

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: ESSOLUBE HDX PLUS ENGINE OIL 10W-30
Product Description: Base Oil and Additives
MSDS Number: 15046
Intended Use: Engine oil

COMPANY IDENTIFICATION

Supplier: Imperial Oil Products Division
240 4th Avenue
Calgary, ALBERTA. T2P 3M9 Canada
24 Hour Environmental / Health Emergency Telephone 519-339-2145
Transportation Emergency Phone Number 519-339-2145
Product Technical Information 1-800-268-3183
Supplier General Contact 1-800-567-3776

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

No Reportable Hazardous Substance(s) or Complex Substance(s).

SECTION 3 HAZARDS IDENTIFICATION

This material is not considered to be hazardous according to regulatory guidelines see Section 15.

HEALTH EFFECTS

Low order of toxicity. Excessive exposure may result in eye, skin, or respiratory irritation. High-pressure injection under skin may cause serious damage.

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|------------------------|-----------|-----------------|---------------|
| NFPA Hazard ID: | Health: 0 | Flammability: 1 | Reactivity: 0 |
| HMIS Hazard ID: | Health: 0 | Flammability: 1 | Reactivity: 0 |

Note: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

Eye Contact

Flush thoroughly with water. If irritation occurs, get medical assistance.

Ingestion

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames.

Inappropriate Extinguishing Media: Straight streams of water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply. Fire-fighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulphur Oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: 210C (410F) [ASTM D-92]

Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0

Autoignition Temperature: 315°C (599°F)

SECTION 6 ACCIDENTAL RELEASE MEASURES

Notification Procedures

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do so without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do so without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist

before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dyke far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

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| SECTION 7 | HANDLING AND STORAGE |
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HANDLING

Avoid contact with used product. Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is a static accumulator.

STORAGE

Do not store in open or unlabelled containers. Keep away from incompatible materials.

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| SECTION 8 | EXPOSURE CONTROLS / PERSONAL PROTECTION |
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Exposure limits/standards for materials that can be formed when handling this product: When mists / aerosols can occur, the following are recommended: 5 mg/m³ - ACGIH TLV, 10 mg/m³ - ACGIH STEL.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapour warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practise good housekeeping.

ENVIRONMENTAL CONTROLS

See Sections 6, 7, 12, 13.

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| SECTION 9 | PHYSICAL AND CHEMICAL PROPERTIES |
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Typical physical and chemical properties are given below. Consult the Supplier in Section 1 for additional data.

GENERAL INFORMATION

Physical State: Liquid

Colour: Amber

Odour: Characteristic

Odour Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 C): 0.87

Flash Point [Method]: 210C (410F) [ASTM D-92]

Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0

Autoignition Temperature: 315°C (599°F)

Boiling Point / Range: 285C (545F) - 600C (1112F)

Vapour Density (Air = 1): > 2 at 101 kPa

VAPOUR PRESSURE: [N/D at 20°C] | < 1 kPa (7.5 mm Hg) at 38C

Evaporation Rate (N-Butyl Acetate = 1): < 1

pH: N/A

Log Pow (n-Octanol/Water Partition Coefficient): > 3.5

Solubility in Water: Negligible

Viscosity: [N/D at 40°C] | 10.3 cSt (10.3 mm²/sec) at 100C

Oxidizing properties: See Sections 3, 15, 16.

OTHER INFORMATION

Freezing Point: N/D

Melting Point: N/A

Pour Point: -27°C (-17°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt

| SECTION 10 | STABILITY AND REACTIVITY |
|------------|--------------------------|
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STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

| SECTION 11 | TOXICOLOGICAL INFORMATION |
|------------|---------------------------|
|------------|---------------------------|

Acute Toxicity

| Route of Exposure | Conclusion / Remarks |
|---|---|
| INHALATION | |
| Toxicity (Rat): LC50 > 5000 mg/m ³ | Minimally Toxic. Based on test data for structurally similar materials. |
| Irritation: No end point data. | Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components. |
| Ingestion | |
| Toxicity (Rat): LD50 > 5000 mg/kg | Minimally Toxic. Based on test data for structurally similar materials. |
| Skin | |
| Toxicity (Rabbit): LD50 > 5000 mg/kg | Minimally Toxic. Based on test data for structurally similar materials. |
| Irritation (Rabbit): Data available. | Negligible irritation to skin at ambient temperatures. Based on test data for structurally similar materials. |
| Eye | |
| Irritation (Rabbit): Data available. | May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials. |

CHRONIC/OTHER EFFECTS

For the product itself:

Diesel engine oils: Not carcinogenic in animals tests. Used and unused diesel engine oils did not produce any carcinogenic effects in chronic mouse skin painting studies. Oils that are used in gasoline engines may become hazardous and display the following properties: Carcinogenic in animal tests. Caused mutations in vitro. Possible allergen and photoallergen. Contains polycyclic aromatic compounds (PAC) from combustion products of gasoline and/or thermal degradation products.

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitising in test animals.

Additional information is available by request.

CMR Status: None.

--REGULATORY LISTS SEARCHED--

1 = IARC 1
2 = IARC 2A

3 = IARC 2B
4 = ACGIH ALL

5 = ACGIH A1
6 = ACGIH A2

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| SECTION 12 | ECOLOGICAL INFORMATION |
|-------------------|-------------------------------|

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Expected to be harmful to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

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| SECTION 13 | DISPOSAL CONSIDERATIONS |
|-------------------|--------------------------------|

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Dispose of waste at an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal. Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products. Product is suitable for burning in an enclosed, controlled burner for fuel value or disposal by supervised incineration.

Regulatory Disposal Information

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

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| SECTION 14 | TRANSPORT INFORMATION |
|-------------------|------------------------------|

LAND (TDG) : Not Regulated for Land Transport

LAND (DOT) : Not Regulated for Land Transport

SEA (IMDG) : Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA) : Not Regulated for Air Transport

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| SECTION 15 | REGULATORY INFORMATION |
|-------------------|-------------------------------|

WHMIS Classification: Not controlled

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the (M)SDS contains all the information required by the Controlled Products Regulations.

CEPA: All components of this material are either on the Canadian Domestic Substances List (DSL), exempt, or have been notified under CEPA.

