

Safety Data Sheet (CANADA)

1. Identification

Product Identifier: Isooctane

Other Means of Identification: Isooctane; Iso-octane; 2,2,4-Trimethylpentane; Pentane, 2,2,4-Trimethyl; 2,4,4-Trimethylpentane; Isobutyltrimethylmethane; TMP

Product use: Gasoline blending component

Restrictions on use: Do not use for non-industrial purpose

Manufacturer: Keyera Alberta Envirofuels Facility




Address: 9511-17th Street, Edmonton, Alberta T6P 1Y3

SDS Information: 1-780-449-7910

Emergency Contact (24 hours): 1-613-996-6666 (CANUTEC, Canada)
1-800-424-9300 (CHEMTREC, U.S.)

2. Hazards Identification

GHS Hazards

Pictogram	Classification	Hazard Statements
	Flammable Liquids – Category 2	Highly flammable liquid and vapor
	Skin Corrosion/Irritation – Category 2 (Irritant) Specific Target Organ Toxicity, Single Exposure – Category 3	Causes skin irritation May cause drowsiness or dizziness
	Aspiration Hazard – Category 1	May be fatal if swallowed and enters airways

Signal Word: Danger

Precautionary Statements:

Prevention

- Keep away from heat, hot surfaces, sparks, open flames and other ignition sources – No smoking.
 - Keep container tightly closed.
 - Ground and bond container and receiving equipment.
 - Use explosion-proof electrical/ventilating/lighting equipment.
 - Use non-sparking tools.
 - Take action to prevent static discharges.
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- Avoid breathing vapors.
 - Wash skin thoroughly after handling.
 - Use only outdoors or in a well-ventilated area.
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- Wear protective gloves/ protective clothing/ eye protection/ face protection.
Gloves: neoprene, nitrile.
Clothing: fire-retardant Nomex, Proban.
Eye: Safety glasses with side shields or goggles.

Response

- In case of fire: use dry chemical, CO₂, or fire-fighting foam to extinguish.
 - If inhaled: Remove person to fresh air and keep comfortable for breathing.
 - Call a doctor/physician if you feel unwell.
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- If on skin (or hair): take off immediately all contaminated clothing. Rinse skin with water/shower.
 - Take off contaminated clothing and wash it before reuse.
 - If skin irritation occurs: get medical advice/attention.
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- If swallowed: immediately call a doctor/ physician. Do not induce vomiting.

Storage

- Store in a well-ventilated place. Keep container tightly closed. Keep cool.
- Store locked up.

Disposal

- Dispose of contents/container in accordance with applicable local, provincial/state, and federal regulations.

3. Composition/Information on Ingredients

Chemical Name: Isooctane
Common Name/Synonyms: Isooctane; Iso-octane; 2,2,4-Trimethylpentane; Pentane, 2,2,4-Trimethyl; 2,4,4-Trimethylpentane; Isobutyltrimethylmethane; TMP

Ingredient Name	wt %	CAS No.
Isooctane	85 – 100	540-84-1
Isododecane	0 – 10	13475-82-6
Paraffins & Isoparaffins	0 – 5	N/A
Benzene	0 – 0.005 (0 – 50 ppm)	71-43-2

The quantity of benzene in isooctane is below the threshold of 0.1 % for classification of this product as carcinogen.

4. First Aid Measures

Immediate Medical Attention and Special Treatment:
Treat symptomatically and supportively. Refer also to Table below.

First Aid:	
Inhalation:	Remove person to fresh air and keep comfortable for breathing. Call a doctor/physician if you feel unwell.
Skin:	If on skin (or hair): take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation occurs: get medical advice/attention.
Eyes:	Rinse cautiously with water for several minutes. If eye irritation persists: get medical advice/attention.
Ingestion:	If swallowed: immediately call a poison center/doctor/ physician. Do not induce vomiting. Note to Physician: Ingestion of this product or subsequent vomiting can result in aspiration, which can cause pneumonitis.

Most Important Effects and Symptoms, Acute or Delayed:

Exposure Route	Health Effects	Symptoms of Exposure
Inhalation:	Effects on the Central Nervous system (CNS) may range from mild to severe effects such as respiratory depression.	From rapid breathing, fatigue, headache, light-headedness to more severe symptoms of dizziness and in extreme cases, respiratory arrest, convulsions or loss of consciousness.
Ingestion:	May be aspirated into lungs if swallowed, may result in pulmonary edema & chemical pneumonitis.	Signs and symptoms of aspiration may include coughing, difficulty breathing, “gurgling” lung sounds when breathing, coughing up phlegm (sputum) that is yellow or green in color or bad smelling, change in voice (hoarseness), skin turning bluish due to lack of oxygen.

