SAFETY DATA SHEET

Revision Date 31-Jul-2017 **SDS Number** 888100004849 **Revision Number** 1.01

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

Product Name **Mixed Pentanes**

Synonyms Isomerate, DeHexanizer Overhead, Sweet Pentane, Isopentane, RS099

Recommended Use Fuel
Uses advised against All others

Manufacturer
Tesoro Refining & Marketing Co.
19100 Ridgewood Parkway
San Antonio, TX 78259

Emergency Telephone Chemtrec: 1-800-424-9300
Tesoro Call Center: 1-877-783-7676

E-mail address ProductStewardship@TSOCORP.com

2. HAZARDS IDENTIFICATION

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 1
Acute Oral Toxicity	Category 4
Acute dermal toxicity	Category 3
Skin Corrosion/Irritation Category	Category 2
Germ cell mutagenicity	Category 1B
Carcinogenicity	Category 1A
Reproductive toxicity	Category 2
Specific target organ toxicity (single exposure)	Category 3
Specific target organ toxicity (repeated exposure)	Category 1
Chronic Aquatic Toxicity	Category 2
Aspiration toxicity	Category 1

Label elements

Danger

Extremely flammable liquid and vapor
Harmful if swallowed
Toxic in contact with skin
Causes skin irritation
May cause genetic defects
May cause cancer
Suspected of damaging fertility or the unborn child

May cause drowsiness or dizziness by inhalation.
Causes damage to organs through prolonged or repeated exposure
Toxic to aquatic life with long lasting effects
May be fatal if swallowed and enters airways

Appearance Liquid **Physical State @20°C** Liquid **Odor** Gasoline-like

Precautionary Statements - Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Wear protective gloves/protective clothing/eye protection/face protection
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/or bond container and receiving equipment
Use explosion-proof electrical/ ventilating / lighting / equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Keep cool

Precautionary Statements - Response
IF exposed or concerned: Get medical advice/attention
Call a POISON CENTER or doctor if you feel unwell
If skin irritation occurs: Get medical advice/attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower
Wash contaminated clothing before reuse
IF INHALED: Remove person to fresh air and keep comfortable for breathing
IF SWALLOWED: Immediately call a POISON CENTER or doctor
Do NOT induce vomiting
Rinse mouth
In case of fire: Use CO2, dry chemical, or foam to extinguish

Precautionary Statements - Storage
Store in a well-ventilated place. Keep container tightly closed

Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)
Not applicable

Other Information
Toxic to aquatic life.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Percent
Naphtha (petroleum), isomerization	64741-70-4	0-100
Hydrocarbons, C5 rich	68476-55-1	0-100

Isopentane	78-78-4	0-90
Pentane	109-66-0	0-60
Neohexane	75-83-2	0-35
2-Methylpentane	107-83-5	0-35
3-Methylpentane	96-14-0	0-20
2,3-Dimethylbutane	79-29-8	0-15
N-hexane	110-54-3	0-10
Cyclohexane	110-82-7	0-10
Butane	106-97-8	0-10
2-Methyl-2-Butene	513-35-9	0-10
Benzene	71-43-2	0-1

4. FIRST AID MEASURES

Description of first aid measures

General advice

Show this safety data sheet to the doctor in attendance. Remove from exposure, lie down. In case of accident or if you feel unwell, seek medical advice immediately. When symptoms persist or in all cases of doubt, seek medical advice. Never give anything by mouth to an unconscious person. Take off all contaminated clothing immediately and thoroughly wash material from skin. Immediate medical attention is required.

Inhalation

Remove to fresh air. Aspiration into lungs can produce severe lung damage. If breathing has stopped, give artificial respiration. Get medical attention immediately. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. If breathing is difficult, (trained personnel should) give oxygen. Get immediate medical advice/attention. Delayed pulmonary edema may occur. Immediate medical attention is required. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

Eye contact

Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Keep eye wide open while rinsing. Do not rub affected area. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.

Skin contact

Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation develops and persists. Note: When using this product in high pressure equipment - Accidental high velocity dermal injection of this material requires immediate medical attention.