National Chemical Inventory Listing: DSL, ENCS, KECI, TSCA
Special Cases:

| Inventory | Status |
|-----------|--------------------|
| AICS | Restrictions Apply |
| ELINCS | Restrictions Apply |

The Following Ingredients are Cited on the Lists Below:

| Chemical Name | CAS Number | List Citations |
|---------------------------|------------|----------------|
| DIPHENYLAMINE | 122-39-4 | 1 |
| ZINC ALKYLDITHIOPHOSPHATE | 68649-42-3 | 6 |

--REGULATORY LISTS SEARCHED--

1 = TSCA 4
2 = TSCA 5a2

3 = TSCA 5e
4 = TSCA 6

5 = TSCA 12b
6 = NPRI

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|-------------------|--------------------------|
| SECTION 16 | OTHER INFORMATION |
|-------------------|--------------------------|

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Revision Changes:

Section 04: First Aid Skin - Header was modified.

Section 10: Materials To Avoid - Header was modified.
Section 15: Canadian List Citations Table was modified.
Section 12: Ecological Information - Acute Aquatic Toxicity was added.
Section 12: Ecological Information - Acute Aquatic Toxicity was added.
Section 12: Ecological Information - Acute Aquatic Toxicity was deleted.
Section 12: Ecological Information - Acute Aquatic Toxicity was deleted.

WHMIS Classification: Not controlled

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Prepared By: Imperial Oil Limited, IH and Product Safety

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: (see Section 16 for Synonyms) **UNLEADED GASOLINE**
Product Description: Hydrocarbons and Additives
MSDS Number: 8522
Intended Use: Fuel

COMPANY IDENTIFICATION

Supplier: Imperial Oil Products Division
240 4th Avenue
Calgary, ALBERTA. T2P 3M9 Canada
24 Hour Environmental / Health Emergency Telephone 519-339-2145
Transportation Emergency Phone Number 519-339-2145
Product Technical Information 1-800-268-3183
Supplier General Contact 1-800-567-3776

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

| Name | CAS# | Concentration* | Acute Toxicity |
|-------------------------|------------|----------------|--|
| GASOLINE | 86290-81-5 | > 99% | None |
| METHYL-TERT-BUTYL ETHER | 1634-04-4 | 0 - 15% | Dermal Lethality: LD50 > 10.0 g/kg (Rabbit); Inhalation Lethality: LC50 23576 ppm (Rat); Oral Lethality: LD50 4.0 g/kg (Rat) |

Hazardous Constituent(s) Contained in Complex Substance(s)

| Name | CAS# | Concentration* | Acute Toxicity |
|---------------|----------|----------------|--|
| BENZENE | 71-43-2 | 0 - 1.5% | Dermal Lethality: LD50 > 9.4 g/kg (Rabbit); Inhalation Lethality: LC50 13328 ppm (Rat); Oral Lethality: LD50 0.93 g/kg (Rat) |
| CUMENE | 98-82-8 | 0 - 1% | Dermal Lethality: LD50 10.6 g/kg (Rabbit); Inhalation Lethality: LC50 8000 ppm (Rat); Oral Lethality: LD50 1.4 g/kg (Rat) |
| Cyclohexane | 110-82-7 | 0 - 1% | Dermal Lethality: LD50 > 18 g/kg (Rabbit); Oral Lethality: 12 g/kg (Rat) |
| ETHYL BENZENE | 100-41-4 | 0 - 3% | Dermal Lethality: LD50 15 g/kg (Rabbit); Inhalation Lethality: LC50 4000 ppm (Rat); Oral Lethality: LD50 3.5 g/kg (Rat) |
| n-Hexane | 110-54-3 | 0 - 3% | Dermal Lethality: LD50 3.295 g/kg (Rabbit); Inhalation Lethality: LC50 97469 ppm (Rat); Oral |

| | | | |
|-------------|-----------|---------|--|
| | | | Lethality: LD50 28.7 g/kg (Rat) |
| Naphthalene | 91-20-3 | 0 - 1% | Dermal Lethality: LD50 > 20 g/kg (Rabbit); Oral Lethality: LD50 0.49 g/kg (Rat) |
| TOLUENE | 108-88-3 | 0 - 20% | Dermal Lethality: LD50 12.10 g/kg (Rabbit); Inhalation Lethality: LC50 8000 ppm (Rat); Oral Lethality: LD50 5.0 g/kg (Rat) |
| XYLENES | 1330-20-7 | 0 - 10% | Dermal Lethality: LD50 4.5 g/kg (Rabbit); Inhalation Lethality: LC50 5000 ppm (Rat); Oral Lethality: LD50 4.3 g/kg (Rat) |

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

Note: The concentration of the components shown above may vary substantially. In certain countries, benzene content may be limited to lower levels. Oxygenates such as tertiary-amyl-methyl ether, ethanol, di-isopropyl ether, and ethyl-tertiary-butyl ether may be present. Because of volatility considerations, gasoline vapor may have concentrations of components very different from those of liquid gasoline. The major components of gasoline vapor are: butane, isobutane, pentane, and isopentane. The reportable component percentages, shown in the composition/information on ingredients section, are based on API's evaluation of a typical gasoline mixture.

SECTION 3 HAZARDS IDENTIFICATION

This material is considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

PHYSICAL/CHEMICAL EFFECTS

FLAMMABLE. Material can release vapours that readily form flammable mixtures. Vapour accumulation could flash and/or explode if ignited. Material can accumulate static charges which may cause an incendiary electrical discharge.

HEALTH EFFECTS

May cause cancer. Repeated exposure may cause skin dryness or cracking. If swallowed, may be aspirated and cause lung damage. May be irritating to the eyes, nose, throat, and lungs. May cause central nervous system depression. High-pressure injection under skin may cause serious damage. Prolonged and repeated exposure to benzene may cause serious injury to blood forming organs and is associated with anaemia and to the later development of acute myelogenous leukaemia (AML).

