn child.

Reproductive toxicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

Isoprene:

Species: Rat
Sex: male and female
Application Route: Inhalation

Method: OECD Test Guideline 421
Remarks: Based on available data, the classification criteria are not met.

Species: Mouse, female
Application Route: Inhalation
Method: Other guideline method.
Remarks: Based on available data, the classification criteria are not met.

Reproductive toxicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

Benzene:

Species: Rat
Sex: male and female
Application Route: Inhalation

Method: Test(s) equivalent or similar to OECD Test Guideline 415.
Remarks: Based on available data, the classification criteria are not met.

Species: Rat, female
Application Route: Inhalation
Method: Test(s) equivalent or similar to OECD Test Guideline 414
Remarks: Based on available data, the classification criteria are not met., Causes foetotoxicity in animals at doses which are maternally toxic.

Reproductive toxicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

STOT - single exposure

Product:

Exposure routes: Inhalation
Target Organs: Central nervous system, Respiratory Tract
Remarks: May cause drowsiness or dizziness., May cause respiratory irritation., Inhalation of vapours or mists may cause irritation to the respiratory system., High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea.

Components:

Dicyclopentadiene:
Exposure routes: Inhalation
Target Organs: Respiratory Tract
Remarks: May cause respiratory irritation.

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

Benzene:
Remarks: Based on available data, the classification criteria are not met., Inhalation of vapours or mists may cause irritation to the respiratory system.

STOT - repeated exposure

Product:

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

Components:

Dicyclopentadiene:
Target Organs: Central nervous system
Assessment: The substance or mixture is classified as specific target organ toxicant, repeated exposure, category 2.

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

Benzene:
Exposure routes: Oral, Inhalation
Target Organs: hematopoietic system
Remarks: Causes damage to organs through prolonged or repeated exposure., Blood-forming organs: repeated exposure affects the bone marrow., Blood: may cause haemolysis of red blood cells and/or anaemia., Immune System: animal studies on this material or its components have demonstrated immunotoxicity., May cause MDS (Myelodysplastic Syndrome)., Exposure to very high concentrations of similar materials has been associated with irregular heart rhythms and cardiac arrest., Myelodysplastic syndrome (MDS) was observed in individuals exposed to very high levels (50 ppm to 300 ppm range) of benzene over a long period of time in the workplace. The relevance of these results to lower levels of exposure is not known.

Repeated dose toxicity

Product:

Rat, male and female:
Application Route: Oral
Method: Test(s) equivalent or similar to OECD Test Guideline 422
Target Organs: No specific target organs noted

Rat, male and female:
Application Route: Inhalation
Test atmosphere: vapour

Method: Test(s) equivalent or similar to OECD Test Guideline 422
Target Organs: No specific target organs noted

Components:

Dicyclopentadiene:

Rat, male and female:
Application Route: Oral
Method: Test(s) equivalent or similar to OECD Test Guideline 422
Target Organs: No specific target organs noted

Rat, male and female:
Application Route: Inhalation
Test atmosphere: vapour
Method: Test(s) equivalent or similar to OECD Test Guideline 413
Target Organs: No specific target organs noted

Rat, male and female:
Application Route: Oral
Method: OECD Test Guideline 408
Symptoms: Tremors

Isoprene:

Mouse, male and female:
Application Route: Inhalation
Test atmosphere: vapour
Method: Other guideline method.
Target Organs: No specific target organs noted

Benzene:

Rat, male and female:
Application Route: Oral
Method: Test(s) equivalent or similar to OECD Test Guideline 408
Target Organs: hematopoietic system

Mouse, male and female:
Application Route: Inhalation
Test atmosphere: vapour
Method: Literature data
Target Organs: hematopoietic system

Aspiration toxicity

Product:

Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

Components:
Dicyclopentadiene:
Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which

can be fatal.

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

Benzene:
May be fatal if swallowed and enters airways.

Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

Further information

Product:

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

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

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

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

12. ECOLOGICAL INFORMATION

Basis for assessment	:	Incomplete ecotoxicological data are available for this substance. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

Ecotoxicity

Product:

Toxicity to fish (Acute toxicity)	:	LL50 (Oncorhynchus mykiss (rainbow trout)): 14.1 mg/l Method: OECD Test Guideline 203 Remarks: Harmful LL/EL/IL50 >10 <= 100 mg/l
Toxicity to crustacean (Acute toxicity)	:	EC50 (Daphnia magna (Water flea)): 4.7 mg/l Exposure time: 48 h Method: OECD Test Guideline 202 Remarks: Toxic LC/EC/IC50 >1 - <=10 mg/l

Toxicity to algae/aquatic plants (Acute toxicity)	:	EC50 (Pseudokirchneriella subcapitata (algae)): 12.4 mg/l Exposure time: 72 h Method: OECD Test Guideline 201 Remarks: Harmful LL/EL/IL50 >10 <= 100 mg/l
Toxicity to fish (Chronic toxicity)	:	Remarks: Data not available
Toxicity to crustacean (Chronic toxicity)	:	Remarks: Data not available
Toxicity to microorganisms (Acute toxicity)	:	NOELR (Activated sludge, domestic waste): 2 mg/l Exposure time: 5 Days Method: OECD Test Guideline 301D Remarks: Data not available

Components:
Dicyclopentadiene :

Toxicity to fish (Acute toxicity)	:	LC50 (Oryzias latipes (Japanese medaka)): 15.7 mg/l Exposure time: 96 h Method: OECD Test Guideline 203 Remarks: Harmful LL/EL/IL50 >10 <= 100 mg/l
Toxicity to crustacean (Acute toxicity)	:	EC50 (Daphnia magna (Water flea)): 0.62 mg/l Exposure time: 48 h Method: OECD Test Guideline 202 Remarks: Toxic LL/EL/IL50 >10 <= 100 mg/l
Toxicity to algae/aquatic plants (Acute toxicity)	:	Remarks: Harmful LL/EL/IL50 >10 <= 100 mg/l
M-Factor (Short-term (acute) aquatic hazard)	:	1
Toxicity to microorganisms (Acute toxicity)	:	EC10 (Pseudomonas putida): 2.2 mg/l Method: Other guideline method. Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to fish (Chronic toxicity)	:	NOEC: 0.98 mg/l Exposure time: 14 d Species: Lepomis macrochirus (Bluegill sunfish) Method: Test(s) equivalent or similar to OECD Test Guideline 204 Remarks: NOEC/NOEL > 0.1 - <=1.0 mg/l
Toxicity to crustacean(Chronic toxicity)	:	NOEC: 0.574 mg/l Exposure time: 21 d Species: Daphnia sp. (water flea) Method: Based on quantitative structure-activity relationship (QSAR) modelling

Isoprene :

Toxicity to fish (Acute toxicity)	:	LC50 (Oncorhynchus mykiss (rainbow trout)): 7.43 mg/l Exposure time: 96 h Method: OECD Test Guideline 203 Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to crustacean (Acute toxicity)	:	EC50 (Daphnia magna (Water flea)): 5.77 mg/l Exposure time: 48 h Method: OECD Test Guideline 202 Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to algae/aquatic plants (Acute toxicity)	:	EC50 (Selenastrum capricornutum (green algae)): 15.3 mg/l Exposure time: 72 h Method: OECD Test Guideline 201 Remarks: Harmful LL/EL/IL50 >10 <= 100 mg/l
Toxicity to microorganisms (Acute toxicity)	:	Remarks: Data not available
Toxicity to fish (Chronic toxicity)	:	NOEC: 1.1 mg/l Exposure time: 32 d Species: Pimephales promelas (fathead minnow) Method: Based on quantitative structure-activity relationship (QSAR) modelling Remarks: NOEC/NOEL > 1.0 - <= 10 mg/l
Toxicity to crustacean(Chronic toxicity)	:	NOEC: 1.08 mg/l Exposure time: 768 h Species: Daphnia sp. (water flea) Method: Based on quantitative structure-activity relationship (QSAR) modelling Remarks: NOEC/NOEL > 0.1 - <=1.0 mg/l

Benzene :

