

SAFETY DATA SHEET

Light Olefins

Section 1. Identification

GHS product identifier	: Light Olefins
Product use	: Industrial use
Supplier's details	: TPC Group One Allen Center, Suite 1000 Houston, TX, 77002, USA T 713-627-7474
company web address	: www.tpcgrp.com
Emergency telephone number (with hours of operation)	: 800-424-9300 (Chemtrec - U.S.) +1-793-527-3887 (Chemtrec - International)

Section 2. Hazards identification

OSHA/HCS status	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture	: FLAMMABLE LIQUIDS - Category 2 ACUTE TOXICITY (oral) - Category 4 ACUTE TOXICITY (inhalation) - Category 3 SKIN CORROSION/IRRITATION - Category 2 SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A GERM CELL MUTAGENICITY - Category 1B CARCINOGENICITY - Category 1A TOXIC TO REPRODUCTION (Fertility) - Category 2 SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3 SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (Central Nervous System (CNS), Haematopoietic system)- Category 1 Percentage of the mixture consisting of ingredient(s) of unknown toxicity: 25%

GHS label elements

Hazard pictograms



Signal word

: Danger

Hazard statements

: Highly flammable liquid and vapor.
Toxic if inhaled.
Harmful if swallowed.
Causes serious eye irritation.
Causes skin irritation.
May cause cancer.
Suspected of damaging fertility.
Suspected of causing genetic defects.
May cause respiratory irritation.
May cause drowsiness and dizziness.
Causes damage to organs (Central Nervous System (CNS), Haematopoietic system) through prolonged or repeated exposure.

Section 2. Hazards identification

Precautionary statements

Prevention

- : Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Use personal protective equipment as required.
- Wear protective gloves. Wear eye or face protection.
- Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- Use explosion-proof electrical, ventilating, lighting and all material-handling equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- Keep container tightly closed.
- Use only outdoors or in a well-ventilated area.
- Do not breathe vapor.
- Do not eat, drink or smoke when using this product.
- Wash hands thoroughly after handling.

Response

- : Get medical attention if you feel unwell.
- IF exposed or concerned: Get medical attention.
- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician.
- IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. Rinse mouth.
- IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.
- IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing.
- If skin irritation occurs: Get medical attention.
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- If eye irritation persists: Get medical attention.

Storage

- : Store locked up.
- Store in a well-ventilated place.
- Keep cool.

Disposal

- : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements

- : Avoid contact with skin and clothing. Wash thoroughly after handling.

Hazards not otherwise classified

- : Prolonged or repeated contact can defat the skin and lead to irritation, cracking and/or dermatitis.

Section 3. Composition/information on ingredients

Substance/mixture

- : Substance.

Other means of identification

- : Not available.

CAS number/other identifiers

CAS number

- : Not applicable.

Product code

- : Not available.

Ingredient name	%	CAS number
C6+	15-75	Mixture
Dicyclopentadiene	5-35	77-73-6
4-Vinylcyclohexene	1-20	100-40-3
1-Pentene	1-20	109-67-1
Diisobutylene-1	1-20	107-39-1
Methyl tert-butyl ether	1-10	1634-04-4
n-Pentane	<5	109-66-0

Section 3. Composition/information on ingredients

1-Butene	<5	106-98-9
Benzene	<10	71-43-2
Toluene	<5	108-88-3
Butylated hydroxytoluene (BHT)	<5	128-37-0

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

- Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
- Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
- Skin contact** : Wash skin thoroughly with soap and water or use recognized skin cleanser. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion** : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Toxic if inhaled. Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness. May cause respiratory irritation.
- Skin contact** : Causes skin irritation. Defatting to the skin.
- Ingestion** : Harmful if swallowed. Can cause central nervous system (CNS) depression.

Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:
 pain or irritation
 watering
 redness

Section 4. First aid measures

- Inhalation** : Adverse symptoms may include the following:
 respiratory tract irritation
 coughing
 nausea or vomiting
 headache
 drowsiness/fatigue
 dizziness/vertigo
 unconsciousness
 reduced fetal weight
 increase in fetal deaths
 skeletal malformations
- Skin contact** : Adverse symptoms may include the following:
 irritation
 redness
 dryness
 cracking
 reduced fetal weight
 increase in fetal deaths
 skeletal malformations
- Ingestion** : Adverse symptoms may include the following:
 reduced fetal weight
 increase in fetal deaths
 skeletal malformations

Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO₂, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : Highly flammable liquid and vapor. Solvent vapors may form explosive mixtures with air. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Runoff to sewer may create fire or explosion hazard. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

- Hazardous thermal decomposition products** : Decomposition products may include the following materials:
 carbon dioxide
 carbon monoxide

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Containers with collected spillage must be properly labeled with correct contents and hazard symbol. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Avoid exposure during pregnancy. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental

Section 7. Handling and storage

contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
n-hexane	<p>ACGIH TLV (United States, 4/2014). Absorbed through skin. TWA: 50 ppm 8 hours.</p> <p>OSHA PEL 1989 (United States, 3/1989). TWA: 50 ppm 8 hours. TWA: 180 mg/m³ 8 hours.</p> <p>NIOSH REL (United States, 10/2013). TWA: 50 ppm 10 hours. TWA: 180 mg/m³ 10 hours.</p> <p>OSHA PEL (United States, 2/2013). TWA: 500 ppm 8 hours. TWA: 1800 mg/m³ 8 hours.</p>
Dicyclopentadiene	<p>ACGIH TLV (United States, 4/2014). TWA: 5 ppm 8 hours. TWA: 27 mg/m³ 8 hours.</p> <p>OSHA PEL 1989 (United States, 3/1989). TWA: 5 ppm 8 hours. TWA: 30 mg/m³ 8 hours.</p> <p>NIOSH REL (United States, 10/2013). TWA: 5 ppm 10 hours. TWA: 30 mg/m³ 10 hours.</p>
4-vinylcyclohexene	<p>ACGIH TLV (United States, 4/2014). TWA: 0.1 ppm 8 hours. TWA: 0.44 mg/m³ 8 hours.</p> <p>AIHA WEEL (United States, 10/2011). TWA: 1 ppm 8 hours.</p>
methyl tert-butyl ether	<p>ACGIH TLV (United States, 4/2014). TWA: 50 ppm 8 hours.</p>
toluene	<p>OSHA PEL 1989 (United States, 3/1989). TWA: 100 ppm 8 hours. TWA: 375 mg/m³ 8 hours. STEL: 150 ppm 15 minutes. STEL: 560 mg/m³ 15 minutes.</p> <p>OSHA PEL Z2 (United States, 2/2013). TWA: 200 ppm 8 hours. CEIL: 300 ppm AMP: 500 ppm 10 minutes.</p> <p>NIOSH REL (United States, 10/2013). TWA: 100 ppm 10 hours. TWA: 375 mg/m³ 10 hours. STEL: 150 ppm 15 minutes. STEL: 560 mg/m³ 15 minutes.</p> <p>ACGIH TLV (United States, 4/2014). TWA: 20 ppm 8 hours.</p>
Benzene	<p>ACGIH TLV (United States, 4/2014). Absorbed through skin. TWA: 0.5 ppm 8 hours. TWA: 1.6 mg/m³ 8 hours. STEL: 2.5 ppm 15 minutes. STEL: 8 mg/m³ 15 minutes.</p> <p>OSHA PEL 1989 (United States, 3/1989).</p>

Section 8. Exposure controls/personal protection

n-Pentane

TWA: 1 ppm 8 hours.
 STEL: 5 ppm 15 minutes.
OSHA PEL Z2 (United States, 2/2013).
 TWA: 10 ppm 8 hours.
 CEIL: 25 ppm
 AMP: 50 ppm 10 minutes.
NIOSH REL (United States, 10/2013).
 TWA: 0.1 ppm 10 hours.
 STEL: 1 ppm 15 minutes.
OSHA PEL (United States, 2/2013).
 TWA: 1 ppm 8 hours.
 STEL: 5 ppm 15 minutes.

ACGIH TLV (United States, 4/2014).
 TWA: 1000 ppm 8 hours.
OSHA PEL 1989 (United States, 3/1989).
 TWA: 600 ppm 8 hours.
 TWA: 1800 mg/m³ 8 hours.
 STEL: 750 ppm 15 minutes.
 STEL: 2250 mg/m³ 15 minutes.
NIOSH REL (United States, 10/2013).
 TWA: 120 ppm 10 hours.
 TWA: 350 mg/m³ 10 hours.
 CEIL: 610 ppm 15 minutes.
 CEIL: 1800 mg/m³ 15 minutes.
OSHA PEL (United States, 2/2013).
 TWA: 1000 ppm 8 hours.
 TWA: 2950 mg/m³ 8 hours.