Target Organs: Blood and/or blood-forming organs |

| | | | |
|------------------------|------------|-----------------|---------------|
| NFPA Hazard ID: | Health: 1 | Flammability: 3 | Reactivity: 0 |
| HMIS Hazard ID: | Health: 1* | Flammability: 3 | Reactivity: 0 |

Note: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

Skin Contact

Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

Eye Contact

Flush thoroughly with water. If irritation occurs, get medical assistance.

Ingestion

Seek immediate medical attention. Do not induce vomiting.

NOTE TO PHYSICIAN

If ingested, material may be aspirated into the lungs and cause chemical pneumonitis. Treat appropriately.

PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE

Benzene- Individuals with liver disease may be more susceptible to toxic effects.

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| SECTION 5 | FIRE FIGHTING MEASURES |
|------------------|-------------------------------|

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames.

Inappropriate Extinguishing Media: Straight streams of water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. If a leak or spill has not ignited, use water spray to disperse the vapours and to protect personnel attempting to stop a leak. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply. Fire-fighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: EXTREMELY FLAMMABLE. Vapour is flammable and heavier than air. Vapour may travel across the ground and reach remote ignition sources, causing a flashback fire danger.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulphur Oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: -40C (-40F) [ASTM D-92]

Flammable Limits (Approximate volume % in air): LEL: 1.4 UEL: 7.6

Autoignition Temperature: >250°C (482°F)

| | |
|------------------|------------------------------------|
| SECTION 6 | ACCIDENTAL RELEASE MEASURES |
|------------------|------------------------------------|

Notification Procedures

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required, due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for Personal Protective Equipment.

SPILL MANAGEMENT

Land Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do so without risk. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Prevent entry into waterways, sewer, basements or confined areas. A vapour-suppressing foam may be used to reduce vapour. Use clean non-sparking tools to collect absorbed material. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Large Spills: Water spray may reduce vapour, but may not prevent ignition in enclosed spaces. Recover by pumping or with suitable absorbent.

Water Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do so without risk. Do not confine in area of spill. Advise occupants and shipping in downwind areas of fire and explosion hazard and warn them to stay clear. Allow liquid to evaporate from the surface. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dyke far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7

HANDLING AND STORAGE

HANDLING

Avoid breathing mists or vapour. Avoid contact with skin. Use non-sparking tools and explosion-proof equipment. Potentially toxic/irritating fumes/vapour may be evolved from heated or agitated material. Do not siphon by mouth. Use only with adequate ventilation. Use proper bonding and/or earthing procedures. Do not use as a cleaning solvent or other non-motor fuel uses. For use as a motor fuel only. It is dangerous and/or unlawful to put petrol into unapproved containers. Do not fill container while it is in or on a vehicle. Static electricity may ignite vapour and cause fire. Place container on ground when filling and keep nozzle in contact with container. Do not use electronic devices (including but not limited to cellular phones, computers, calculators, pagers or other electronic devices etc) in or around any fuelling operation or storage area unless the devices are certified intrinsically safe by an approved national testing agency and to the safety standards required by national and/or local laws and regulations. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source).

Static Accumulator: This material is a static accumulator.

STORAGE

Ample fire water supply should be available. A fixed sprinkler/deluge system is recommended. Keep container

closed. Handle containers with care. Open slowly in order to control possible pressure release. Store in a cool, well-ventilated area. Outside or detached storage preferred. Storage containers should be earthed and bonded. Drums must be earthed and bonded and equipped with self-closing valves, pressure vacuum bungs and flame arresters.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

| Substance Name | Form | Limit/Standard | | | Note | Source |
|-------------------------|---------|----------------|-----------------------|---------|------|----------|
| BENZENE | | STEL | 2.5 ppm | | Skin | ACGIH |
| BENZENE | | TWA | 0.5 ppm | | Skin | ACGIH |
| CUMENE | | TWA | 50 ppm | | | ACGIH |
| Cyclohexane | | TWA | 100 ppm | | | ACGIH |
| ETHYL BENZENE | | STEL | 125 ppm | | | ACGIH |
| ETHYL BENZENE | | TWA | 100 ppm | | | ACGIH |
| GASOLINE | | STEL | 200 ppm | | | Supplier |
| GASOLINE | | TWA | 100 ppm | | | Supplier |
| GASOLINE | Vapour. | TWA | 300 mg/m ³ | 100 ppm | | Supplier |
| METHYL-TERT-BUTYL ETHER | | TWA | 50 ppm | | | ACGIH |
| n-Hexane | | TWA | 50 ppm | | Skin | ACGIH |
| Naphthalene | | STEL | 15 ppm | | Skin | ACGIH |
| Naphthalene | | TWA | 10 ppm | | Skin | ACGIH |
| TOLUENE | | TWA | 20 ppm | | | ACGIH |
| XYLENES | | STEL | 150 ppm | | | ACGIH |
| XYLENES | | TWA | 100 ppm | | | ACGIH |

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

Use explosion-proof ventilation equipment to stay below exposure limits.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

Half-face filter respirator

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapour warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove

manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

If prolonged or repeated contact is likely, chemical-resistant gloves are recommended. If contact with forearms is likely, wear gauntlet-style gloves.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

If prolonged or repeated contact is likely, chemical, and oil resistant clothing is recommended.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practise good housekeeping.

ENVIRONMENTAL CONTROLS

See Sections 6, 7, 12, 13.

SECTION 9

PHYSICAL AND CHEMICAL PROPERTIES

Typical physical and chemical properties are given below. Consult the Supplier in Section 1 for additional data.

GENERAL INFORMATION

Physical State: Liquid

Colour: Clear (May Be Dyed)

Odour: Petroleum/solvent

Odour Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 C): 0.73

Flash Point [Method]: -40C (-40F) [ASTM D-92]

Flammable Limits (Approximate volume % in air): LEL: 1.4 UEL: 7.6

Autoignition Temperature: >250°C (482°F)

Boiling Point / Range: 35C (95F) - 210C (410F)

Vapour Density (Air = 1): 3.2 at 101 kPa

VAPOUR PRESSURE: > 26.6 kPa (200 mm Hg) at 20°C | 76 kPa (570 mm Hg) at 38 C - 103 kPa (772.5 mm Hg) at 38C

Evaporation Rate (N-Butyl Acetate = 1): > 10

pH: N/A

Log Pow (n-Octanol/Water Partition Coefficient): > 3

Solubility in Water: Negligible

Viscosity: <1 cSt (1 mm²/sec) at 40°C

Oxidizing properties: See Sections 3, 15, 16.

