SAFETY DATA SHEET

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

IRU Feed

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SECTION 1. IDENTIFICATION

Product name : IRU Feed

Product code : X2384

Manufacturer or supplier's details

Company : **Shell Chemical LP**
PO Box 576
HOUSTON TX 77001
USA

SDS Request : 1-800-240-6737

Customer Service : 1-855-697-4355

Emergency telephone number

Chemtrec Domestic (24 hr) : 1-800-424-9300

Chemtrec International (24 hr) : 1-703-527-3887

Recommended use of the chemical and restrictions on use

Recommended use :
Base chemical., Base chemical for the production of synthetic rubbers.

Restrictions on use : This product must not be used in applications other than those listed in Section 1 without first seeking the advice of the supplier.
This product must not be used in applications other than the above without first seeking the advice of the supplier.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids : Category 1

Acute toxicity (Oral) : Category 4

Acute toxicity (Dermal) : Category 4

Skin irritation : Category 2

Eye irritation : Category 2A

Aspiration hazard	:	Category 1
Germ cell mutagenicity	:	Category 1B
Carcinogenicity	:	Category 1A
Specific target organ toxicity - single exposure	:	Category 3 (Respiratory system, Narcotic effects)
Long-term (chronic) aquatic hazard	:	Category 2

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements :

PHYSICAL HAZARDS:
H224 Extremely 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.
H340 May cause genetic defects.
H350 May cause cancer.
H335 May cause respiratory irritation.
H336 May cause drowsiness or dizziness.
ENVIRONMENTAL HAZARDS:
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, hot surfaces, sparks, open flames and other ignition sources. No smoking.
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.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P264 Wash hands thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P281 Use personal protective equipment as required.
P273 Avoid release to the environment.

Response:

P370+P378 In case of fire: Use appropriate media for extinction.
P303 + P361 + P353 IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P330 Rinse mouth.
P331 Do NOT induce vomiting.
P322 Specific measures (see supplemental first aid instructions on this label).
P362 Take off contaminated clothing and wash before reuse.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312 Call a POISON CENTER/ doctor if you feel unwell.
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

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.
The vapour is heavier than air, spreads along the ground and distant ignition is possible.
Will float and can be reignited on surface water.
The classification of this material is based on OSHA HCS 2012 criteria.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Hazardous components

Chemical name	Synonyms	CAS-No.	Concentration (% w/w)
Other C5 Hydrocarbons		Not Assigned	>= 55

Isoprene	isoprene (Stabilized)	78-79-5	>= 15 - <= 25
isopentane	2-methylbutane	78-78-4	10

Further information

Contains:

Chemical name	Identification number	Concentration (% w/w)
1,3-butadiene	106-99-0	<=0.8
Benzene	71-43-2	<=0.5

SECTION 4. FIRST AID MEASURES

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

If inhaled : Call emergency number for your location / facility.
Remove to fresh air. Do not attempt to rescue the victim unless proper respiratory protection is worn. If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting, or unresponsive, give 100% oxygen with rescue breathing or Cardio-Pulmonary Resuscitation as required and transport to the nearest medical facility.

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 redness, swelling, pain and/or blisters occur, 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, lightheadedness, 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.
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.
Ingestion may result in nausea, vomiting and/or diarrhoea.
Damage to blood-forming organs may be evidenced by: a) fatigue and anaemia (RBC), b) decreased resistance to infection, and/or excessive bruising and bleeding (platelet effect).
Heart damage may be evidenced by shortness of breath and, in severe cases, by collapse (cardiac arrest).

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.

Indication of any immediate medical attention and special treatment needed : IMMEDIATE TREATMENT IS EXTREMELY IMPORTANT!
Call a doctor or poison control center for guidance.
Potential for chemical pneumonitis.
Treat symptomatically.

SECTION 5. FIREFIGHTING 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.

Further information : 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).

SECTION 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. Notify authorities if any exposure to the general public or the environment occurs or is likely to occur. U.S. regulations may require reporting releases of this material to the environment which exceed the reportable quantity

(refer to Section 15) to the National Response Center at (800) 424-8802.