5. Fire Fighting Measures

<p>Flammability: Yes. The liquid and vapor are highly flammable.</p>	<p>Hazardous Combustion Products: Carbon monoxide (CO), carbon dioxide (CO₂), and acrid smoke.</p>
<p>Explosion: Sensitive to impact: No</p>	<p>Sensitive to static discharge: Yes</p>
<p>Extinguishing Media: Small Fire: dry chemical, CO₂, or fire-fighting foam. Large Fire: fire-fighting foam.</p> <p>Fire-fighting foams which can be used are as follows: Fluoroprotein (FP)- Aspirated, Film-Forming Fluoroprotein (FFFP)- Non aspirated or aspirated, Alcohol-Resistant FFFP- Non aspirated or aspirated, AFFF - Non-aspirated or aspirated, AR-AFFF - Non-aspirated or aspirated.</p>	
<p>Unsuitable Extinguishing Media:</p> <ul style="list-style-type: none"> • Water: isooctane is not soluble in water. Using water may spread fire. 	
<p>Special Protective Equipment for Firefighters:</p> <ul style="list-style-type: none"> • Wear full protective clothing and NIOSH-approved SCBA with full face-piece. 	
<p>Precautions for Firefighters:</p> <ul style="list-style-type: none"> • If tank, rail car or tank truck is involved in a fire, isolate for 800 meters (1/2 mile) in all directions; also consider initial evacuation for 800 meters (1/2 mile) in all directions. • Move container from fire area if you can do it without risk. • Apply cooling water to sides of containers that are exposed to flames until well after fire is out. • Stay away from ends of tanks. • Stay away from tanks engulfed in fire. Closed containers exposed to heat may explode. (OSHA Class 1B Flammable Liquid) • Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. • Cool fire-exposed containers with flooding quantities of water applied from as far a distance as possible. • See Guide 128, Emergency Response Guidebook (Tranp. Can/US Dept. of Transp). 	
<p>Unusual Fire and Explosion Hazards:</p> <ul style="list-style-type: none"> • The highly flammable vapors are heavier than air and may accumulate in low areas and /or spread along ground to distant ignition sources and flash back. • Thermal decomposition produces acrid fumes. • Vapor-air mixtures are explosive above the flash point. 	

6. Accidental Release Measures

Protective Equipment:

Gloves:	Recommended: neoprene and nitrile. Not recommended for heavy use: rubber, PVC, latex.
Respirator:	NIOSH Approved and equipped with organic-vapor filter;
Eye:	Safety glasses with side shields, safety goggles or face shields.
Clothing:	Flame-retardant e.g. Nomex, Proban.

Large spills: wear full protective clothing and NIOSH-approved SCBA with full face-piece.

Precautions:

- This highly flammable liquid must be kept from sparks, open flame, hot surfaces, and all sources of ignition and heat.
- The highly flammable vapors are heavier than air and may accumulate in low areas and /or spread along ground to distant ignition sources and flash back.

Emergency Procedures:

- Shut off leak/release source, if it can be done safely.
- Remove all sources of ignition.
- Isolate hazard area.
- Evacuate area of all unnecessary personnel.
- Keep unnecessary and unprotected personnel from entering.
- Emergency personnel must wear appropriate personal protective equipment.

Small spill: will evaporate.

Large spill: consider downwind evacuation of at least 300 meters (1000 ft.)

If tank, rail car or tank truck is involved in a fire, ISOLATE and consider initial evacuation in all directions for 800 meters (½ mile).

- Ventilate area of leak or spill.

Containment and Clean-up:

- Use non-sparking tools and equipment.
- Use booms/pillows to prevent runoff into storm sewers and ditches that lead to waterways.
- Have foam or dry powder extinguisher on hand.
- Contain and recover liquid if it can be done safely: Collect spillage or absorb with an inert material (e.g., vermiculite, dry sand, earth), and place in metal container which can be grounded.
- Do not use combustible materials, such as sawdust, as absorbent.
- On large ground spills use fire fighting foam to contain vapors. Recommended application rate is 0.1 USGPM/sq. ft. (4.1 L/Min/sq.ft.). This is the application rate for hydrocarbons as per NFPA 11
- If a leak or spill has not ignited, water spray may be used to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures.
- Refer to Guide 128 of the Emergency Response Guidebook (Transport Canada/US Dept. of Transportation).