OTHER INFORMATION

Freezing Point: N/D

Melting Point: N/A

| SECTION 10 | STABILITY AND REACTIVITY |
|------------|--------------------------|
|------------|--------------------------|

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Avoid heat, sparks, open flames and other ignition sources.

Materials To Avoid: Halogens, Strong Acids, Alkalies, Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

| SECTION 11 | TOXICOLOGICAL INFORMATION |
|------------|---------------------------|
|------------|---------------------------|

Acute Toxicity

| Route of Exposure | Conclusion / Remarks |
|---|---|
| INHALATION | |
| Toxicity (Rat): LC50 > 5000 mg/m ³ | Minimally Toxic. Based on test data for structurally similar materials. |
| Irritation: No end point data. | Elevated temperatures or mechanical action may form vapours, mist, or fumes which may be irritating to the eyes, nose, throat, or lungs. Based on assessment of the components. |
| Ingestion | |
| Toxicity (Rat): LD50 > 2000 mg/kg | Minimally Toxic. Based on test data for structurally similar materials. |
| Skin | |
| Toxicity (Rabbit): LD50 > 2000 mg/kg | Minimally Toxic. Based on test data for structurally similar materials. |
| Irritation: No end point data. | Mildly irritating to skin with prolonged exposure. Based on test data for structurally similar materials. |
| Eye | |
| Irritation: Data available. | May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials. |

CHRONIC/OTHER EFFECTS

For the product itself:

Laboratory animal studies have shown that prolonged and repeated inhalation exposure to light hydrocarbon vapours in the same boiling range as this product can produce adverse kidney effects in male rats. However, these effects were not observed in similar studies with female rats, male and female mice, or in limited studies with other animal species. Additionally, in a number of human studies, there was no clinical evidence of such effects at normal occupational levels. In 1991, The U.S. EPA determined that the male rat kidney is not useful for assessing human risk. Vapour concentrations above recommended exposure levels are irritating to the eyes and the respiratory tract, may cause headaches and dizziness, are anaesthetic and may have other central nervous system effects. Small amounts of liquid aspirated into the lungs during ingestion or from vomiting may cause chemical pneumonitis or pulmonary edema.

Contains:

BENZENE: Caused cancer (leukemia), damage to the blood-producing system, and serious blood disorders from prolonged, high exposure based on human epidemiology studies. Caused genetic effects and effects on the immune system in laboratory animal and some human studies. Caused toxicity to the fetus in laboratory animal studies.

CUMENE: Repeated inhalation exposure of cumene vapour produced damage in the kidney of male rats only.

These effects are believed to be species specific and are not relevant to humans. **GASOLINE UNLEADED:** Carcinogenic in animal tests. Chronic inhalation studies resulted in liver tumours in female mice and kidney tumours in male rats. Neither result considered significant for human health risk assessment by the United States EPA and others. Did not cause mutations in-vitro or in-vivo. Negative in inhalation developmental studies and reproductive tox studies. Inhalation of high concentrations in animals resulted in reversible central nervous system depression, but no persistent toxic effect on the nervous system. Non-sensitizing in test animals. Caused nerve damage in humans from abusive use (sniffing). **METHYL TERTIARY BUTYL ETHER (MTBE):** Carcinogenic in animal tests. Inhalation exposure to high concentrations resulted in higher than expected mortality in male mice due to urinary tract obstructions and female mice displayed benign liver tumours. Inhalation exposure to high concentrations resulted in higher than expected mortality in male rats due to progressive kidney damage as well as increased benign and malignant kidney tumours, and benign testicular tumours. Did not cause mutations in-vitro or in-vivo. Rabbits exposed to high vapour concentrations did not have any offspring with adverse developmental effects. Mice exposed to high vapour concentrations (maternally toxic) had offspring with embryo/fetal toxicity and birth defects. Rats exposed to high vapour concentrations did not display any treatment-related effects in a two generation reproduction study. The significance of the animal findings at high exposures are not believed to be directly related to potential human health hazards in the workplace. **NAPHTHALENE:** Exposure to high concentrations of naphthalene may cause destruction of red blood cells, anemia, and cataracts. Naphthalene caused cancer in laboratory animal studies, but the relevance of these findings to humans is uncertain. **N-HEXANE:** Prolonged and/or repeated exposures to n-Hexane can cause progressive and potentially irreversible damage to the peripheral nervous system (e.g. fingers, feet, arms, legs, etc.). Simultaneous exposure to Methyl Ethyl Ketone (MEK) or Methyl Isobutyl Ketone (MIBK) and n-Hexane can potentiate the risk of adverse effects from n-Hexane on the peripheral nervous system. n-Hexane has been shown to cause testicular damage at high doses in male rats. The relevance of this effect for humans is unknown. **TOLUENE :** Concentrated, prolonged or deliberate inhalation may cause brain and nervous system damage. Prolonged and repeated exposure of pregnant animals (> 1500 ppm) have been reported to cause adverse fetal developmental effects. **ETHYLBENZENE:** Caused cancer in laboratory animal studies. The relevance of these findings to humans is uncertain. **XYLENES:** High exposures to xylenes in some animal studies have been reported to cause health effects on the developing embryo/fetus. These effects were often at levels toxic to the mother. The significance of these findings to humans has not been determined.

Additional information is available by request.

CMR Status:

| Chemical Name | CAS Number | List Citations |
|-------------------------|------------|----------------|
| BENZENE | 71-43-2 | 1, 4, 5 |
| CUMENE | 98-82-8 | 4 |
| Cyclohexane | 110-82-7 | 4 |
| ETHYL BENZENE | 100-41-4 | 3, 4 |
| GASOLINE | 86290-81-5 | 3, 4 |
| METHYL-TERT-BUTYL ETHER | 1634-04-4 | 4 |
| n-Hexane | 110-54-3 | 4 |
| Naphthalene | 91-20-3 | 3, 4 |
| TOLUENE | 108-88-3 | 4 |
| XYLENES | 1330-20-7 | 4 |

--REGULATORY LISTS SEARCHED--

1 = IARC 1
2 = IARC 2A

3 = IARC 2B
4 = ACGIH ALL

5 = ACGIH A1
6 = ACGIH A2

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Expected to be toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

MOBILITY

More volatile component -- Highly volatile, will partition rapidly to air. Not expected to partition to sediment and wastewater solids.