SECTION 7. HANDLING AND STORAGE

Technical measures	:	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.
Further information on storage stability	:	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). IEC/TS 60079-32-1: Electrostatic hazards, guidance

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis

Isoprene	78-79-5	TWA	3 ppm 8.4 mg/m3	Shell Internal Standard (SIS) for 8 hour TWA.
isopentane	78-78-4	TWA	1,000 ppm	ACGIH
1,3-butadiene	106-99-0	TWA	2 ppm	ACGIH
1,3-butadiene		PEL	1 ppm	OSHA CARC
1,3-butadiene		STEL	5 ppm	OSHA CARC
1,3-butadiene		TWA	1 ppm	OSHA Z-1
1,3-butadiene		STEL	5 ppm	OSHA Z-1
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		TWA	0.02 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 (10 minutes)	OSHA Z-2

Biological occupational exposure limits

Components	CAS-No.	Control parameters	Biological specimen	Sam-pling time	Permissible concentra-tion	Basis
1,3-butadiene	106-99-0	1,2 Dihy-droxy-4-(N-acetylcyste-inyl)-butane	Urine	End of shift (As soon as possible after exposure ceases)	2.5 mg/l	ACGIH BEI
		Mixture of N-1 and N-2(hydroxybu tenyl)valine	Hemoglo-bin (Hb) adducts in blood	Not criti-cal	2.5 picomoles per gram Hemoglobin	ACGIH BEI
Benzene	71-43-2	S-Phenylmer-capturic acid	Urine	End of shift (As soon as possible after exposure ceases)	25 µg/g creatinine	ACGIH BEI
		t,t-Muconic acid	Urine	End of shift (As soon as possible	500 µg/g creatinine	ACGIH BEI

				after exposure ceases)		

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 : 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

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)]. Respirator selection, use and maintenance should be in accordance with the requirements of the OSHA Respiratory Protection Standard, 29 CFR 1910.134.
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.

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

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Liquid.
Colour	:	Colourless to light coloured
Odour	:	Disagreeable
Odour Threshold	:	Data not available
pH	:	Data not available
Melting point/freezing point	:	Data not available
Boiling point/boiling range	:	34 °C / 93 °F estimated value(s)
Flash point	:	-7 °C / 19 °F
Evaporation rate	:	Data not available
Flammability		
Flammability (liquids)	:	Static-accumulating flammable liquid.
Lower explosion limit and upper explosion limit / flammability limit		
Upper explosion limit / Upper flammability limit	:	12.0 %(V)
Lower explosion limit / Lower flammability limit	:	1.0 %(V)
Vapour pressure	:	65.7 kPa (20 °C / 68 °F)

		estimated value(s)
Relative vapour density	:	2.3 (Air = 1.0)
Relative density	:	0.7 (20.0 °C / 68.0 °F) Method: ASTM D4052
Density	:	Data not available
Solubility(ies)		
Water solubility	:	0.05 g/l negligible
Partition coefficient: n-octanol/water	:	Data not available
Auto-ignition temperature	:	Data not available
Decomposition temperature	:	Data not available
Viscosity		
Viscosity, dynamic	:	Data not available
Viscosity, kinematic	:	Data not available
Explosive properties	:	Not applicable
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 semiconductive, 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
Molecular weight	:	Data not available
Particle size	:	Data not available

SECTION 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.

SECTION 11. TOXICOLOGICAL INFORMATION

Basis for assessment	:	Information given is based on data on the components and the toxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

Information on likely routes of exposure
Exposure may occur via inhalation, ingestion, skin absorption, skin or eye contact, and accidental ingestion.

Acute toxicity

Product:

Acute oral toxicity	:	LD50 : > 300 - 2,000 mg/kg Remarks: Harmful if swallowed.
Acute inhalation toxicity	:	Remarks: Low toxicity if inhaled. Based on available data, the classification criteria are not met.
Acute dermal toxicity	:	LD50 : > 1,000 - 2,000 mg/kg Remarks: Harmful in contact with skin.

Components:

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.

isopentane:

Acute oral toxicity	:	LD 50 (Rat, male and female): > 5,000 mg/kg Method: OECD Test Guideline 401 Remarks: Based on available data, the classification criteria are not met.
Acute inhalation toxicity	:	LD50 (Rat, male and female): > 20 mg/l Exposure time: 4 h Test atmosphere: vapour Method: OECD Test Guideline 403 Remarks: Based on available data, the classification criteria are not met.

Skin corrosion/irritation

Product:

Remarks: Causes skin irritation.

Components:

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

isopentane:
Species: Rabbit
Method: Test(s) equivalent or similar to OECD Test Guideline 404
Remarks: Slightly irritating., Insufficient to classify.