Appropriate engineering controls

: Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls

: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures

: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection

: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles, face shield.

Skin protection

Hand protection

: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Section 8. Exposure controls/personal protection

- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Use NIOH/MSHA approved air purifying respirator as needed to control exposure. Use positive pressure, air-supplied respirator for uncontrolled releases or when air purifying respirator limitations may be exceeded. Follow respirator protection program requirements (OSHA 29CFR 1910.134 and ANSI Z88.2) for all respirator use.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Liquid.
- Color** : Yellow to dark liquid.
- Odor** : Pungent.
- Odor threshold** : Not available.
- pH** : Not available.
- Melting point** : Not available.
- Boiling point** : Not available.
- Flash point** : Not available.
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and heat.
- Lower and upper explosive (flammable) limits** : Not available.
- Vapor pressure** : 11.05 PSIA @ 37.8°C (100°F)
- Vapor density** : Not available.
- Relative density** : 0.7389
- Solubility** : Not available.
- Partition coefficient: n-octanol/water** : Not available.
- Auto-ignition temperature** : Not available.
- Decomposition temperature** : Not available.
- Viscosity** : Not available.

Section 10. Stability and reactivity

- Reactivity** : No specific test data related to reactivity available for this product or its ingredients.
- Chemical stability** : The product is stable.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.
- Conditions to avoid** : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.
- Incompatible materials** : Reactive or incompatible with the following materials: Strong Oxidizers, Strong Acids, Strong Bases

Section 10. Stability and reactivity

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced. Hazardous polymerization does not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
n-hexane	LC50 Inhalation Gas.	Rat	48000 ppm	4 hours
	LD50 Oral	Rat	15840 mg/kg	-
Dicyclopentadiene	LC50 Inhalation Gas.	Rat	660 ppm	4 hours
	LC50 Inhalation Vapor	Rat	610 mg/m ³	4 hours
	LD50 Dermal	Rabbit	5080 mg/kg	-
	LD50 Oral	Rat	353 mg/kg	-
pent-1-ene	LC50 Inhalation Vapor	Rat	175000 mg/m ³	4 hours
4-vinylcyclohexene	LD50 Oral	Rat	2560 mg/kg	-
methyl tert-butyl ether	LC50 Inhalation Gas.	Rat	23576 ppm	4 hours
	LC50 Inhalation Vapor	Rat	41000 mg/m ³	4 hours
	LD50 Oral	Rat	4 g/kg	-
toluene	LC50 Inhalation Vapor	Rat	49 g/m ³	4 hours
	LD50 Oral	Rat	636 mg/kg	-
Benzene	LD50 Oral	Rat	930 mg/kg	-
n-Pentane	LC50 Inhalation Vapor	Rat	364 g/m ³	4 hours

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
n-hexane	Eyes - Mild irritant	Rabbit	-	10 milligrams	-
Dicyclopentadiene	Skin - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-
	Skin - Severe irritant	Rabbit	-	24 hours 9300 Micrograms	-
4-vinylcyclohexene	Respiratory - Irritant	Human	-	-	-
	Eyes - Mild irritant	Rabbit	-	0.005 Milliliters	-
	Skin - Moderate irritant	Rabbit	-	0.01 Milliliters	-
methyl tert-butyl ether	Skin - Irritant	Rabbit	-	-	72 hours
toluene	Eyes - Mild irritant	Rabbit	-	0.5 minutes 100 milligrams	-
	Eyes - Mild irritant	Rabbit	-	870 Micrograms	-
	Eyes - Severe irritant	Rabbit	-	24 hours 2 milligrams	-
	Skin - Mild irritant	Pig	-	24 hours 250 microliters	-
	Skin - Mild irritant	Rabbit	-	435 milligrams	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-
	Skin - Moderate irritant	Rabbit	-	500 milligrams	-
Benzene	Eyes - Moderate irritant	Rabbit	-	88 milligrams	-
	Eyes - Severe irritant	Rabbit	-	24 hours 2 milligrams	-
	Skin - Mild irritant	Rat	-	8 hours 60 microliters	-
	Skin - Mild irritant	Rabbit	-	24 hours 15 milligrams	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-

Section 11. Toxicological information

Sensitization

Not available.