Less volatile component -- Low solubility and floats and is expected to migrate from water to the land.

Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Majority of components -- Expected to be inherently biodegradable

Atmospheric Oxidation:

More volatile component -- Expected to degrade rapidly in air

BIOACCUMULATION POTENTIAL

Majority of components -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

Regulatory Disposal Information

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (TDG)

Proper Shipping Name: GASOLINE

Hazard Class & Division: 3

UN Number: 1203

Packing Group: II
Marine Pollutant: MP: 100 % weight PP: 0 % weight
Special Provisions: 17

LAND (DOT)

Proper Shipping Name: GASOLINE
Hazard Class & Division: 3
ID Number: 1203
Packing Group: II
ERG Number: 128
Label(s): 3
Transport Document Name: UN1203, GASOLINE, 3, PG II

SEA (IMDG)

Proper Shipping Name: MOTOR SPIRIT or GASOLINE or PETROL
Hazard Class & Division: 3
EMS Number: F-E, S-E
UN Number: 1203
Packing Group: II
Label(s): 3
Transport Document Name: UN1203, MOTOR SPIRIT or GASOLINE or PETROL, 3, PG II, (-40°C c.c.)

AIR (IATA)

Proper Shipping Name: GASOLINE
Hazard Class & Division: 3
UN Number: 1203
Packing Group: II
Label(s): 3
Transport Document Name: UN1203, GASOLINE, 3, PG II

| | |
|-------------------|-------------------------------|
| SECTION 15 | REGULATORY INFORMATION |
|-------------------|-------------------------------|

WHMIS Classification: Class B, Division 2: Flammable Liquids Class D, Division 2, Subdivision A: Very Toxic Material

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the (M)SDS contains all the information required by the Controlled Products Regulations.

CEPA: All components of this material are either on the Canadian Domestic Substances List (DSL), exempt, or have been notified under CEPA.

National Chemical Inventory Listing: AICS, DSL, EINECS, ENCS, KECI, PICCS, TSCA

The Following Ingredients are Cited on the Lists Below:

| Chemical Name | CAS Number | List Citations |
|---------------|------------|----------------|
| BENZENE | 71-43-2 | 6 |
| CUMENE | 98-82-8 | 6 |
| Cyclohexane | 110-82-7 | 6 |

| | | |
|-------------------------|-----------|------|
| ETHYL BENZENE | 100-41-4 | 6 |
| METHYL-TERT-BUTYL ETHER | 1634-04-4 | 6 |
| n-Hexane | 110-54-3 | 6 |
| Naphthalene | 91-20-3 | 1, 6 |
| TOLUENE | 108-88-3 | 6 |
| XYLENES | 1330-20-7 | 1, 6 |

--REGULATORY LISTS SEARCHED--

1 = TSCA 4
2 = TSCA 5a2

3 = TSCA 5e
4 = TSCA 6

5 = TSCA 12b
6 = NPRI

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Revision Changes:

Section 04: First Aid Skin - Header was modified.
Section 04: First Aid Eye - Header was modified.
Section 04: First Aid Ingestion - Header was modified.
Section 06: Notification Procedures - Header was modified.
Section 10: Materials To Avoid - Header was modified.
Section 11: Ingestion Acute Lethality - Header was modified.
Section 09: Vapour Pressure - Header was modified.
Section 05: Hazardous Combustion Products was modified.
Section 14: Sea (IMDG) - Header was modified.
Section 15: National Chemical Inventory Listing - Header was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 16: Synonyms was modified.
Section 16: Health Hazards - Header was modified.
Section 16: Physical Hazards - Header was modified.
Section 11: Chronic Tox - Component - WHMIS was modified.
Section 08: OEL Table - Substance Name Column - Header was added.
Section 08: OEL Table - Form Column - Header was added.
Section 08: OEL Table - Limit Column - Header was added.
Section 08: OEL Table - Notation Column - Header was added.
Section 08: OEL Table - Source Column - Header was added.
Section 13: Regulatory Disposal Information - Header was added.
Section 13: Regulatory Disposal Information - Header was deleted.
Section 08: OEL Table - Form Column - Header was deleted.
Section 08: OEL Table - Limit Column - Header was deleted.
Section 08: OEL Table - Notation Column - Header was deleted.
Section 08: OEL Table - Source Column - Header was deleted.
Section 08: OEL Table - Substance Name Column - Header was deleted.

SYNONYMS: ESSO PREMIUM GASOLINE, GASOLINE REGULAR UNLEADED RUL87 LDCA DYED, ESSO EXTRA MIDGRADE GASOLINE, GASOLINE REGULAR UNLEADED RUL87 LDCA, EXXON MIDGRADE GASOLINE, ESSO MIDGRADE GASOLINE, ESSO REGULAR GASOLINE, GASOLINE MIDGRADE UNLEADED MUL89 DCA, EXXON REGULAR GASOLINE, GASOLINE MIDGRADE UNLEADED MUL89, EXXON PREMIUM GASOLINE, GASOLINE REGULAR UNLEADED RUL87 DYED, GASOLINE MIDGRADE UNLEADED MUL89 DCA DYED, GASOLINE REGULAR UNLEADED RUL87, GASOLINE PREMIUM UNLEADED PUL91, GASOLINE RBOB

BLENDSTOCK P91, GASOLINE RBOB BLENDSTOCK R87, GASOLINE MIDGRADE UNLEADED MUL89 LDCA, GASOLINE MIDGRADE UNLEADED MUL89 LDCA DYED, GASOLINE REGULAR UNLEADED RUL87 DCA, GASOLINE PREMIUM UNLEADED PUL91 LDCA, GASOLINE PREMIUM UNLEADED PUL91 LDCA DYED, GASOLINE PREMIUM UNLEADED PUL91 DCA DYED, GASOLINE REGULAR UNLEADED RUL87 DCA DYED, GASOLINE PREMIUM UNLEADED PUL91 DCA, Isooctane, UNLEADED AUTOMOTIVE GASOLINE

Precautionary Label Text:

WHMIS Classification: Class B, Division 2: Flammable Liquids Class D, Division 2, Subdivision A: Very Toxic Material

Health Hazards

May cause cancer. Repeated exposure may cause skin dryness or cracking. If swallowed, may be aspirated and cause lung damage. May cause central nervous system depression.