Serious eye damage/eye irritation

Product:

Remarks: Causes serious eye irritation.

Components:

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

isopentane:
Species: Rabbit
Method: Test(s) equivalent or similar to OECD Test Guideline 405
Remarks: Slightly irritating., Insufficient to classify.

Respiratory or skin sensitisation

Product:

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

Components:

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

isopentane:
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.

Germ cell mutagenicity

Product:

Genotoxicity in vivo	:	Remarks: Mutagenic; positive in in-vivo and in-vitro assays., Contains 1,3-butadiene., May cause heritable genetic damage

Components:

Isoprene:

Genotoxicity in vitro	:	Method: Literature data Remarks: Suspected of causing genetic defects.
Genotoxicity in vivo	:	Test species: Mouse Method: 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.

isopentane:

Genotoxicity in vitro	:	Method: Test(s) equivalent or similar to OECD Guideline 471 Remarks: Based on available data, the classification criteria are not met.
	:	Method: Directive 67/548/EEC, Annex V, B.10. Remarks: Based on available data, the classification criteria are not met.
Genotoxicity in vivo	:	Test species: Rat Method: Directive 67/548/EEC, Annex V, B.12. 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.

Carcinogenicity

Product:

Remarks: May cause cancer., Contains Benzene, CAS # 71-43-2., Causes leukaemia (AML - acute myelogenous leukaemia)., OSHA has concluded that there is strong evidence that workplace exposure to butadiene poses an increased risk of death from cancers of the lymphohematopoietic (blood-forming) system.

Components:

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.

isopentane:

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

IARC	Group 1: Carcinogenic to humans	
	1,3-butadiene	106-99-0
	Benzene	71-43-2

	Group 2B: Possibly carcinogenic to humans	
	Isoprene	78-79-5
OSHA	OSHA specifically regulated carcinogen	
	1,3-butadiene	106-99-0
	Benzene	71-43-2
NTP	Known to be human carcinogen	
	1,3-butadiene	106-99-0
	Benzene	71-43-2
	Reasonably anticipated to be a human carcinogen	
	Isoprene	78-79-5

Reproductive toxicity

Product:

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

Components:

Isoprene:

Effects on fertility : 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.

Effects on foetal development : 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.

isopentane:

Effects on fertility : Species: Rat

Sex: male and female
Application Route: Inhalation

Method: Equivalent or similar to OECD Test Guideline 416
Remarks: Based on available data, the classification criteria are not met.

Effects on foetal development : Species: Rat, female
Application Route: Oral
Method: OECD Test Guideline 414
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.

STOT - single exposure

Product:

Remarks: 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:

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

isopentane:
Exposure routes: Inhalation
Target Organs: Central nervous system
Remarks: May cause drowsiness or dizziness.

STOT - repeated exposure

Product:

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

Components:

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

isopentane:
Remarks: Based on available data, the classification criteria are not met., Low systemic toxicity on repeated exposure.

Repeated dose toxicity

Components:

Isoprene:
Species: Mouse, male and female
Application Route: Inhalation

Test atmosphere: vapour
Method: Other guideline method.
Target Organs: No specific target organs noted

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

Aspiration toxicity

Product:

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

Components:

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

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

Further information

Product:

Remarks: May cause MDS (Myelodysplastic Syndrome)., Classifications by other authorities under varying regulatory frameworks may exist.

Components:

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

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

SECTION 12. ECOLOGICAL INFORMATION

Basis for assessment	:	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: > 10 - 100 mg/l Remarks: Harmful

Toxicity to daphnia and other aquatic invertebrates (Acute toxicity)	:	EL50: > 1 - 10 mg/l Remarks: Toxic
Toxicity to algae (Acute toxicity)	:	EL50: > 10 - 100 mg/l Remarks: Harmful
Toxicity to fish (Chronic toxicity)	:	Remarks: Data not available
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	Remarks: Data not available
Toxicity to microorganisms (Acute toxicity)	:	Remarks: Data not available

Components:

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 daphnia and other aquatic invertebrates (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 (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 fish (Chronic toxicity)	:	NOEC (Pimephales promelas (fathead minnow)): 1.1 mg/l Exposure time: 32 d Method: Based on quantitative structure-activity relationship (QSAR) modelling Remarks: NOEC/NOEL > 1.0 - <= 10 mg/l
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC (Daphnia sp. (water flea)): 1.08 mg/l Exposure time: 768 h Method: Based on quantitative structure-activity relationship (QSAR) modelling Remarks: NOEC/NOEL > 0.1 - <=1.0 mg/l
Toxicity to microorganisms (Acute toxicity)	:	Remarks: Data not available

isopentane:

