

PROPANE

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Section 9. Physical and Chemical Properties

Physical State & Appearance	Gas at room temperature; liquid when stored under pressure.	Viscosity	Not applicable.
Colour	Colourless.	Pour Point	Not applicable.
Odour	Odourless gas in natural state at any concentration. Propane sold for fuel purposes under pressure usually has an odourant added to it. This odourant is usually a mercaptan, which has an odour similar to "rotten eggs" or "skunk". The odourant level is such that it is noticeable below the Lower Exposure Limit (LEL) of the propane. WARNING: Studies have shown that not all persons are sensitive to the skunky smell and may not be able to detect this warning device!	Softening Point	Not applicable.
Odour Threshold	Odour is not an adequate warning to prevent overexposure to propane. Prolonged exposure to mercaptans can cause olfactory desensitization.	Dropping Point	Not applicable.
Boiling Point	-42°C (-44°F).	Penetration	Not applicable.
Density	0.51 Kg/L @ 15°C (Water = 1).	Oil/Water Dist. Coeff	Log Kow: 2.35; mobile.
Vapour Density	1.56 @ 0°C (32°F), 1.8 @ 20°C (68°F) Air = 1.	Ionicity (in water)	Not applicable.
Vapour Pressure	<10763 mmHg @ 100°F (<1435 kPa @ 33°C).	Dispersion Properties	Not available.
Volatility	Volatile	Solubility	62ppm in water at 25°C (77°F), slightly soluble in acetone. Soluble in benzene, ether, alcohols, chloroform.

Section 10. Stability and Reactivity

Corrosivity	Non corrosive		
Stability	The product is stable under normal handling and storage conditions.	Hazardous Polymerization	Will not occur under normal conditions.
Incompatible Substances/ Conditions to Avoid	Highly reactive with oxidizing agents (peroxides, chlorines).	Decomposition Products	Releases of Co., smoke and irritating fumes when heated to decomposition

Section 11. Toxicological Information

Routes of Entry	Inhalation, skin contact and eye contact.
Acute Lethality	Simple asphyxiant. LC50 (Inhalation/human): no effect for 10,000 ppm (1%) break exposure; slight dizziness in a few minutes at 100,000 ppm (10%).

Chronic or Other Toxic Effects	
Dermal Route:	Low dermal penetration. Skin irritation has not been shown even with twice daily application for 12 weeks in human volunteers.
Inhalation Route:	Subchronic inhalation studies in monkeys show no evidence of organs toxicity or abnormalities.
Oral Route:	No studies were found.
Eye Irritation/Inflammation.	None.
Immunotoxicity.	No studies were found.
Skin Sensitization:	No studies were found.
Respiratory Tract Sensitization:	No studies were found.
Mutagenic:	Not mutagenic in the Salmonella typhimurium/microsome assay (Ames test).
Reproductive Toxicity	No studies were found.
Teratogenicity/Embryotoxicity:	No studies were found.
Carcinogenicity (ACGIH)	Simple asphyxiant
Carcinogenicity (IARC)	No studies were found.
Carcinogenicity (NTP)	No studies were found.
Carcinogenicity (IRIS)	No studies were found.
Carcinogenicity (OSHA)	No studies were found.

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Other Considerations	Acts as a simple asphyxiant — inert gas or vapour. The narcotic or intoxicated effect of a simple asphyxiant may impair a person's judgement, but it is temporary and will rapidly disappear in fresh air. Persons with anemia or other conditions of reduced oxygen-carrying capacity may be more sensitive. Propane producers and distributors may, from time to time, add small amounts of methanol to the propane to overcome water and freezing problems. Methanol may accumulate in liquid residues in propane piping and storage vessels. Please refer to a methanol Material Safety Data Sheet (MSDS) for further details concerning methanol.
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Section 12. Ecological Information

Environmental Fate	Volatilizes and disperses rapidly. Volatilization is expected to be the dominant fate process.	Persistence/Bioaccumulation Potential	Propane is readily biodegraded by soil bacteria (<i>Microbacterium vaccae</i>). The degradation of propane is similar to the degradation of fatty acids.
BOD5 & COD	Not available.	Products of Biodegradation	Not available.
Additional Remarks	Henry's Law constants for propane has been calculated to be 7.07×10^{-1} atm-m ³ /mole @ 25°C. These mean that propane may rapidly volatilize from water and moist soil to the atmosphere. The estimated half-life for evaporation of propane from a model river (1m deep flowing 1m/s with a wind speed of 3 m/s) and a model pond are 1.9 hrs. and 2.3 hrs., respectively.		