7. Handling and Storage

Handling Precautions :

- Use only in a well ventilated area.
- Keep away from heat/sparks/open flames/hot surfaces – No smoking.
- Avoid contact with eyes, skin, and clothing.
- Avoid ingestion and inhalation
- Wear protective gloves/clothing and eye/face protection:

Gloves:	Recommended: neoprene and nitrile.
	Not recommended for heavy use: rubber, PVC, latex.
Respirator:	NIOSH Approved and equipped with organic-vapor filter;
Eye:	Safety glasses with side shields, safety goggles or face shields.
Clothing:	Flame-retardant e.g. Nomex, Proban.
- Use only non-sparking tools and explosion-proof ventilation equipment.
- Take precautionary measures against static discharge.
- Ground/bond containers and equipment when transferring material.
- Keep container tightly closed.

Storage Precautions:

Locations

- Store in a cool, dry, well-ventilated location, away from any area of fire-hazard.
- Outside or detached storage is preferred.
- Storage and use areas should be No Smoking areas.
- Ventilation system must be explosion-proof.

Containers

- Containers should be grounded.
- Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
- Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.
- Do not attempt to clean empty containers since residue is difficult to remove.
- Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death.

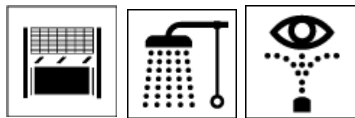
Other precautions

- Separate from incompatibles like oxidizers e.g. bromates, chlorates, chromates, hypochlorites, perchlorates, peroxides, nitrates, nitrites.

8. Exposure Controls / Personal Protection

EXPOSURE LIMITS

	Authority	15 MINS STEL	8-HOURS
Isooctane (2,2,4-trimethylpentane) CAS 540-84-1	Alberta, B.C.	-	300 ppm (1400mg/m ³)
	Ontario	375 ppm (1750 mg/m ³)	300 ppm (1400mg/m ³)
Benzene (CAS 71-43-2)	Alberta	2.5 ppm (1.6 mg/m ³) – skin	0.5 ppm (8 mg/m ³) – skin
	Ontario, BC	2.5 ppm – skin	0.5 ppm – skin



ENGINEERING CONTROLS

- Engineering control methods to reduce hazardous exposures are preferred. Methods include mechanical ventilation, process or personal enclosure, control or process conditions, and process modification.
- Ventilate area where product is used, stored and/or handled to maintain airborne concentrations below the LEL and OEL, especially in confined spaces.
- Ventilation equipment must be explosion proof.
- Exhaust directly to the outside, taking necessary precautions for environmental protection.
- Supply sufficient replacement air to make up for air removed by exhaust systems.



PERSONAL PROTECTIVE EQUIPMENT

- Gloves: Recommended: neoprene and nitrile.
Not recommended for heavy use: rubber, PVC, latex.
- Clothing: Flame-retardant e.g. Nomex, Proban.
- Respirator: NIOSH-approved air-purifying respirator equipped with organic-vapor cartridges.
NIOSH-approved SCBA with full face-piece if concentration is unknown.
- Eye: Safety glasses with side shields, safety goggles or face shields.

9. Physical and Chemical Properties

Chemical Formula: C ₈ H ₁₈ (CH ₃) ₃ CCH ₂ CH(CH ₃) ₂	Molecular Weight: 114.23 g/mole	Chemical Family: Hydrocarbon, aliphatic
Appearance: Clear, colorless, mobile liquid	Odor: Mild gasoline odor	Odor Threshold: Not established
pH: N/AP	Freezing Point: -107°C (-161°F)	Boiling Point: 96-97°C (204.8-206.61°F)
Flashpoint and Method: -12°C (10.4°F) Closed Cup 4.5°C (40.1°F) Open Cup	Flammability: Yes	Evaporation Rate: <1 (ether = 1) >1 (Butyl Acetate = 1)
Upper-Lower Explosive Limit: 6.0% - 1.1%	Vapor Pressure: 13-20 kPa @20°C	Vapor Density: 3.9 (air = 1)
Specific Gravity: ~0.701 @20°C/4°C	Percent Soluble (@25°C): 0.0002% in water	Soluble in organic solvents e.g. acetone, chloroform, xylene, alcohol and ether
Partition Coefficient n-octanol/water: Not available	Auto-Ignition Temperature: ~415°C (779°F)	Decomposition Temp.: Not available
Dynamic Viscosity: 0.51 mPas @ 22°C (less than 32 saybolt universal seconds)	Kinematic Viscosity: ~0.8 cSt (or mm ² /sec) @ 20°C(68°F)	Isobaric Heat Capacity: 2.408 J/g K (360K, 20 bar), 2.399 J/g K (360K, 100 bar)
Henry's Law Constant: 3.04 atm m ³ /mol @ 25°C	Percent Volatile: 100 by volume	

