1. MATERIAL AND COMPANY IDENTIFICATION

Material Name : **C5 Gasoline**
Uses : Chemical intermediate.
Product Code : X2160
Company : **Shell Chemical LP**
PO Box 2463
HOUSTON TX 77252-2463
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

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No.	Concentration
Hydrocarbons C5-Rich	68476-55-1	100.00 %
CONTAINS:		%
Pentane, iso-	78-78-4	20.00 - 30.00 %
1,3-Pentadiene	504-60-9	<= 20.00 %
Cyclopentane	287-92-3	10.00 - 20.00 %
Pentane, -n	109-66-0	10.00 - 20.00 %
n-Pentene	25377-72-4	10.00 - 20.00 %
2-Methyl-1-butene	563-46-2	10.00 - 20.00 %
2-Methyl-2-Butene	513-35-9	5.00 - 10.00 %
Isoprene	78-79-5	<= 5.00 %
3-Methyl-1-Butene	563-45-1	1.00 - 5.00 %

3. HAZARDS IDENTIFICATION

Emergency Overview

Appearance and Odour : Clear. Liquid. Disagreeable.

Health Hazards : Vapours may cause drowsiness and dizziness. Harmful: may cause lung damage if swallowed. May cause cancer.

Safety Hazards : Extremely flammable. Highly reactive. May form explosive peroxides. Will float and can be reignited on surface water. The vapour is heavier than air, spreads along the ground and distant ignition is possible. 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.

Health Hazards

Inhalation	:	Slightly irritating to respiratory system. Vapours may cause drowsiness and dizziness.
Skin Contact	:	May cause moderate irritation to skin. Repeated exposure may cause skin dryness or cracking.
Eye Contact	:	Moderately irritating to eyes.
Ingestion	:	Harmful: may cause lung damage if swallowed.
Other Information	:	May cause cancer. Possible risk of irreversible (genetic) effects.
Signs and Symptoms	:	Eye irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blurred vision. Skin irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blisters. Defatting dermatitis signs and symptoms may include a burning sensation and/or a dried/cracked appearance. 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. If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever. The onset of respiratory symptoms may be delayed for several hours after exposure.
Aggravated Medical Condition	:	Pre-existing medical conditions of the following organ(s) or organ system(s) may be aggravated by exposure to this material: Central nervous system (CNS). Skin. Eyes.

4. FIRST AID MEASURES

Inhalation	:	Remove to fresh air. If rapid recovery does not occur, transport to nearest medical facility for additional treatment.
Skin Contact	:	Remove contaminated clothing. 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.
Eye Contact	:	Immediately flush eyes with large amounts of water for at least 15 minutes while holding eyelids open. Transport to the nearest medical facility for additional treatment.
Ingestion	:	If swallowed, do not induce vomiting: transport to nearest medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent aspiration. 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. Give nothing by mouth.
Advice to Physician	:	Potential for chemical pneumonitis. Call a doctor or poison

control center for guidance.

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

Flash point	:	-51.7 °C / -61.0 °F
Specific Hazards	:	Carbon monoxide may be evolved if incomplete combustion occurs. Will float and can be reignited on surface water. The vapour is heavier than air, spreads along the ground and distant ignition is possible.
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.
Protective Equipment for Firefighters	:	Wear full protective clothing and self-contained breathing apparatus.
Additional Advice	:	Keep adjacent containers cool by spraying with water.

6. ACCIDENTAL RELEASE MEASURES

Observe all relevant local and international regulations.

Protective measures	:	Avoid contact with spilled or released material. Immediately remove all contaminated clothing. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. For guidance on disposal of spilled material see Chapter 13 of this Material Safety Data Sheet. Be ready for fire or possible exposure. Stay upwind and keep out of low areas. Shut off leaks, if possible without personal risks. Remove all possible sources of ignition in the surrounding area. Use appropriate containment (of product and fire fighting water) to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers. Attempt to disperse the vapour or to direct its flow to a safe location for example by using fog sprays. Take precautionary measures against static discharge. Ensure electrical continuity by bonding and grounding (earthing) all equipment.
Clean Up Methods	:	For small liquid spills (< 1 drum), transfer by mechanical means to a labelled, sealable container for product recovery or safe disposal. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely. 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.
Additional Advice	:	Risk of explosion. Inform the emergency services if liquid enters

surface water drains. 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. Under Section 311 of the Clean Water Act (CWA) this material is considered an oil. As such, spills into surface waters must be reported to the National Response Center at (800) 424-8802. This material is covered by EPA's Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Petroleum Exclusion. Therefore, releases to the environment may not be reportable under CERCLA.

7. HANDLING AND STORAGE

General Precautions : Avoid breathing vapours or contact with material. Only use in well ventilated areas. Wash thoroughly after handling. On guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet.

Handling : Avoid inhaling vapour and/or mists. Avoid contact with skin, eyes and clothing. 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. The vapour is heavier than air. Beware of accumulation in pits and confined spaces. Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. Handling Temperature: Ambient.