Ingestion

Do NOT induce vomiting. Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. ASPIRATION HAZARD IF SWALLOWED - CAN ENTER LUNGS AND CAUSE DAMAGE. If vomiting occurs spontaneously, keep head below hips to prevent aspiration. Get immediate medical advice/attention.

Self-protection of the first aider

Remove all sources of ignition. Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination. Use personal protective equipment as required. See section 8 for more information. Avoid contact with skin, eyes or clothing. Wear personal protective clothing (see section 8). Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Do not breathe vapor or mist.

Most important symptoms and effects, both acute and delayed

Symptoms

Difficulty in breathing. Coughing and/ or wheezing. Dizziness. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting.

Indication of any immediate medical attention and special treatment needed

Note to physicians Because of the danger of aspiration, emesis or gastric lavage should not be employed unless the risk is justified by the presence of additional toxic substances. A patient adversely affected by exposure to this product should not be given adrenaline (epinephrine) or similar heart stimulant since these would increase the risk of cardiac arrhythmias.

5. FIRE-FIGHTING MEASURES

Small Fire Any extinguisher suitable for Class B fires, dry chemical, CO2, foam (AFFF/ATC), or water spray can be used.

Large Fire Water spray, fog or alcohol-resistant foam. CAUTION: Use of water spray when fighting fire may be inefficient. Cool containers with flooding quantities of water until well after fire is out.

Unsuitable extinguishing media CAUTION: Use of water spray when fighting fire may be inefficient.

Specific hazards arising from the chemical Risk of ignition. Keep product and empty container away from heat and sources of ignition. In the event of fire, cool tanks with water spray. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

Hazardous combustion products Smoke, CO, and other products of incomplete combustion.

Explosion data
Sensitivity to Mechanical Impact None.
Sensitivity to Static Discharge Yes.

Special protective equipment for fire-fighters Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible withdraw from area and let fire burn.

Further information ALWAYS stay away from tanks engulfed in fire. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. Do not direct water at source of leak or safety devices; icing may occur. Cool containers with flooding quantities of water until well after fire is out. Do not allow run-off from fire-fighting to enter drains or water courses.

NFPA **Health hazards** 1 **Flammability** 4 **Stability** 0 **Physical and chemical properties** -

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions Evacuate personnel to safe areas. Use personal protective equipment as required. See section 8 for more information. Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Keep people away from and upwind of spill/leak. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Pay attention to flashback. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Do not breathe vapor or mist.

Other Information Ventilate the area. Refer to protective measures listed in Sections 7 and 8.

Environmental precautions

Environmental precautions Refer to protective measures listed in Sections 7 and 8. Prevent further leakage or spillage if safe to do so. Prevent product from entering drains.

Methods and material for containment and cleaning up

Methods for containment Stop leak if you can do it without risk. Do not touch or walk through spilled material. A vapor suppressing foam may be used to reduce vapors. Dike far ahead of spill to collect runoff

water. Keep out of drains, sewers, ditches and waterways. Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal.

Methods for cleaning up Take precautionary measures against static discharges. Dam up. Soak up with inert absorbent material. Pick up and transfer to properly labeled containers.

Prevention of secondary hazards Clean contaminated objects and areas thoroughly observing environmental regulations.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling Use personal protection equipment. Avoid contact with skin and eyes. Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Use grounding and bonding connection when transferring this material to prevent static discharge, fire or explosion. Use spark-proof tools and explosion-proof equipment. Keep in an area equipped with sprinklers. Use according to package label instructions. Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Do not eat, drink or smoke when using this product. Remove contaminated clothing and shoes. Take off contaminated clothing and wash before reuse. Do not breathe vapor or mist. In case of insufficient ventilation, wear suitable respiratory equipment. Handle product only in closed system or provide appropriate exhaust ventilation.