Mutagenicity

Product/ingredient name	Test	Experiment	Result
Benzene	-	Experiment: In vitro Subject: Mammalian-Animal Cell: Somatic Metabolic activation: Benzene was positive for cell transformation, gene mutation and aneuploidy	Positive
	-	Experiment: In vivo Subject: Mammalian-Animal Cell: Somatic	Positive

Carcinogenicity

Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
4-vinylcyclohexene	-	2B	-
methyl tert-butyl ether	-	3	-
Benzene	1A	1	Known to be a human carcinogen.
toluene	-	3	-

Reproductive toxicity

Product/ingredient name	Maternal toxicity	Fertility	Development toxin	Species	Dose	Exposure
n-hexane	-	Positive	-	Rat - Male	Inhalation: >5000 ppm	1 days; 24 hours per day
4-vinylcyclohexene	-	Negative	-	Mouse - Male, Female	Oral: 500 mg/kg	14 weeks; 7 days per week
toluene	-	Positive	-	Rat - Male, Female	Inhalation: 600 ppm	90 days; 6 hours per day

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
n-hexane	Category 3	Not applicable.	Narcotic effects
Dicyclopentadiene	Category 3	Not applicable.	Respiratory tract irritation
toluene	Category 3	Not applicable.	Narcotic effects
n-Pentane	Category 3	Not applicable.	Narcotic effects

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
n-hexane	Category 2	Inhalation	central nervous system (CNS)
toluene	Category 2	Inhalation	central nervous system (CNS)
Benzene	Category 1	All	haematopoietic system

Aspiration hazard

Section 11. Toxicological information

Name	Result
n-hexane	ASPIRATION HAZARD - Category 1
1-Pentene	ASPIRATION HAZARD - Category 1
methyl tert-butyl ether	ASPIRATION HAZARD - Category 1
Benzene	ASPIRATION HAZARD - Category 1
n-Pentane	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Toxic if inhaled. Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness. May cause respiratory irritation.

Skin contact : Causes skin irritation. Defatting to the skin.

Ingestion : Harmful if swallowed. Can cause central nervous system (CNS) depression.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness
reduced fetal weight
increase in fetal deaths
skeletal malformations

Skin contact : Adverse symptoms may include the following:
irritation
redness
dryness
cracking
reduced fetal weight
increase in fetal deaths
skeletal malformations

Ingestion : Adverse symptoms may include the following:
reduced fetal weight
increase in fetal deaths
skeletal malformations

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

Section 11. Toxicological information

General	: Causes damage to organs through prolonged or repeated exposure. Prolonged or repeated contact can defat the skin and lead to irritation, cracking and/or dermatitis.
Carcinogenicity	: May cause cancer. Risk of cancer depends on duration and level of exposure.
Mutagenicity	: May cause genetic defects.
Teratogenicity	: No known significant effects or critical hazards.
Developmental effects	: No known significant effects or critical hazards.
Fertility effects	: Suspected of damaging fertility.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	1467 mg/kg
Inhalation (gases)	3394.3 ppm
Inhalation (vapors)	3.137 mg/l

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
n-hexane	Acute LC50 2500 µg/l Fresh water	Fish - Pimephales promelas	96 hours
	Acute EC50 4200 µg/l Fresh water	Daphnia - Daphnia pulex - Neonate	48 hours
Dicyclopentadiene	Acute LC50 15000 µg/l Fresh water	Crustaceans - Asellus militaris - Juvenile (Fledgling, Hatchling, Weanling)	48 hours
	Acute LC50 12000 µg/l Fresh water	Fish - Pimephales promelas - Fry	96 hours
methyl tert-butyl ether	Acute LC50 672000 µg/l Fresh water	Fish - Pimephales promelas	96 hours
	Acute EC50 12500 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
toluene	Acute EC50 11600 µg/l Fresh water	Crustaceans - Gammarus pseudolimnaeus - Adult	48 hours
	Acute EC50 6000 µg/l Fresh water	Daphnia - Daphnia magna - Juvenile (Fledgling, Hatchling, Weanling)	48 hours
Benzene	Acute LC50 5500 µg/l Fresh water	Fish - Oncorhynchus kisutch - Fry	96 hours
	Chronic NOEC 1000 µg/l Fresh water	Daphnia - Daphnia magna	21 days
	Acute EC50 29000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 1600000 µg/l Fresh water	Algae - Selenastrum sp.	96 hours
	Acute EC50 9230 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 21000 µg/l Marine water	Crustaceans - Artemia salina - Nauplii	48 hours
	Acute LC50 5.28 ul/L Fresh water	Fish - Oncorhynchus gorbuscha - Fry	96 hours
	Chronic NOEC 98 mg/l Fresh water	Daphnia - Daphnia magna	21 days
	Chronic NOEC 1.5 to 5.4 ul/L Marine water	Fish - Morone saxatilis - Juvenile (Fledgling, Hatchling, Weanling)	4 weeks