Target Organs: Blood and/or blood-forming organs |

Physical Hazards

FLAMMABLE. Material can accumulate static charges which may cause an incendiary electrical discharge. Material can release vapours that readily form flammable mixtures. Vapour accumulation could flash and/or explode if ignited.

PRECAUTIONS

Avoid breathing mists or vapour. Avoid contact with skin. Use non-sparking tools and explosion-proof equipment. Potentially toxic/irritating fumes/vapour may be evolved from heated or agitated material. Do not siphon by mouth. Use only with adequate ventilation. Use proper bonding and/or earthing procedures.

FIRST AID

INHALATION: Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

Eye: Flush thoroughly with water. If irritation occurs, get medical assistance.

Oral: Seek immediate medical attention. Do not induce vomiting.

Skin: Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

FIRE FIGHTING MEDIA

Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames.

SPILL/LEAK

Land Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do so without risk. Prevent entry into waterways, sewer, basements or confined areas. A vapour-suppressing foam may be used to reduce vapour. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Recover by pumping or with suitable absorbent.

Water Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do so without risk. Do not confine in area of spill. Advise occupants and shipping in downwind areas of fire and

explosion hazard and warn them to stay clear. Allow liquid to evaporate from the surface. Seek the advice of a specialist before using dispersants.

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Prepared By: Imperial Oil Limited, IH and Product Safety

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: COMMERCIAL PROPANE (ODORIZED)
Product Description: Liquefied Hydrocarbon Gas, Gas or Liquefied Gas
MSDS Number: 8515
Intended Use: Fuel gas

COMPANY IDENTIFICATION

Supplier: Imperial Oil Products Division
240 4th Avenue
Calgary, ALBERTA. T2P 3M9 Canada
24 Hour Environmental / Health Emergency Telephone 519-339-2145
Transportation Emergency Phone Number 519-339-2145
Product Technical Information 1-800-268-3183
Supplier General Contact 1-800-567-3776

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

| Name | CAS# | Concentration* | Acute Toxicity |
|-------------|------------|----------------|---|
| ALKANES, C4 | 68513-65-5 | 0 - 2.5% | None |
| Ethane | 74-84-0 | 0 - 5% | None |
| ISOBUTANE | 75-28-5 | 0 - 2.5% | Inhalation Lethality: LC50 142,500 ppm (Rat) |
| Propane | 74-98-6 | 90 - 99% | None |
| Propylene | 115-07-1 | 1 - 10% | None |

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

SECTION 3 HAZARDS IDENTIFICATION

This material is considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

PHYSICAL/CHEMICAL EFFECTS

FLAMMABLE GAS. Material can release vapours that readily form flammable mixtures. Vapour accumulation could flash and/or explode if ignited. Frostbite hazard - rapidly expanding gas or liquid may cause frostbite. Material can accumulate static charges which may cause an incendiary electrical discharge.

HEALTH EFFECTS

Continued exposure to odorised gas may reduce or eliminate ability to smell the odorant. People with impaired ability to detect odour due to colds, allergies, injuries etc must be especially cautious. Odour must not be used exclusively as a safety measure. Proper respiratory protection and fire/explosion precautions should be utilised when odour is first detected. Inert gas and/or simple asphyxiant. Reduces oxygen available for breathing. Exposure to concentrations above 10% of the LEL may cause a general central nervous system (CNS) depression typical of anesthetic gases or intoxicants. Aliphatic hydrocarbon gases may build up in confined spaces and may cause dizziness, light-headedness, headache, nausea and loss of co-ordination. Continued inhalation may result in narcosis, unconsciousness, and possibly lead to death. High-pressure injection under skin may cause serious damage.

| | | | |
|------------------------|-----------|-----------------|---------------|
| NFPA Hazard ID: | Health: 1 | Flammability: 4 | Reactivity: 0 |
| HMIS Hazard ID: | Health: 1 | Flammability: 4 | Reactivity: 0 |

Note: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Immediately remove from further exposure. Get immediate medical assistance. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. Give supplemental oxygen, if available. If breathing has stopped, assist ventilation with a mechanical device.

SKIN CONTACT

If frostbite occurs, immerse involved area in water at body temperature. Keep immersed for 20 to 40 minutes. Seek medical assistance. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water for at least 15 minutes. Get medical assistance.

INGESTION

Not Applicable

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, dry chemical or carbon dioxide (CO₂) to extinguish flames.

Inappropriate Extinguishing Media: Straight streams of water

FIRE FIGHTING

Fire Fighting Instructions: Allow the fire to burn under controlled conditions. Stop leak if you can do so without risk. Evacuate area. If a leak or spill has not ignited, use water spray to disperse the vapours and to protect personnel attempting to stop a leak. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply. Fire-fighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: FLAMMABLE GAS. Vapour is flammable and heavier than air. Vapour may travel across the ground and reach remote ignition sources, causing a flashback fire danger. Hazardous material. Firefighters should consider protective equipment indicated in Section 8.

Hazardous Combustion Products: Oxides of carbon, Incomplete combustion products

FLAMMABILITY PROPERTIES

Flash Point [Method]: -103C (-153F) [ASTM D-92]

Flammable Limits (Approximate volume % in air): LEL: 2.4 UEL: 9.5

Autoignition Temperature: 432°C (810°F)

SECTION 6

ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required, due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for Personal Protective Equipment.

SPILL MANAGEMENT

Land Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do so without risk. CAUTION: When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning. Allow liquid to evaporate from the surface. All equipment used when handling the product must be grounded. Do not direct water at spill or source of leak. Do not touch or walk through spilled material. If possible, turn leaking containers so that gas escapes rather than liquid. Isolate area until gas has dispersed. Prevent spreading of vapour through sewers, ventilation systems and confined areas. Use water spray to reduce vapour or divert vapour cloud drift. Avoid allowing water run-off to contact spilled material.