Hydrocarbon liquids including this product can act as a non-conductive flammable liquid (or static accumulator), and may form ignitable vapor-air mixtures in storage tanks or other containers. Precautions to prevent static initiated fire or explosion during transfer, storage or handling, include but are not limited to these examples: (1) Ground and bond containers during product transfers. Grounding and bonding may not be adequate protection to prevent ignition or explosion of hydrocarbon liquid and vapors that are static accumulators. (2) Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel or diesel) is loaded into tanks previously containing low flash point products (such as gasoline or naphtha). (3) Storage tank level floats must be effectively bonded. For more information on precautions to prevent static-initiated fire or explosion, see NFPA 77 Recommended Practice on Static Electricity and API Recommended Practice 2003 Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). Keep in properly labeled containers. Do not store near combustible materials. Keep in an area equipped with sprinklers. Store in accordance with the particular national regulations. Store in accordance with local regulations. Store locked up. Keep out of the reach of children. Store away from other materials. Keep away from food, drink and animal feed. Incompatible with oxidizing agents. Incompatible with acids. Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure.

Keep away from flame, sparks, excessive temperatures and open flame. Use approved containers. Keep containers closed and clearly labeled. Empty or partially full product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. The storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Chemical Name	ACGIH TLV	OSHA PEL
Isopentane 78-78-4	TWA: 1000 ppm	-
Pentane 109-66-0	TWA: 1000 ppm	TWA: 1000 ppm TWA: 2950 mg/m³ (vacated) TWA: 600 ppm (vacated) TWA: 1800 mg/m³ (vacated) STEL: 750 ppm (vacated) STEL: 2250 mg/m³
Neohexane 75-83-2	STEL: 1000 ppm TWA: 500 ppm	-
2-Methylpentane 107-83-5	STEL: 1000 ppm TWA: 500 ppm	-
3-Methylpentane 96-14-0	STEL: 1000 ppm TWA: 500 ppm	-
2,3-Dimethylbutane 79-29-8	STEL: 1000 ppm TWA: 500 ppm	-
N-hexane 110-54-3	TWA: 50 ppm S*	TWA: 500 ppm TWA: 1800 mg/m³ (vacated) TWA: 50 ppm (vacated) TWA: 180 mg/m³
Cyclohexane 110-82-7	TWA: 100 ppm	TWA: 300 ppm TWA: 1050 mg/m³ (vacated) TWA: 300 ppm (vacated) TWA: 1050 mg/m³
Butane 106-97-8	STEL: 1000 ppm	(vacated) TWA: 800 ppm (vacated) TWA: 1900 mg/m³
Benzene 71-43-2	STEL: 2.5 ppm TWA: 0.5 ppm S*	TWA: 10 ppm applies to industry segments exempt from the benzene standard at 29 CFR 1910.1028 TWA: 1 ppm (vacated) TWA: 10 ppm unless specified in 1910.1028 (vacated) STEL: 50 ppm 10 min unless specified in 1910.1028 (vacated) Ceiling: 25 ppm unless specified in 1910.1028 Ceiling: 25 ppm STEL: 5 ppm see 29 CFR 1910.1028

S* - Potential exposure by cutaneous route

NOTE: Limits shown for guidance only. For additional information, OSHA's 1989 air contaminants standard exposure limits provided even though the limits were vacated in 1992. State, local or other agencies or advisory groups may have established more stringent limits. Follow applicable regulations.

Appropriate engineering controls

Engineering controls Showers
Eyewash stations
Ventilation systems.

Individual protection measures, such as personal protective equipment

Eye/face protection Use goggles or face-shield where there is a possibility of splashing.

Hand Protection Wear suitable gloves. Polyvinyl alcohol. Nitrile rubber. Neoprene gloves. Ensure that the breakthrough time of the glove material is not exceeded. Refer to glove supplier for information on breakthrough time for specific gloves.

Skin and body protection If there is a risk of contact:. Wear suitable protective clothing. Wear fire/flame resistant/retardant clothing.

Respiratory protection

When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. Use a NIOSH approved respirator when there is a potential for airborne concentrations to exceed occupational exposure limits. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2, NIOSH Respirator Decision Logic, and the respirator manufacturer for additional guidance on respiratory protection selection. A Self-Contained Breathing Apparatus (SCBA) should be used for fire fighting. Use a NIOSH approved positive-pressure supplied air respirator if there is a potential for uncontrolled release, exposure levels are unknown, in oxygen deficient (less than 19.5% oxygen), or any other circumstance where an air-purifying respirator may not provide adequate protection.