Toxicity to fish (Acute toxicity)	:	LC50 (Oncorhynchus mykiss (rainbow trout)): 5.3 mg/l Exposure time: 96 h Method: Test(s) equivalent or similar to OECD Guideline 203 Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to crustacean (Acute toxicity)	:	EC50 (Daphnia magna (Water flea)): 10 mg/l Exposure time: 48 h Method: OECD Test Guideline 202 Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to algae/aquatic plants (Acute toxicity)	:	ErC50 (Selenastrum capricornutum (green algae)): 100 mg/l Exposure time: 72 h Method: OECD Test Guideline 201 Remarks: Harmful LL/EL/IL50 >10 <= 100 mg/l
Toxicity to microorganisms (Acute toxicity)	:	IC50 (Nitrosomonas): 13 mg/l Exposure time: 24 h

Method: Literature data.
Remarks: Harmful
LL/EL/IL50 >10 <= 100 mg/l

Toxicity to fish (Chronic toxicity) : NOEC: 0.8 mg/l
Exposure time: 32 d
Species: Pimephales promelas (fathead minnow)
Method: Other guideline method.
Remarks: NOEC/NOEL > 0.1 - <=1.0 mg/l

Toxicity to crustacean(Chronic toxicity) : NOEC: 3 mg/l
Exposure time: 7 d
Species: Ceriodaphnia dubia (Water flea)
Method: Other guideline method.
Remarks: NOEC/NOEL > 1.0 - <= 10 mg/l

Persistence and degradability

Product:

Biodegradability : Biodegradation: 9 %
Exposure time: 28 d
Method: OECD Test Guideline 301D
Remarks: Not readily biodegradable.

Components:
Dicyclopentadiene :

Biodegradability : Biodegradation: 0 %
Exposure time: 28 d
Method: OECD Test Guideline 301F
Remarks: Not readily biodegradable.
Oxidises rapidly by photo-chemical reactions in air.

Isoprene :

Biodegradability : Biodegradation: 61 %
Exposure time: 28 d
Method: OECD Test Guideline 301F
Remarks: Not readily biodegradable.
Oxidises rapidly by photo-chemical reactions in air.

Benzene :

Biodegradability : Biodegradation: 96 %
Exposure time: 28 d
Method: OECD Test Guideline 301F
Remarks: Readily biodegradable.
Not Persistent per IMO criteria.
International Oil Pollution Compensation (IOPC) Fund definition: “A non-persistent oil is oil, which, at the time of shipment, consists of hydrocarbon fractions, (a) at least 50% of which, by volume, distills at a temperature of 340ºC (645ºF) and (b) at least 95% of which, by volume, distils at a temperature of 370ºC (700ºF) when tested by the ASTM Method D-86/78 or any subsequent revision thereof."

Bioaccumulative potential

Product:

Bioaccumulation	:	Species: Pimephales promelas (fathead minnow) Bioconcentration factor (BCF): 1.2 - 2.1 Method: Based on quantitative structure-activity relationship (QSAR) modelling Remarks: Does not bioaccumulate significantly.
Partition coefficient: n-octanol/water	:	log Pow: 2.2 - 5

Components:

Dicyclopentadiene :

Bioaccumulation	:	Remarks: Does not bioaccumulate significantly.

Isoprene :

Bioaccumulation	:	Remarks: Does not bioaccumulate significantly.

Benzene :

Bioaccumulation	:	Species: Leuciscus idus (Golden orfe) Exposure time: 3 d Bioconcentration factor (BCF): < 10 Method: Test(s) equivalent or similar to OECD Test Guideline 305 Remarks: Does not bioaccumulate significantly.

Mobility in soil

Product:

Mobility	:	Remarks: Floats on water.

Components:

Dicyclopentadiene :

Mobility	:	Remarks: Floats on water.

Isoprene :

Mobility	:	Remarks: Floats on water.

Benzene :

Mobility	:	Remarks: Floats on water.

Other adverse effects

Product:

Results of PBT and vPvB assessment	:	The substance does not fulfill all screening criteria for persistence, bioaccumulation and toxicity and hence is not considered to be PBT or vPvB.

Components:

Dicyclopentadiene :

Results of PBT and vPvB assessment	:	The substance does not fulfill all screening criteria for persistence, bioaccumulation and toxicity and hence is not considered to be PBT or vPvB.