Water Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Allow liquid to evaporate from the surface. See Land Spill in the section of the SDS for advice on gases.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7

HANDLING AND STORAGE

HANDLING

Use non-sparking tools and explosion-proof equipment. Ethyl mercaptan is added to gas as an odorant to aid in the detection of the gas in case of leak or accidental discharge. Since ethyl mercaptan is reactive, a reduction in its effectiveness may occur during transport and storage of the odorised gas. Therefore, odour must not be used exclusively as a safety measure. Handle gas with strict adherence to established safety procedures. Use proper bonding and/or earthing procedures. Material can accumulate static charges which may cause an electrical spark (ignition source).

Static Accumulator: This material is a static accumulator.

Storage

Ample fire water supply should be available. A fixed sprinkler/deluge system is recommended. Keep container closed. Handle containers with care. Open slowly in order to control possible pressure release. Store in a cool, well-ventilated area. Outside or detached storage preferred. Storage containers should be earthed and bonded.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

| Substance Name | Form | Limit/Standard | | | Note | Source |
|----------------|------|----------------|----------|--|------|--------|
| Ethane | | TWA | 1000 ppm | | | ACGIH |
| ISOBUTANE | | TWA | 1000 ppm | | | ACGIH |
| Propane | | TWA | 1000 ppm | | | ACGIH |
| Propylene | | TWA | 500 ppm | | | ACGIH |

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

Use explosion-proof ventilation equipment to stay below exposure limits.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapour warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

If product is hot, thermally protective gloves are recommended. If contact with forearms is likely, wear gauntlet-style gloves.

Eye Protection: If contact is likely, safety glasses with side shields are recommended. Face shield is recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact. Thermally protective and chemical resistant apron and long sleeves are recommended when volume of material is significant.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practise good housekeeping.

ENVIRONMENTAL CONTROLS

See Sections 6, 7, 12, 13.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Typical physical and chemical properties are given below. Consult the Supplier in Section 1 for additional data.

GENERAL INFORMATION

Physical State: Gas
Form: Liquefied
Colour: Colourless
Odour: Mercaptan
Odour Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 C): 0.51
Flash Point [Method]: -103C (-153F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 2.4 UEL: 9.5
Autoignition Temperature: 432°C (810°F)
Boiling Point / Range: -42C (-44F)
Vapour Density (Air = 1): 1.5 at 101 kPa
Vapour Pressure: 850 kPa (6375 mm Hg) at 20°C
Evaporation Rate (N-Butyl Acetate = 1): > 1
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): N/A
Solubility in Water: Negligible
Viscosity: [N/D at 40°C] | 0.5 cSt (0.5 mm²/sec) at 15C
Oxidizing properties: See Sections 3, 15, 16.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: >-187°C (-305°F)

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Avoid heat, sparks, open flames and other ignition sources.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

| SECTION 11 | TOXICOLOGICAL INFORMATION |
|------------|---------------------------|
|------------|---------------------------|

Acute Toxicity

| Route of Exposure | Conclusion / Remarks |
|---|---|
| INHALATION | |
| Toxicity (Rat): LC50 > 5000 mg/m ³ | Minimally Toxic. Based on test data for structurally similar materials. |
| Irritation: No end point data. | Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components. |
| INGESTION | |
| Toxicity: No end point data. | Not applicable. |
| Skin | |
| Toxicity: No end point data. | Not applicable. |
| Irritation (Rabbit): Data available. | Negligible irritation to skin at ambient temperatures. Based on test data for structurally similar materials. |
| Eye | |
| Irritation (Rabbit): Data available. | May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials. |

CHRONIC/OTHER EFFECTS

For the product itself:

May cause central nervous system disorder (e.g., narcosis involving a loss of coordination, weakness, fatigue, mental confusion and blurred vision) and/or damage. Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite (cold burn). Simple asphyxiant: Acts by displacing oxygen in the lungs thereby diminishing the supply of oxygen available to the blood and tissues. Symptoms include shortness of breath, rapid heart rate, incoordination, lethargy, headaches, nausea, vomiting, and disorientation. Continued lack of oxygen may result in convulsions, loss of consciousness and death. Since exercise increases the tissue need for oxygen, symptoms will occur more quickly during exertion in an oxygen-deficient environment. Oxygen in enclosed spaces should be maintained at 21 percent by volume.

Additional information is available by request.

CMR Status: None.

| Chemical Name | CAS Number | List Citations |
|---------------|------------|----------------|
| Ethane | 74-84-0 | 4 |
| ISOBUTANE | 75-28-5 | 4 |
| Propane | 74-98-6 | 4 |
| Propylene | 115-07-1 | 4 |

--REGULATORY LISTS SEARCHED--

1 = IARC 1

3 = IARC 2B

5 = ACGIH A1

2 = IARC 2A

4 = ACGIH ALL

6 = ACGIH A2

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Material -- Highly volatile, will partition rapidly to air. Not expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Material -- Expected to be inherently biodegradable

Atmospheric Oxidation:

Material -- Expected to degrade at a moderate rate in air

BIOACCUMULATION POTENTIAL

Material -- Potential to bioaccumulate is low.

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (TDG)

Proper Shipping Name: LIQUEFIED PETROLEUM GASES

Hazard Class & Division: 2.1

UN Number: 1075

Packing Group: (N/A)

LAND (DOT)

Proper Shipping Name: Petroleum gases, liquified
Hazard Class & Division: 2.1
ID Number: 1075
Packing Group: (N/A)
ERG Number: 115
Label(s): 2.1
Transport Document Name: UN1075, PETROLEUM GASES, LIQUEFIED, 2.1

SEA (IMDG)

Proper Shipping Name: Petroleum gases, liquified
Hazard Class & Division: 2.1
EMS Number: F-D, S-U
UN Number: 1075
Packing Group: (N/A)
Label(s): 2.1
Transport Document Name: UN1075, PETROLEUM GASES, LIQUEFIED, 2.1 (-103°C c.c.)