General hygiene considerations

Do not eat, drink or smoke when using this product. Contaminated work clothing should not be allowed out of the workplace. Regular cleaning of equipment, work area and clothing is recommended. Wash hands before breaks and immediately after handling the product. Avoid contact with skin, eyes or clothing. Wear suitable gloves and eye/face protection. Remove and wash contaminated clothing and gloves, including the inside, before re-use.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical State @20°C	Liquid
Appearance	Liquid
Odor	Gasoline-like
Color	Clear
Odor threshold	Detectable at 300-500 ppm

Property	**Values**	**Remarks • Method**
pH	Not applicable	
Melting point / freezing point	-159 °C / -254 °F	
Boiling range	24 - 24 to 32 °C	
Flash point	-57 °C / -71 °F	
Evaporation rate	No data available	
Flammability (solid, gas)	Flammable vapor released by liquid	
Flammability Limit in Air %		
Upper flammability limit:	7.8	
Lower flammability limit:	1.5	
Vapor pressure	573	
Vapor density	2.5	
Relative density	0.624	
Water solubility	48 mg/L	
Solubility in other solvents	No data available	
Partition coefficient	3.4	
Autoignition temperature	420 °C / 788 °F	
Decomposition temperature	No data available	
Kinematic viscosity	0.34 cSt @ 20	
Dynamic viscosity	No data available	
Explosive properties	No data available	
Oxidizing properties	No data available	
Minimum Ignition Energy (mJ)	No data available	
K_{st} (bar.m/s)	No data available	
Softening point	No data available	
VOC Content (%)	No data available	
Density	No data available	
Bulk density	Not applicable	
Conductivity	Hydrocarbon liquids without static dissipater additive may have conductivity below 1 picoSiemens per meter (pS/m). The highest electro-static ignition risks are associated with "ultra-low conductivities" below 5 pS/m. See Section 7 for sources of information on defining safe loading and handling procedures for low conductivity products. Note that conductivity can be reduced by environmental factors such as a decrease in temperature	

10. STABILITY AND REACTIVITY

Reactivity This product is non-reactive under normal conditions.

Chemical stability Stable under recommended storage conditions.

Possibility of hazardous reactions None under normal processing.

Conditions to avoid Heat, flames and sparks. Excessive heat.

Incompatible materials Strong acids. Strong bases. Strong oxidizing agents.

Hazardous decomposition products None under normal use conditions.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation Specific test data for the substance or mixture is not available. Aspiration into lungs can produce severe lung damage. May cause pulmonary edema. Pulmonary edema can be fatal. May cause irritation of respiratory tract. May cause drowsiness or dizziness by inhalation.

Eye contact Specific test data for the substance or mixture is not available. Irritating to eyes. (based on components).

Skin contact Repeated exposure may cause skin dryness or cracking. Specific test data for the substance or mixture is not available. Causes skin irritation. (based on components). Toxic in contact with skin.

Ingestion Specific test data for the substance or mixture is not available. Potential for aspiration if swallowed. May cause lung damage if swallowed. Aspiration may cause pulmonary edema and pneumonitis. May be fatal if swallowed and enters airways. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. (based on components).

Information on toxicological effects

Symptoms Difficulty in breathing. Coughing and/ or wheezing. Dizziness. Redness. May cause redness and tearing of the eyes. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting.

Numerical measures of toxicity

Acute toxicity

The following values are calculated based on chapter 3.1 of the GHS document .