Persistence and degradability

Not available.

Bioaccumulative potential

Section 12. Ecological information

Product/ingredient name	LogP _{ow}	BCF	Potential
n-hexane	4	501.187	high
Dicyclopentadiene	2.78	53	low
1-Pentene	2.66	-	low
4-vinylcyclohexene	3.93	165.96	low
methyl tert-butyl ether	1.04	1.5	low
toluene	2.73	90	low
Benzene	2.13	11	low
n-Pentane	3.45	171	low

Mobility in soil

Soil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.










Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT Classification	TDG Classification	Mexico Classification	ADR/RID	IMDG	IATA
UN number	UN1993	UN1993	UN1993	UN1993	UN1993	UN1993
UN proper shipping name	Flammable liquids, n.o.s. (N-pentane (contains other isomers of pentane in unknown proportion), Methyl-t-butyl ether)	Flammable liquids, n.o.s. (N-pentane (contains other isomers of pentane in unknown proportion), Methyl-t-butyl ether)	Flammable liquids, n.o.s. (N-pentane (contains other isomers of pentane in unknown proportion), Methyl-t-butyl ether)	Flammable liquids, n.o.s. (N-pentane (contains other isomers of pentane in unknown proportion), Methyl-t-butyl ether)	Flammable liquids, n.o.s. (N-pentane (contains other isomers of pentane in unknown proportion), Methyl-t-butyl ether)	Flammable liquids, n.o.s. (N-pentane (contains other isomers of pentane in unknown proportion), Methyl-t-butyl ether)
Transport hazard class(es)	3	3	3	3	3	3

Section 14. Transport information

Transport Label		 		 	 	
Packing group	I	I	I	I	I	I
Environmental hazards	Yes.	Yes.	Yes.	Yes.	Marine Pollutant: Yes	Yes.
Additional information	<p>Reportable quantity 200 lbs / 90.8 kg [32.463 gal / 122.89 L] Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.</p> <p>Special provisions T11, TP1, TP27</p> <p>Packaging Exceptions: 150 Packaging Non-Bulk: 201 Packaging Bulk: 243</p>	The marine pollutant mark is not required when transported by road or rail.	-	The environmentally hazardous substance mark is not required when transported in sizes of ≤5 L or ≤5 kg. Tunnel code (D/E)	The marine pollutant mark is not required when transported in sizes of ≤5 L or ≤5 kg. Emergency schedules (EmS) F-E, S-E	The environmentally hazardous substance mark may appear if required by other transportation regulations.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) PAIR:** heptane; 2,4,4-trimethylpent-1-ene; 4-vinylcyclohexene; 3a,4,7,7a-tetrahydro-4,7-methanoindene; pentane
TSCA 8(a) CDR Exempt/Partial exemption: Not determined
United States inventory (TSCA 8b): All components are listed or exempted.
Clean Water Act (CWA) 307: benzene; toluene
Clean Water Act (CWA) 311: benzene; toluene