AIR (IATA)

Proper Shipping Name: Petroleum gases, liquified
Hazard Class & Division: 2.1
UN Number: 1075
Packing Group: (N/A)
Label(s): 2.1
Transportation Limitations: CARGO AIRCRAFT ONLY
Transport Document Name: UN1075, PETROLEUM GASES, LIQUEFIED, 2.1

| SECTION 15 | REGULATORY INFORMATION |
|------------|------------------------|
|------------|------------------------|

WHMIS Classification: Class A: Compressed Gas Class B, Division 1: Flammable Gases

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the (M)SDS contains all the information required by the Controlled Products Regulations.

CEPA: All components of this material are either on the Canadian Domestic Substances List (DSL), exempt, or have been notified under CEPA.

NATIONAL CHEMICAL INVENTORY LISTING: EINECS, KECI, PICCS, TSCA, IECSC, ENCS, DSL, AICS

The Following Ingredients are Cited on the Lists Below: None.

| Chemical Name | CAS Number | List Citations |
|---------------|------------|----------------|
| ISOBUTANE | 75-28-5 | 6 |
| Propane | 74-98-6 | 6 |
| Propylene | 115-07-1 | 6 |

--REGULATORY LISTS SEARCHED--

1 = TSCA 4
2 = TSCA 5a2

3 = TSCA 5e
4 = TSCA 6

5 = TSCA 12b
6 = NPRI

| | |
|-------------------|--------------------------|
| SECTION 16 | OTHER INFORMATION |
|-------------------|--------------------------|

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Revision Changes:

Section 04: First Aid Skin was modified.
Section 04: First Aid Eye was modified.
Section 05: Fire Fighting Measures - Fire Fighting Instruction was modified.
Section 06: Protective Measures was modified.
Section 06: Notification Procedures - Header was modified.
Section 13: Empty Container Warning was modified.
Section 09: Phys/Chem Properties Note was modified.
Section 09: Boiling Point C(F) was modified.
Section 08: Hand Protection was modified.
Section 09: Vapour Pressure was modified.
Section 07: Handling and Storage-Storage was modified.
Section 01: Company Mailing Address was modified.
Section 01: Company Mailing Address was modified.
Hazard Identification: Health Hazards was modified.
Hazard Identification: Physical/Chemical Hazard was modified.
Section 05: Hazardous Combustion Products was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09 Viscosity was modified.
Section 09 Viscosity was modified.
Section 08: Hand Protection was modified.
Section 14: Transport Document Name was modified.
Section 14: Sea (IMDG) - Header was modified.
Section 14: Transport Document Name was modified.
Section 14: Transport Document Name was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 08: Exposure Limits Table was modified.
Section 16: First Aid Skin was modified.
Hazard Identification: Physical/Chemical Hazard was added.
Section 16: Physical Hazards was added.
Section 16: First Aid Eye was added.
Section 16: First Aid Eye - Header was added.
Section 15: Canadian List Citations Table was added.
Section 15: Chemical Name - Header was added.
Section 15: CAS Number - Header was added.
Section 15: List Citations -Header was added.
Section 11: Chronic Tox - Component - Header was added.
Section 11: Other Health Effects Header was added.
Composition: CAS Number was added.
Composition: Concentration - Header was added.
Composition: Primary Ingredient Name was added.
Composition: Substances Table - Header was added.
Composition: No components was added.
Composition: Concentration Footnote was added.

Section 08: OEL Table - Substance Name Column - Header was added.
Section 08: OEL Table - Form Column - Header was added.
Section 08: OEL Table - Limit Column - Header was added.
Section 08: OEL Table - Notation Column - Header was added.
Section 08: OEL Table - Source Column - Header was added.
Section 13: Regulatory Disposal Information - Header was added.
Section 13: Regulatory Disposal Information - Header was deleted.
Composition: Concentration Footnote was deleted.
Section 11: Other Health Effects Header was deleted.
Composition: Primary Ingredient Name was deleted.
Composition: CAS Number was deleted.
Composition: Concentration - Header was deleted.
Composition: Substances Table - Header was deleted.
Composition: No components was deleted.
Section 11: Chronic Tox - Component - Header was deleted.
Section 08: OEL Table - Form Column - Header was deleted.
Section 08: OEL Table - Limit Column - Header was deleted.
Section 08: OEL Table - Notation Column - Header was deleted.
Section 08: OEL Table - Source Column - Header was deleted.
Section 08: OEL Table - Substance Name Column - Header was deleted.

Precautionary Label Text:

WHMIS Classification: Class A: Compressed Gas Class B, Division 1: Flammable Gases

HEALTH HAZARDS

May cause central nervous system depression.

PHYSICAL HAZARDS

FLAMMABLE GAS. In use, may form flammable/explosive vapour-air mixture. Suffocation (asphyxiant) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels. Frostbite hazard - rapidly expanding gas or liquid may cause frostbite. Material can accumulate static charges which may cause an incendiary electrical discharge.

PRECAUTIONS

Use non-sparking tools and explosion-proof equipment. Use proper bonding and/or earthing procedures.

FIRST AID

INHALATION: Immediately remove from further exposure. Get immediate medical assistance. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. Give supplemental oxygen, if available. If breathing has stopped, assist ventilation with a mechanical device.

Eye: Flush thoroughly with water for at least 15 minutes. Get medical assistance.

Skin: If frostbite occurs, immerse involved area in water at body temperature. Keep immersed for 20 to 40 minutes. Seek medical assistance. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

FIRE FIGHTING MEDIA

Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames.

SPILL/LEAK

Land Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do so without risk. CAUTION: When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning. Allow liquid to evaporate from the surface. Do not direct water at spill or source of leak. If possible, turn leaking containers so that gas escapes rather than liquid. Isolate area until gas has dispersed. Prevent spreading of vapour through sewers, ventilation systems and confined areas. Use water spray to reduce vapour or divert vapour cloud drift. Avoid allowing water run-off to contact spilled material.

Water Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Allow liquid to evaporate from the surface. Report spills as required to appropriate authorities. See Land Spill in the section of the SDS for advice on gases.

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Prepared By: Imperial Oil Limited, IH and Product Safety