Isoprene :

Results of PBT and vPvB assessment	:	The substance does not fulfill all screening criteria for persistence, bioaccumulation and toxicity and hence is not considered to be PBT or vPvB.

Benzene :

Results of PBT and vPvB assessment	:	The substance does not fulfill all screening criteria for persistence, bioaccumulation and toxicity and hence is not considered to be PBT or vPvB.

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.
Local legislation Remarks	:	If potential for exposure exists refer to Section 8 for specific personal protective equipment.

14. TRANSPORT INFORMATION

International Regulations

ADR

UN number	:	1268
Proper shipping name	:	PETROLEUM DISTILLATES, N.O.S.
Class	:	3
Packing group	:	II
Labels	:	3
Hazard Identification Number	:	33
Environmentally hazardous	:	yes

IATA-DGR

UN/ID No.	:	UN 1268
Proper shipping name	:	Petroleum distillates, n.o.s.
Class	:	3
Packing group	:	II
Labels	:	3

IMDG-Code

UN number	:	UN 1268

Proper shipping name	:	PETROLEUM DISTILLATES, N.O.S. (distillates (petroleum), C3-6, piperylene-rich)
Class	:	3
Packing group	:	II
Labels	:	3
Marine pollutant	:	yes

Maritime transport in bulk according to IMO instruments

Pollution category	:	Y
Ship type	:	2
Product name	:	1-3 Pentadiene (greater than 50%), cyclopentene, and isomers, mixtures

Special precautions for user

Remarks	:	Special Precautions: Refer to Section 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. Transport in bulk according to Annex II of Marpol and the IBC Code

15. REGULATORY INFORMATION

National regulatory information

Rotterdam Convention (Prior Informed Consent)
Not applicable

Stockholm Convention (Persistent Organic Pollutants)
Not applicable

Law on the Prevention and Control of Occupational Diseases

The categories of occupational disease:
Occupational disease is not clearly listed.

Occupational Disease Classification list:
Not applicable

Regulations on Safety Management of Hazardous Chemicals

Catalogue of Hazardous Chemicals : Listed

Identification of Major Hazard Installations for Hazardous Chemicals (GB 18218)

Category	Threshold quantity
Flammable liquids	10 t

Hazardous Chemicals for Priority Management under SAWS : Not applicable

Regulations on Labour Protection in Workplaces where Toxic Substances are Used

Catalogue of Highly Toxic Chemicals : Not applicable

Regulation of Environmental Management on the First Import of Chemicals and the Import and Export of Toxic Chemicals

Catalogue of Toxic Chemicals Severely Restricted in China : Not applicable

Other international regulations

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

IECSC : All components listed.

16. OTHER INFORMATION

Full text of H-Statements

H224	Extremely flammable liquid and vapour.
H225	Highly flammable liquid and vapour.
H226	Flammable liquid and vapour.
H301	Toxic if swallowed.
H302	Harmful if swallowed.
H303	May be harmful if swallowed.
H304	May be fatal if swallowed and enters airways.
H311	Toxic in contact with skin.
H312	Harmful in contact with skin.
H314	Causes severe skin burns and eye damage.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H330	Fatal if inhaled.
H332	Harmful if inhaled.
H335	May cause respiratory irritation.
H336	May cause drowsiness or dizziness.
H340	May cause genetic defects.
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H351	Suspected of causing cancer.
H361	Suspected of damaging fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H373	May cause damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H401	Toxic to aquatic life.
H402	Harmful to aquatic life.
H411	Toxic to aquatic life with long lasting effects.
H412	Harmful to aquatic life with long lasting effects.

Full text of other abbreviations

Acute Tox.	Acute toxicity
Aquatic Acute	Short-term (acute) aquatic hazard
Aquatic Chronic	Long-term (chronic) aquatic hazard
Asp. Tox.	Aspiration hazard
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids

Muta.	Germ cell mutagenicity
Repr.	Reproductive toxicity
Skin Corr.	Skin corrosion
Skin Irrit.	Skin irritation
STOT RE	Specific target organ toxicity - repeated exposure
STOT SE	Specific target organ toxicity - single exposure

Abbreviations and Acronyms

AIIC - Australian Inventory of Industrial Chemicals; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

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).

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

CN / EN