Toxicity to fish (Acute toxicity)	:	LC50 (Oncorhynchus mykiss (rainbow trout)): 4.26 mg/l Exposure time: 96 h Method: Information given is based on data obtained from similar substances. Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to daphnia and other aquatic invertebrates (Acute toxicity)	:	EC50 (Daphnia magna (Water flea)): 4.2 mg/l Exposure time: 48 h Method: Test(s) equivalent or similar to OECD Guideline 301 F Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to algae (Acute toxicity)	:	EL50 (Selenastrum capricornutum (green algae)): 25.12 mg/l Exposure time: 72 h Method: Based on quantitative structure-activity relationship (QSAR) modelling Remarks: Harmful LL/EL/IL50 >10 <= 100 mg/l
Toxicity to fish (Chronic toxicity)	:	NOELR (Oncorhynchus mykiss (rainbow trout)): 7.618 mg/l Exposure time: 28 d Method: Based on quantitative structure-activity relationship (QSAR) modelling Remarks: NOEC/NOEL > 1.0 - <= 10 mg/l
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOELR (Daphnia magna (Water flea)): 13.29 mg/l Exposure time: 21 d Method: Based on quantitative structure-activity relationship (QSAR) modelling Remarks: NOEC/NOEL > 10 - <=100 mg/l
Toxicity to microorganisms (Acute toxicity)	:	EL50 (Tetrahymena pyriformis): 130.9 mg/l Exposure time: 48 h Method: Based on quantitative structure-activity relationship (QSAR) modelling Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l

Persistence and degradability

Product:

Biodegradability	:	Remarks: Not readily biodegradable.

Components:

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.

isopentane:

Biodegradability : Biodegradation: 71 %
Exposure time: 28 d
Method: Test(s) equivalent or similar to OECD Guideline 301 F
Remarks: Readily biodegradable.
Oxidises rapidly by photo-chemical reactions in air.

Bioaccumulative potential

Product:

Bioaccumulation : Remarks: Does not bioaccumulate significantly.

Components:

Isoprene:

Bioaccumulation : Remarks: Does not bioaccumulate significantly.

isopentane:

Bioaccumulation : Species: Pimephales promelas (fathead minnow)
Bioconcentration factor (BCF): 171
Method: Information given is based on data obtained from similar substances.
Remarks: Does not bioaccumulate significantly.

Mobility in soil

Product:

Mobility : Remarks: Floats on water.

Components:

Isoprene:

Mobility : Remarks: Floats on water.

isopentane:

Mobility : Remarks: Floats on water.
If the product enters soil, one or more constituents will or may be mobile and may contaminate groundwater.

Other adverse effects

Components:

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.

isopentane:

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.
Additional ecological information	:	In view of the high rate of loss from solution, the product is unlikely to pose a significant hazard to aquatic life. Does not have ozone depletion potential.

SECTION 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.

SECTION 14. TRANSPORT INFORMATION

National Regulations

49 CFR

UN/ID/NA number	:	UN 1268
Proper shipping name	:	Petroleum distillates, n.o.s.
Class	:	3
Packing group	:	I
Labels	:	3
Reportable quantity		ISOPRENE (100 lb) Isopentane (100 lb)
ERG Code	:	128
Marine pollutant	:	no

International Regulations

IATA-DGR

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

Labels : 3

IMDG-Code

UN number : UN 1268
Proper shipping name : PETROLEUM DISTILLATES, N.O.S.
Class : 3
Packing group : I
Labels : 3
Marine pollutant : yes

Maritime transport in bulk according to IMO instruments

MARPOL Annex 1 rules apply for bulk shipments by sea.

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.