10. Stability and Reactivity

Reactivity: Avoid incompatible materials: may react violently with oxidizers.
Chemical Stability: Stable under normal temperatures and pressures.
Possibility of Hazardous Reactions: Polymerization has not been reported to occur under normal temperature and pressure conditions.
Conditions to Avoid: Extreme temperatures and incompatible materials.
Incompatible Materials: <ul style="list-style-type: none"> • <u>Acids</u>: may react violently with nitric acid, an oxidizer. • <u>Oxidizers</u>: may react violently with oxidizers such as bromates, chlorates, chromates, hypochlorites, perchlorates, peroxides, nitrates, nitrites.
Hazardous Decomposition Products: No decomposition if stored and applied as directed.

11. Toxicological Information

Exposure Route	Acute Health Effects	Symptoms of Exposure
Inhalation:	May cause slight irritation of the nose, throat and lungs.	Cough, running nose, difficulty in breathing.
	Effects on the Central Nervous system (CNS) may range from mild to severe effects such as respiratory depression.	From rapid breathing, fatigue, headache, light-headedness to more severe symptoms of dizziness and in extreme cases, respiratory arrest, convulsions or loss of consciousness.
Skin:	May produce mild irritation.	Redness, rash.
Eye:	May cause mild irritation.	Redness and pain.
Ingestion:	May be aspirated into lungs if swallowed, may result in pulmonary edema & chemical pneumonitis.	Signs and symptoms of aspiration may include coughing, difficulty breathing, "gurgling" lung sounds when breathing, coughing up phlegm (sputum) that is yellow or green in color or bad smelling, change in voice (hoarseness), skin turning bluish due to lack of oxygen.
	May have effects on the CNS.	See "inhalation" above for symptoms of CNS effects.
	May cause gastrointestinal irritation.	Symptoms of gastrointestinal irritation include diarrhea, nausea and vomiting.

Chronic Exposure:

Inhalation:

Animal studies indicated that isooctane can induce kidney tumor in male rats; the effects are not considered to be relevant to human since it is a male-rate-specific nephropathy involving the alpha-2μ-globulin protein.

Skin:

Not known to be a skin-sensitizer. Repeated and prolonged contact may cause dermatitis due to the defatting action. Benzene may cause cancer (leukemia).

Medical Conditions Aggravated by Exposure:

Dermatitis impaired pulmonary function, diseases of the eyes, liver, kidneys or lungs.

Sensitization: No	Reproductive Toxicology: No	Teratogenicity: No	Mutagenicity: No
Carcinogenicity: Yes (benzene component).	Irritancy: Irritant to eyes, nose, throat, gastrointestinal tract & skin.	Target Organs: Central Nervous System (CNS), Kidneys.	

Lethality Tests:

Chemical Name	CAS No.	LD50	LC50
Isooctane	540-84-1	Rat >2500 mg/kg	Rat, inhalation 47.4 mg/L/1 hr.
Benzene	71-43-2	Rabbit, dermal:>8200 mg/kg Rat, oral: 810 mg/kg	Rat, inhalation: 44.66 mg/L 4hr.

12. Ecological Information

Persistence & Degradability: Slow biodegradation in soil and water.	Bioaccumulative Potential: May bioaccumulate to some extent.
Mobility: No data available.	Other Adverse Effects: No data available.

Terrestrial Fate:

- Photolysis and hydrolysis of isooctane are not expected to be important in soil. Although isooctane may undergo slow biodegradation in soil, volatilization from dry and wet soil surfaces is expected to be more important in the fate process. Isooctane is not expected to leach into groundwater.