Storage : Keep away from aerosols, flammables, oxidizing agents, corrosives and from other flammable products which are not harmful or toxic to man or to the environment. Keep container tightly closed. Must be stored in a diked (bunded) well-ventilated area, away from sunlight, ignition sources and other sources of heat. Vapours from tanks should not be released to atmosphere. Breathing losses during storage should be controlled by a suitable vapour treatment system. 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. Storage Temperature: Ambient.

Product Transfer	:	Refer to guidance under Handling section.
Container Advice	:	Containers, even those that have been emptied, can contain explosive vapours. Do not cut, drill, grind, weld or perform similar operations on or near containers.
Additional Information	:	Ensure that all local regulations regarding handling and storage facilities are followed. See additional references that provide safe handling practices 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). CENELEC CLC/TR 50404 (Electrostatics – Code of practice for the avoidance of hazards due to static electricity).

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

Material	Source	Type	ppm	mg/m3	Notation
Pentane, -n	ACGIH	TWA	600 ppm		
	OSHA Z1	PEL	1,000 ppm	2,950 mg/m3	
	OSHA Z1A	TWA	600 ppm	1,800 mg/m3	
	OSHA Z1A	STEL	750 ppm	2,250 mg/m3	
Cyclopentane	ACGIH	TWA	600 ppm		
	OSHA Z1A	TWA	600 ppm	1,720 mg/m3	
Pentane, iso-	ACGIH	TWA	600 ppm		
Cyclopentane	ACGIH	TWA	600 ppm		
	OSHA Z1A	TWA	600 ppm	1,720 mg/m3	
Pentane, -n	ACGIH	TWA	600 ppm		
	OSHA Z1	PEL	1,000 ppm	2,950 mg/m3	
	OSHA Z1A	TWA	600 ppm	1,800 mg/m3	
	OSHA Z1A	STEL	750 ppm	2,250 mg/m3	
Isoprene	SHELL IS	TWA (8 h)	10 ppm	28 mg/m3	
	SHELL IS	STEL	50 ppm	140 mg/m3	

Biological Exposure Index (BEI)

Biological Limit Values (BLV) have not been established for this material.

Additional Information	:	Shell has adopted as Interim Standards the OSHA Z1A values that were established in 1989 and later rescinded. SHELL IS is the Shell Internal Standard.
Exposure Controls	:	The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Adequate explosion-proof ventilation to control airborne concentrations below the exposure guidelines/limits.
Personal Protective Equipment	:	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 respiratory protective equipment is required, use a full-face mask. If air-filtering respirators are suitable for conditions of use: Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65 °C (149 °F)].
Hand Protection	:	Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739, AS/NZS:2161) made from the following materials may provide suitable chemical protection: Longer term protection - Viton. Incidental contact/Splash protection - Nitrile rubber. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.
Eye Protection	:	Chemical splash goggles (chemical monogoggles).
Protective Clothing	:	Chemical resistant gloves/gauntlets, boots, and apron (where risk of splashing). Where risk of splashing or in spillage clean up, use chemical resistant one-piece overall with integral hood. Wear antistatic and flame retardant clothing.
Monitoring Methods	:	Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate. Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available. National Institute of Occupational Safety and Health (NIOSH), USA: Manual of

Analytical Methods http://www.cdc.gov/niosh/ Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods http://www.osha.gov/ Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances, http://www.hse.gov.uk/ 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

9. PHYSICAL AND CHEMICAL PROPERTIES

The physical and chemical property data are typical values and do not constitute a specification.

Appearance	:	Clear. Liquid.
Odour	:	Disagreeable.
Boiling point	:	32.2 °C / 90.0 °F
Flash point	:	-51.7 °C / -61.0 °F
Vapour pressure	:	18.0 psia at 37.8 °C / 100.0 °F
Specific gravity	:	0.66
Water solubility	:	0.05 g/l Negligible.
Electrical 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.
State of aggregation	:	Liquid/Solid
Viscosity		0.22 centiPoise at 37.8 °C / 100.0 °F

10. STABILITY AND REACTIVITY

Stability	:	Reacts violently with strong oxidising agents. Oxidises on contact with air to form unstable peroxides.
Conditions to Avoid	:	Heat, flames, and sparks.
Materials to Avoid	:	Strong oxidising agents.
Hazardous Decomposition Products	:	Thermal decomposition is highly dependent on conditions. A complex mixture of airborne solids, liquids and gases, including carbon monoxide, carbon dioxide and other organic compounds will be evolved when this material undergoes combustion or thermal or oxidative degradation.
Hazardous Polymerisation	:	Material will spontaneously polymerise.

11. TOXICOLOGICAL INFORMATION

Basis for Assessment	:	Information given is based on product testing, and/or similar products, and/or components.
Acute Oral Toxicity	:	Low toxicity: LD50 >2000 mg/kg , Rat (Isoprene) Aspiration into the lungs when swallowed or vomited may cause

chemical pneumonitis which can be fatal.

Acute Inhalation Toxicity : Low toxicity: LC50>5000 ppm / 1 hours, Rat (Isoprene)
High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea; continued inhalation may result in unconsciousness and/or death.

Skin corrosion/irritation : May cause moderate irritation to skin. (Isoprene)
Prolonged/repeated contact may cause defatting of the skin which can lead to dermatitis.