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Isoprene	**78-79-5**	**100**	**400**
Benzene	**71-43-2**	**10**	**10 (D018)**

*: The components with RQs are given for information.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Flammable (gases, aerosols, liquids, or solids)
Acute toxicity (any route of exposure)
Skin corrosion or irritation
Serious eye damage or eye irritation
Aspiration hazard
Germ cell mutagenicity
Carcinogenicity
Specific target organ toxicity (single or repeated exposure)

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Isoprene	78-79-5	>= 20 - < 30 %
1,3-butadiene	106-99-0	>= 0.1 - < 1 %

Benzene	71-43-2	>= 0.1 - < 1 %

Clean Water Act

The following Hazardous Chemicals are listed under the U.S. CleanWater Act, Section 311, Table 117.3:

Isoprene	78-79-5	25 %
Benzene	71-43-2	0.5 %

US State Regulations

Pennsylvania Right To Know

Isoprene	78-79-5
isopentane	78-78-4
1,3-butadiene	106-99-0
Benzene	71-43-2

California Prop. 65

WARNING: This product can expose you to chemicals including 1,3-butadiene, Isoprene, Benzene, which is/are known to the State of California to cause cancer, and 1,3-butadiene, Benzene, which is/are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

California List of Hazardous Substances

Isoprene	78-79-5

California Regulated Carcinogens

1,3-butadiene	106-99-0
Benzene	71-43-2

Other regulations:

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

SECTION 16. OTHER INFORMATION

Further information

NFPA Rating (Health, Fire, Reactivity)	2, 4, 2

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
ACGIH BEI	:	ACGIH - Biological Exposure Indices (BEI)
OSHA CARC	:	OSHA Specifically Regulated Chemicals/Carcinogens
OSHA Z-1	:	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
OSHA Z-2	:	USA. Occupational Exposure Limits (OSHA) - Table Z-2
ACGIH / TWA	:	8-hour, time-weighted average
ACGIH / STEL	:	Short-term exposure limit
OSHA CARC / PEL	:	Permissible exposure limit (PEL)
OSHA CARC / STEL	:	Excursion limit

OSHA Z-1 / TWA	:	8-hour time weighted average
OSHA Z-1 / STEL	:	Short Term Exposure Limit
OSHA Z-2 / TWA	:	8-hour time weighted average
OSHA Z-2 / CEIL	:	Acceptable ceiling concentration
OSHA Z-2 / Peak	:	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift
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.

ACGIH = American Conference of Governmental Industrial Hygienists
ADR = European Agreement concerning the International Carriage of Dangerous Goods by Road
AICS = Australian Inventory of Chemical Substances
ASTM = American Society for Testing and Materials
BEL = Biological exposure limits
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
CAS = Chemical Abstracts Service
CEFIC = European Chemical Industry Council
CLP = Classification Packaging and Labelling
COC = Cleveland Open-Cup
DIN = Deutsches Institut fur Normung
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
DSL = Canada Domestic Substance List
EC = European Commission
EC50 = Effective Concentration fifty
ECETOC = European Center on Ecotoxicology and Toxicology Of Chemicals
ECHA = European Chemicals Agency
EINECS = The European Inventory of Existing Commercial Chemical Substances
EL50 = Effective Loading fifty
ENCS = Japanese Existing and New Chemical Substances Inventory
EWC = European Waste Code
GHS = Globally Harmonised System of Classification and Labelling of Chemicals
IARC = International Agency for Research on Cancer
IATA = International Air Transport Association
IC50 = Inhibitory Concentration fifty
IL50 = Inhibitory Level fifty
IMDG = International Maritime Dangerous Goods
INV = Chinese Chemicals Inventory
IP346 = Institute of Petroleum test method N° 346 for the determination of polycyclic aromatics DMSO-extractables
KECI = Korea Existing Chemicals Inventory
LC50 = Lethal Concentration fifty
LD50 = Lethal Dose fifty per cent.
LL/EL/IL = Lethal Loading/Effective Loading/Inhibitory loading
LL50 = Lethal Loading fifty
MARPOL = International Convention for the Prevention of Pollution From Ships
NOEC/NOEL = No Observed Effect Concentration / No Ob-

served Effect Level
OE_HPV = Occupational Exposure - High Production Volume
PBT = Persistent, Bioaccumulative and Toxic
PICCS = Philippine Inventory of Chemicals and Chemical Substances
PNEC = Predicted No Effect Concentration
REACH = Registration Evaluation And Authorisation Of Chemicals
RID = Regulations Relating to International Carriage of Dangerous Goods by Rail
SKIN_DES = Skin Designation
STEL = Short term exposure limit
TRA = Targeted Risk Assessment
TSCA = US Toxic Substances Control Act
TWA = Time-Weighted Average
vPvB = very Persistent and very Bioaccumulative

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).
Revision Date	:	03/07/2025

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.

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