ATEmix (oral)	1,280.00 mg/kg
ATEmix (dermal)	935.00 mg/kg
ATEmix (inhalation-gas)	2,159,104.96 mg/l
ATEmix (inhalation-dust/mist)	153.00 mg/l
ATEmix (inhalation-vapor)	1,319.51 mg/l

Chemical Name	Oral LD50	LD50/dermal/rat - NO UNITS (Wizards mg/kg)	Inhalation LC50
Naphtha (petroleum), isomerization 64741-70-4	> 7000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 5.04 mg/L (Rat) 4 h
Isopentane 78-78-4	-	-	= 280000 mg/m³ (Rat) 4 h
Pentane 109-66-0	> 2000 mg/kg (Rat)	= 3000 mg/kg (Rabbit)	= 364 g/m³ (Rat) 4 h
N-hexane 110-54-3	= 25 g/kg (Rat)	= 3000 mg/kg (Rabbit)	= 48000 ppm (Rat) 4 h
Cyclohexane	= 12705 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	= 13.9 mg/L (Rat) 4 h

110-82-7			
Butane 106-97-8	-	-	= 658 g/m³ (Rat) 4 h
2-Methyl-2-Butene 513-35-9	700 - 2600 mg/kg (Rat)	> 2000 mg/kg (Rat)	> 61000 ppm (Rat) 4 h
Benzene 71-43-2	= 1800 mg/kg (Rat) = 810 mg/kg (Rat)	> 8200 mg/kg (Rabbit)	= 44.66 mg/L (Rat) 4 h

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Chemical Name

Naphtha (petroleum), isomerization Gasoline blending streams, or naphthas, may be fatal if they are swallowed and enter the airway, and may be irritating if inhaled. Altered mental state, drowsiness, dizziness, peripheral motor neuropathy, irreversible brain damage (gasoline sniffer's neuropathy), delirium, seizures, and sudden death have been reported from repeated exposure or overexposure. In animal studies, these naphthas demonstrate consistently low acute toxicity by oral, dermal and inhalation exposure, are only mildly irritating to the eye, are mild to moderate skin irritants and are not skin sensitizers. Repeated exposures resulted in systemic toxicity that included changes to organ weight, including the liver, decreases to body weight, and changes to clinical pathology. Most naphthas are not considered mutagenic in mammalian cells, though equivocal results were reported with materials having relatively higher aromatic content. Mammals exposed to naphtha dermally or by inhalation of vapor did not demonstrate developmental or reproductive toxicity up to the highest doses tested; however, loss of offspring during pregnancy (resorption) and decreased sperm number have been observed in some studies. Long term inhalation exposure to gasoline produced tumors in male rat kidneys; this result is a species- and sex-specific syndrome that is not relevant to human health. Skin tumors were induced after 2 years dermal exposure primarily by naphtha streams derived from cracked stocks. The carcinogenicity of individual petroleum streams varies due to factors such as source and processing; IARC and ECHA C&L Inventory reports individually on the carcinogenicity of these substances.

Pentane Pentane may be fatal if it is swallowed and enters the airway. If inhaled, short-term (acute) overexposure can cause drowsiness, disorientation, other narcotic effects, and possibly death. Acute exposure to n-pentane by inhalation and ingestion results in low toxicity in animal studies. Exposure can cause irritation to eyes, skin (including dermatitis), and nose. Sensitization has not been reported. Exposure to high enough levels may also affect the central nervous system (CNS).

2-Methylpentane 2-Methylpentane may be fatal if it is swallowed and enters airways. It affects the eyes, skin, respiratory system, and central nervous system. Overexposure can cause irritation to eyes and skin (including dermatitis) and respiratory system. Inhalation can cause drowsiness, dizziness, and nausea.

N-hexane N-Hexane may be fatal if it is swallowed and enters the airways. Acute (short-term) dermal overexposure can cause skin and eye irritation in humans. Acute inhalation and oral exposures have caused systemic effects such as decreased body weight and respiratory effects, as well as reproductive and developmental effects in animals. Respiratory effects may include nose, throat, and lung irritation, coughing, wheezing, and shortness of breath. Acute overexposures may also cause headache, nausea, vomiting, dizziness, lightheadedness, loss of consciousness, coma, and death in human. Intermediate duration inhalation and oral exposures to relatively high concentrations (400-3,000 ppm) of n-hexane have led to nerve damage, paralysis, and/or deaths in rats. N-hexane may damage male reproductive glands. Intermediate-duration inhalation and oral exposure to high levels (1,000-10,000 ppm; 4,000 mg/kg/day) of n-hexane damages sperm-forming cells and testicles in rats. Chronic (long-term) inhalation of large amounts of n-hexane causes nerve damage and paralysis of the arms and legs in humans. Dermal effects, such as a skin rash, dryness, or redness can also occur following chronic overexposure. Chronic duration inhalation exposures in animals are not available.