Aquatic Fate:

- Hydrolysis of isooctane in water is not expected to be important because the compound does not contain any hydrolysable group.
- Photolysis of the compound in water is also expected to be unimportant because isooctane is transparent to wavelengths available in sunlight.
- Although slow biodegradation may occur in aquatic medium, volatilization from water is expected to be the dominant process. Isooctane is expected to have a half-life of less than 1 day in water.
- This material may bio-accumulate to some extent.

Atmospheric Fate:

- The reaction of isooctane with atmospheric oxygen may not be important in the atmosphere. The gas-phase reactions of alkanes with ozone and nitrate radicals are of negligible importance as atmospheric loss processes. The half-life of isooctane due to the reaction with atmospheric OH radicals is 4.4 days.

Eco Toxicity Tests (isooctane: CAS 540-84-1)

Species	Test Method	LC50/ EC50/
	Acute test:	
Oncorhynchus mykiss (rainbow trout)	Semi-static test; 96 hours	LC50 = 0.11 mg/L
Daphnia magna (water flea)	Static test; 48 hours	EC50 = 0.4 mg/L
Algae	72 hours	EL50 = 2.943 mg/L
	Chronic/long-term test:	
Daphnia magna (water flea)	Chronic Toxicity: 21 days	NOEC = 0.17 mg/L

13. Disposal Considerations

Waste Disposal:

- Dispose of waste material at an approved (hazardous) waste treatment/disposal facility in accordance with applicable local, provincial, and federal regulations.
- Waste isooctane can be incinerated, fuels blending, or recycled
- Do not dispose of waste with normal garbage, or to sewer systems.

14. Transport Information

TDG (CANADA) CLASSIFICATION

PROPER SHIPPING NAME: Octanes

CLASS: 3 (Flammable Liquid)

UN NUMBER: UN1262

PACKING GROUP: II

LABEL/PLACARD:



TDG SPECIAL PROVISION: None

IMO (International Marine Organization) and IBC Code (International Bulk Chemical)

- UN 1262, Octanes,3, II (-12°C /10.4°F)
- Marine Pollutant (2,2,4-Trimethylpentane/ Isooctane); Pollution Category: X
- Hazards: P
- Ship Type 2
- Tank Type: 2G

15. Regulatory Information

CANADA

	Isooctane	Benzene
CAS	540-84-1	71-43-2
DSL	yes	yes
NPRI	no	yes
E2	no	yes

16. Other Information

NFPA Hazard Rating:

Health 1, Flammability 4, Instability 0



Prepared for:

Keyera Health and Safety

Issue Date/ Revision No:

September 26, 2017/ Revision #11

Revisions:

- | | |
|------------------------------|--------------------|
| • Original: | February 15, 2001 |
| • 1 st revision: | November 20, 2002 |
| • 2 nd revision: | February 26, 2003 |
| • 3 rd revision: | January 31, 2006 |
| • 4 th revision: | February 22, 2007 |
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| • 7 th revision: | February 8, 2013 |
| • 8 th revision: | September 30, 2014 |
| • 9 th revision: | July 15, 2015 |
| • 10 th revision: | August 31, 2015 |
| • 11 th revision: | September 26, 2017 |

Dates:

Main Changes

regulatory information
 emergency contact phone number
 contact info; vapor pressure
 IMO's adoption of IBC code
 emergency contact phone number
 company name change
 added corporate logo and info
 corrected NFPA rating; GHS format
 added benzene component; added glossary
 changed emergency contact number
 updated Section 9

Glossary

- ACGIH** – American Conference of Governmental Industrial Hygiene
- DOT** – US Department of Transportation
- DSL** – Domestic Substance List (Canada)
- E2** – Environmental Emergencies (Canada)
- GHS** – Globally Harmonized System
- IARC** – International Agency for Research on Cancer
- IDLH** – Immediately Dangerous to Life and Health
- NIOSH** – National Institute for Occupational Safety & Health
- NPRI** – National Pollutant Release Inventory (Canada)
- NTP** – National Toxicology Program
- OSHA** – Occupational Safety & Health Administration of the US Depart of Labour
- PEL** – Permissible Exposure Limit
- SARA** – Superfund Amendments and Reauthorization Act of 1986
- STEL** – Short Term Exposure Limit
- TRI** – US Toxic Release Inventory
- TSCA** – Toxic Substance Control Act
- TWA** – Time Weighed Average

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~ End of Safety Data Sheet ~