Section 15. Regulatory information

Clean Air Act (CAA) 112 regulated flammable substances: pent-1-ene; pentane; but-1-ene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
n-hexane	≥25 - <50	Yes.	No.	No.	Yes.	Yes.
Dicyclopentadiene	≥26 - <47	Yes.	No.	No.	Yes.	No.
1-Pentene	≥10 - <25	Yes.	No.	No.	No.	No.
4-vinylcyclohexene	≥15 - <25	Yes.	No.	No.	Yes.	Yes.
methyl tert-butyl ether	≥10 - <25	Yes.	No.	No.	Yes.	No.
toluene	≥5 - <10	Yes.	No.	No.	Yes.	Yes.
Benzene	≥5 - <10	Yes.	No.	No.	Yes.	Yes.
n-Pentane	≥5 - <10	Yes.	No.	No.	Yes.	No.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	n-hexane	110-54-3	≥25 - <50
	Dicyclopentadiene	77-73-6	≥26 - <47
	methyl tert-butyl ether	1634-04-4	≥10 - <25
	benzene	71-43-2	≥5 - <10
	toluene	108-88-3	≥5 - <10
Supplier notification	n-hexane	110-54-3	≥25 - <50
	Dicyclopentadiene	77-73-6	≥26 - <47
	methyl tert-butyl ether	1634-04-4	≥10 - <25
	benzene	71-43-2	≥5 - <10
	toluene	108-88-3	≥5 - <10

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : The following components are listed: HEXANE; HEPTANE (N-HEPTANE); OCTANE; 2, 4,4-TRIMETHYL-1-PENTENE; 1-PENTENE; 4-VINYL CYCLOHEXENE; DICYCLOPENTADIENE; METHYL TERT-BUTYL ETHER; PENTANE; 1-BUTENE; BENZENE; TOLUENE; BUTYLATED HYDROXYTOLUENE (BHT)

Section 15. Regulatory information

- New York** : The following components are listed: Hexane; Methyl tert-butyl ether; Benzene; Toluene
- New Jersey** : The following components are listed: n-HEXANE; HEXANE; n-HEPTANE; HEPTANE; OCTANE; 1-PENTENE; 4-VINYLCYCLOHEXENE; CYCLOHEXENE, 4-ETHENYL-; DICYCLOPENTADIENE; 4,7-METHANO-1H-INDENE, 3A,4,7,7A-TETRAHYDRO-; METHYL-tert-BUTYL ETHER; PROPANE, 2-METHOXY-2-METHYL-; PENTANE; 1-BUTENE; BENZENE; TOLUENE; BENZENE, METHYL-; 2,6-DI-tert-BUTYL-p-CRESOL; PHENOL, 2,6-BIS(1,1-DIMETHYLETHYL)-4-METHYL-
- Pennsylvania** : The following components are listed: HEXANE; HEPTANE; OCTANE; 1-PENTENE, 2,4,4-TRIMETHYL-; 1-PENTENE; CYCLOHEXENE, 4-ETHENYL-; 4,7-METHANO-1H-INDENE, 3A,4,7,7A-TETRAHYDRO-; METHYL TERT-BUTYL ETHER; PENTANE; 1-BUTENE; BENZENE; BENZENE, METHYL-; PHENOL, 2,6-BIS(1,1-DIMETHYLETHYL)-4-METHYL-

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
4-vinylcyclohexene	Yes.	Yes.	No.	No.
benzene	Yes.	Yes.	6.4 µg/day (ingestion)	24 µg/day (ingestion)
toluene	No.	Yes.	13 µg/day (inhalation)	49 µg/day (inhalation)
			No.	7000 µg/day (ingestion)

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Inform Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

International lists

National inventory

- Australia** : All components are listed or exempted.
- Canada** : All components are listed or exempted.
- China** : All components are listed or exempted.
- Europe** : All components are listed or exempted.
- Japan** : All components are listed or exempted.
- Malaysia** : Not determined.
- New Zealand** : Not determined.
- Philippines** : All components are listed or exempted.
- Republic of Korea** : All components are listed or exempted.
- Taiwan** : All components are listed or exempted.

Section 16. Other information

Hazardous Material Information System (U.S.A.)

Health	2*
Flammability	3
Physical hazards	0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



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Procedure used to derive the classification

Classification	Justification
Flam. Liq. 2	Calculation method
Acute Tox. 4	Calculation method
Acute Tox. 3	Calculation method
Skin Irrit. 2	Calculation method
Eye Irrit. 2A	Calculation method
Muta. 2	Calculation method
Carc. 1A	Calculation method
Repr. 2, (Fertility)	Calculation method
STOT SE 3	Calculation method
STOT SE 3	Calculation method
STOT RE 1	Calculation method

History

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Date of previous issue	: No previous validation.
Version	: 1.0

Key to abbreviations	: ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
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Section 16. Other information

UN = United Nations

References : Not available.

▣ Indicates information that has changed from previously issued version.

Notice to reader

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