Cyclohexane Cyclohexane may be fatal if it is swallowed and enters the airways. Cyclohexane has low acute oral, dermal, and inhalation toxicity. Acute (short-term) overexposure can irritate and

	burn the eyes, irritate the nose and throat, and cause coughing, wheezing, headache, dizziness, nausea, vomiting, lightheadedness, drowsiness, and unconciousness at high concentrations. Chronic inhalation exposure caused maternal toxicity and developmental effects in rats. At high enough levels, repeated or prolonged contact with skin may cause dermatitis.
Butane	If inhaled, short-term overexposure to hydrocarbon gases may cause rapid suffocation. Inhalation of butane at very high concentrations can cause drowsiness, narcosis, axphyxia, and cardiac arrhythmia; butane affects the central nervous system (CNS). As gases, the primary route of exposure is inhalation; compressed gases may exhibit additional hazards. In animal studies, 2-Butene was the most toxic of the C1-4 hydrocarbon gas (C1-4 HCs) evaluated for its short term (acute) toxicity when inhaled for four hours at 10,000 ppm (23.1 g/m^3); no fatalities were observed, and no LC50 value was established. Repeated dose toxicity has been observed in combination with testing for reproductive and developmental toxicity; the lowest does at which adverse effects were observed (LOAEL) following repeated dose reported to be 5,000 ppm. Adverse effects included lowered body weight, though some changes in blood chemistry were also reported. C1-4 HCs were not mutagenic in several test systems using bacteria or mammalian cells, nor were they mutagenic in animal studies. No adverse developmental effects were reported for the highest dose tested (NOAEL ≥ 5,000 ppm). Reproductive toxicity was reported for isobutene (LOAEL = 9,000 ppm) as reduced fertility in females and pregnancy loss; caution should be used in interpreting the results of this study due to the small number of animals tested. The carcinogenicity of individual petroleum streams varies due to factors such as source and processing; IARC and ECHA C&L Inventory reports individually on the carcinogenicity of these substances.
Benzene	Benzene exposure may occur through inhalation, ingestion, skin absorption or eye contact. Benzene exposure can cause skin, eye and respiratory irritation. The most characteristic systemic effect resulting from high enough intermediate and chronic benzene exposure is arrested development of blood cells. Studies have linked overexposure to benzene to many hematological effects including aplastic anemia, pancytopenia, leukopenia, and myelodysplastic syndrome. In vivo and in vitro data from both humans and animals show that benzene and/or its metabolites are genotoxic. Studies in animals provide supporting evidence for the carcinogenicity of inhaled benzene. Epidemiological studies have reported a causal relationship between occupational benzene exposures and acute myelogenous leukemia. Some studies suggest associations between benzene exposure and non-Hodgkin's lymphoma, multiple myeloma, and other cancers. Benzene has been classified as carcinogenic to humans (Group 1) by IARC, and the ECHA C&L Inventory states it may cause cancer (Carc. 1B). IARC concluded that benzene causes acute myeloid leukemia and a positive association has been observed for acute lymphatic leukemia, chronic lymphatic leukemia, non-hodgkin lymphoma, and multiple myeloma. Human studies suggest that female fertility and menstrual cycles were effected by benzene exposure; however, due to uncertainties in exposure and limited data the studies were considered inconclusive. Developmental effects have been observed in animals including persistent hematopoietic anomalies. It has been suggested that the reported benzene fetotoxicity of decreased weight and skeletal variants is a function of maternal toxicity.

Health hazard and classification information

Skin Corrosion/Irritation Category	Classification based on data available for ingredients. Irritating to skin.
Serious eye damage/eye irritation	No information available.
	No information available.
Germ cell mutagenicity	Classification based on data available for ingredients. Contains a known or suspected mutagen. The table below indicates ingredients above the cut-off threshold considered as relevant which are listed as mutagenic.
Carcinogenicity	Classification based on data available for ingredients. Contains a known or suspected carcinogen.