Serious eye damage/irritation : Moderately irritating to eyes.(Isoprene)

Respiratory Irritation : Inhalation of vapours or mists may cause irritation to the respiratory system.

Germ cell mutagenicity : Mutagenic; positive in in-vivo assays. (Isoprene)

Carcinogenicity : Causes cancer in laboratory animals. (Isoprene)

Material	:	**Carcinogenicity Classification**
Pentane, iso-	:	GHS / CLP: No carcinogenicity classification
1,3-Pentadiene	:	GHS / CLP: No carcinogenicity classification
Cyclopentane	:	GHS / CLP: No carcinogenicity classification
Pentane, -n	:	GHS / CLP: No carcinogenicity classification
n-Pentene	:	GHS / CLP: No carcinogenicity classification
2-Methyl-1-butene	:	GHS / CLP: No carcinogenicity classification
2-Methyl-2-Butene	:	GHS / CLP: No carcinogenicity classification
Isoprene	:	NTP: Reasonably Anticipated to be a Human Carcinogen.
Isoprene	:	IARC 2B: Possibly carcinogenic to humans.
Isoprene	:	GHS / CLP: Carcinogenicity Category 1B
3-Methyl-1-Butene	:	GHS / CLP: No carcinogenicity classification

Reproductive and Developmental Toxicity : Does not impair fertility. (Isoprene)

Not a developmental toxicant. (Isoprene)

12. ECOLOGICAL INFORMATION

This section will be updated as ecological reviews are completed.

13. DISPOSAL CONSIDERATIONS

Material Disposal : Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations.
Do not dispose into the environment, in drains or in water courses. Waste product should not be allowed to contaminate soil or water.

Local Legislation : Disposal should be in accordance with applicable regional,

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

14. TRANSPORT INFORMATION

Additional Information	Transportation requirements determined on a case by case basis by shipping location.

15. REGULATORY INFORMATION

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

Federal Regulatory Status

Notification Status

TSCA Listed.

Comprehensive Environmental Release, Compensation & Liability Act (CERCLA)

C5 Gasoline () Reportable quantity: 500 lbs

1,3-Pentadiene (504-60-9)
Cyclopentane (287-92-3)
2-Methyl-1-butene (563-46-2)
2-Methyl-2-Butene (513-35-9)
Isoprene (78-79-5)
3-Methyl-1-Butene (563-45-1)

Shell classifies this material as an "oil" under the CERCLA Petroleum Exclusion, therefore releases to the environment are not reportable under CERCLA. The components with RQs are given for information.

Clean Water Act (CWA) Section 311

Isoprene (78-79-5) Reportable quantity: 100 lbs

Under Section 311 of the Clean Water Act (CWA) this material is considered an oil. As such, spills into surface waters must be reported to the National Response Center at (800) 424-8802. The components with RQs are given for information.

SARA Hazard Categories (311/312)

Immediate (Acute) Health Hazard. Delayed (Chronic) Health Hazard. Fire Hazard.

Reactive Hazard.

SARA Toxic Release Inventory (TRI) (313)

Isoprene (78-79-5)

State Regulatory Status

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)

Known to the state of California to cause cancer.

Isoprene (78-79-5) 5.00%	Carcinogenic.

New Jersey Right-To-Know Chemical List

Pentane, iso- (78-78-4)	Listed.
1,3-Pentadiene (504-60-9)	Listed.
Cyclopentane (287-92-3)	Listed.
Pentane, -n (109-66-0)	Listed. Special hazard.
n-Pentene (25377-72-4)	Listed.
2-Methyl-1-butene (563-46-2)	Listed.
2-Methyl-2-Butene (513-35-9)	Listed.
Isoprene (78-79-5)	Listed.
3-Methyl-1-Butene (563-45-1)	Listed.

Pennsylvania Right-To-Know Chemical List

Pentane, iso- (78-78-4)	Listed.
1,3-Pentadiene (504-60-9)	Listed. Environmental hazard.
Cyclopentane (287-92-3)	Listed.
Pentane, -n (109-66-0)	Listed.
2-Methyl-1-butene (563-46-2)	Listed.
2-Methyl-2-Butene (513-35-9)	Listed.
Isoprene (78-79-5)	Environmental hazard. Listed.

16. OTHER INFORMATION

HMIS Rating (Health, Fire, Reactivity)	:	2, 4, 1
NFPA Rating (Health, Fire, Reactivity)	:	2, 4, 1
SDS Version Number	:	4.1
SDS Effective Date	:	01/07/2013

SDS Revisions	:	A vertical bar (|) in the left margin indicates an amendment from the previous version.
SDS Regulation	:	The content and format of this MSDS is in accordance with the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
Uses and Restrictions	:	Raw material for use in the chemical industry.
SDS Distribution	:	The information in this document should be made available to all who may handle the product
Disclaimer	:	The information contained herein is based on our current knowledge of the underlying data and is intended to describe the product for the purpose of health, safety and environmental requirements only. No warranty or guarantee is expressed or implied regarding the accuracy of these data or the results to be obtained from the use of the product.