The table below indicates whether each agency has listed any ingredient as a carcinogen.

Chemical Name	ACGIH	IARC	NTP	OSHA
Benzene 71-43-2	A1	Group 1	Known	X

Reproductive toxicity Classification based on data available for ingredients. Contains a known or suspected reproductive toxin. The table below indicates ingredients above the cut-off threshold considered as relevant which are listed as reproductive toxins.

Target Organ Systemic Toxicant - Single Exposure May cause drowsiness or dizziness by inhalation.

Target Organ Systemic Toxicant - Repeated Exposure Causes damage to organs through prolonged or repeated exposure.

Target organ effects Respiratory system, Eyes, Skin, Central nervous system, blood, Peripheral Nervous System (PNS), bone marrow.

Aspiration hazard May be fatal if swallowed and enters airways.

12. ECOLOGICAL INFORMATION

Additional Ecological Information Release of this product should be prevented from contaminating soil and water and from entering drainage and sewer systems. U.S.A. regulations require reporting spills of this material that could reach any surface waters. The toll free number to the U.S. Coast Guard National Response Center is (800) 424-8802

Ecotoxicity Toxic to aquatic life with long lasting effects.

Chemical Name	Algae/aquatic plants	Fish	Toxicity to microorganisms	Crustacea
Naphtha (petroleum), isomerization 64741-70-4	30000: 72 h Pseudokirchneriella subcapitata mg/L EC50	-	-	2: 48 h Mysidopsis bahia mg/L LC50
Isopentane 78-78-4	-	-	-	2.3: 48 h Daphnia magna mg/L EC50
Pentane 109-66-0	-	9.99: 96 h Lepomis macrochirus mg/L LC50 9.87: 96 h Oncorhynchus mykiss mg/L LC50 11.59: 96 h Pimephales promelas mg/L LC50	-	9.74: 48 h Daphnia magna mg/L EC50
N-hexane 110-54-3	-	2.1 - 2.98: 96 h Pimephales promelas mg/L LC50 flow-through	-	1000: 24 h Daphnia magna mg/L EC50
Cyclohexane 110-82-7	500: 72 h Desmodesmus subspicatus mg/L EC50	3.96 - 5.18: 96 h Pimephales promelas mg/L LC50 flow-through 23.03 - 42.07: 96 h Pimephales promelas mg/L LC50 static 24.99 - 44.69: 96 h Lepomis macrochirus mg/L LC50 static 48.87 - 68.76: 96 h Poecilia reticulata mg/L LC50 static	-	400: 24 h Daphnia magna mg/L EC50
2-Methyl-2-Butene 513-35-9	-	-	-	3: 48 h Daphnia magna mg/L EC50
Benzene 71-43-2	29: 72 h Pseudokirchneriella subcapitata mg/L EC50	10.7 - 14.7: 96 h Pimephales promelas mg/L LC50 flow-through 5.3: 96 h Oncorhynchus mykiss mg/L LC50 flow-through 22.49: 96 h	-	10: 48 h Daphnia magna mg/L EC50 8.76 - 15.6: 48 h Daphnia magna mg/L EC50 Static

		Lepomis macrochirus mg/L LC50 static 28.6: 96 h Poecilia reticulata mg/L LC50 static 22330 - 41160: 96 h Pimephales promelas µg/L LC50 static 70000 - 142000: 96 h Lepomis macrochirus µg/L LC50 static		

Persistence and degradability No information available.

Bioaccumulation There is no data for this product.

Component Information

Chemical Name	Partition coefficient
Isopentane 78-78-4	3.2 - 3.3
Pentane 109-66-0	3.39
Neohexane 75-83-2	3.8
Cyclohexane 110-82-7	3.44
Butane 106-97-8	2.89
Benzene 71-43-2	2.1

Other adverse effects No information available.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Waste from residues/unused products Should not be released into the environment. Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation.

Contaminated packaging Empty containers pose a potential fire and explosion hazard. Do not cut, puncture of weld containers.

US EPA Waste Number D001, U019 U056

Chemical Name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Cyclohexane 110-82-7	-	-	-	U056
Benzene 71-43-2	U019	Included in waste streams: F005, F024, F025, F037, F038, F039, K085, K104, K105, K141, K142, K143, K144, K145, K147, K151, K159, K169, K171, K172	0.5 mg/L regulatory level	U019

California Hazardous Waste Status This product contains one or more substances that are listed with the State of California as a hazardous waste.

Chemical Name	California Hazardous Waste Status
Isopentane	Ignitable Toxic

78-78-4	
Pentane 109-66-0	Toxic Ignitable
Neohexane 75-83-2	Toxic Ignitable
N-hexane 110-54-3	Toxic Ignitable
Cyclohexane 110-82-7	Toxic Ignitable
Benzene 71-43-2	Toxic Ignitable

14. TRANSPORT INFORMATION

DOT

UN/ID no	UN1993
Proper Shipping Name	Flammable liquid, n.o.s.
Hazard Class	3
Packing group	I
Reportable Quantity (RQ)	(Hexane: RQ (kg)= 2270.00, Cyclohexane: RQ (kg)= 454.00, Benzene: RQ (kg)= 4.54)
Special Provisions	T11, TP1, TP27
Description	UN1993, Flammable liquid, n.o.s. (Isopentane, Benzene), 3, I
Emergency Response Guide Number	128

TDG

UN/ID no	UN1993
Proper Shipping Name	Flammable liquid, n.o.s.
Hazard Class	3
Packing group	I
Description	UN1993, Flammable liquid, n.o.s. (Isopentane, Benzene), 3, I

MEX

UN/ID no	UN1993
Proper Shipping Name	Flammable liquid, n.o.s.
Hazard Class	3
Special Provisions	274
Packing group	I
Description	UN1993, Flammable liquid, n.o.s. (Isopentane, Benzene), 3, I

IATA

UN/ID no	UN1993
Proper Shipping Name	Flammable liquid, n.o.s.
Hazard Class	3
Packing group	I
ERG Code	3H
Description	UN1993, Flammable liquid, n.o.s. (Isopentane, Benzene), 3, I

IMDG

UN/ID no	UN1993
Proper Shipping Name	Flammable liquid, n.o.s.
Hazard Class	3
Packing group	I
EmS No.	F-E, S-E
Special Provisions	274
Description	UN1993, Flammable liquid, n.o.s. (ISOPENTANE, BENZENE), 3, I, (-57°C C.C.), Marine pollutant

15. REGULATORY INFORMATION

International Inventories

TSCA	Listed
DSL/NDSL	Listed
ENCS	Not Listed
IECSC	Not Listed
KECL	Not Listed
PICCS	Not Listed
AICS	Not Listed

Legend:
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

US Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic Health Hazard	Yes
Fire hazard	Yes
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)
This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Cyclohexane 110-82-7	1000 lb	-	-	X
Benzene 71-43-2	10 lb	X	X	X

CERCLA
The CERCLA definition of hazardous substances contains a “petroleum exclusion” clause which exempts crude oil, fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

US State Regulations

California Proposition 65
This product contains the following Proposition 65 chemicals.

Chemical Name	California Proposition 65
Benzene - 71-43-2	Carcinogen Developmental Male Reproductive

U.S. State Right-to-Know Regulations

US State Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
Isopentane 78-78-4	X	X	X
Pentane 109-66-0	X	X	X
2-Methylpentane 107-83-5	X	X	X
Neohexane 75-83-2	X	X	X
2,3-Dimethylbutane 79-29-8	X	X	X
Butane 106-97-8	X	X	X
N-hexane 110-54-3	X	X	X
Cyclohexane 110-82-7	X	X	X
2-Methyl-2-Butene 513-35-9	X	X	X
Tans-2-Pentene 646-04-8	X	X	X
2-Methyl-1-Butene 563-46-2	X	X	X
Cis-2-Pentene 627-20-3	X	X	X
1-Pentene 109-67-1	X	X	X
Benzene 71-43-2	X	X	X

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION

Revision Date 31-Jul-2017

Revision Note No information available.

Disclaimer

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End of Safety Data Sheet