Section 13. Disposal Considerations

Waste Disposal	Preferred waste management priorities are: (1) incineration with energy recovery; (2) evaporation; (3) disposal at licensed waste disposal facility. Ensure that disposal or reprocessing is in compliance with government requirements and local disposal regulations.
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Section 14. Transport Information

TDG Classification	Shipping name: Propane or Liquefied Petroleum Gas; UN1978 or UN 1075, Class 2.1; Label required: Flammable Gas.	Special Provisions for Transport	102 Add "SPECIAL COMMODITY" to document if in car load, container load by rail. Acceptable modes of transportation: air (cargo only), rail, road and water. Not acceptable for transport by passenger aircraft.
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Section 15. Regulatory Information

Other Regulations	All components of this formulation are listed in the Domestic Substances List (DSL-Canadian) and in the Toxic Substances Control Act Inventory (TSCA-U.S.). This product is not known to contain any of the carcinogens required to be listed under OSHA hazard communication standard, 29 CFR 1910.1200 (U.S.). Not listed in EPCRA or SARA Title III, Section 313, Toxic Chemicals (40 CFR 355). Not listed in CERCLA (40 CFR 302.40). Please note that the chemical identity of some or all of the ingredients that may be listed herein is confidential business information and is being withheld as permitted by 29 CFR 1910.1200 and various State Right to Know Laws.		
OSD/OPD (Europe)	2- Risk of explosion by shock, friction, fire or other sources of ignition. 13- Extremely flammable liquefied gas. 16- Explosive when mixed with oxidizing substances. 20/21- Harmful by inhalation and in contact with skin. 35- Causes severe burns.		

DOT (U.S.A.)
(Pictograms)

HMIS (U.S.A.)

Health Hazard	1
Fire Hazard	4
Reactivity	0
Personal Protection	0

NFPA (U.S.A.)



Rating
0 Insignificant
1 Slight
2 Moderate
3 High
4 Extreme

Section 16. Other Information

References	Available upon request.
Glossary	<p>ACGIH - American Conference of Governmental Industrial Hygienists ASTM - American Society for Testing and Materials BOD5 - Biological Oxygen Demand in 5 days CAN/CGA 8:49.2 - Propane Installation Code CAS - Chemical Abstract Services CEPA - Canadian Environmental Protection Act CERCLA - Comprehensive Environmental Response, Compensation and Liability Act CFR - Code of Federal Regulations CHIP - Chemical Hazard Information and Packaging Approved Supply List COD - Chemical Oxygen Demand CPR - Controlled Products Regulation DOT - Department of Transportation DSC - Dangerous Substances Classification and Labeling (Europe)</p> <p>OSD/OPD - Dangerous Substance or Dangerous Preparations Directives (Europe) DSL - Domestic Substances List EEC/EU - European Economic Community/European Union EINECS - European Inventory of Existing Commercial Chemical Substances EPCRA - Emergency Planning and Community Right-to-Know Act FDA - Food and Drug Administration FIFRA - Federal Insecticide, Fungicide, and Rodenticide Act HCS - Hazardous Communication System HMIS - Hazardous Material Information System IARC - International Agency for Research on Cancer IRIS - Integrated Risk Information System LD50/LC50 - Lethal Dose/Concentration kill 50% LDLo/LCLo - Lowest Published Lethal Dose/Concentration NAERG'96 - North American Emergency Response Guide Book (1996) NFPA - National Fire Prevention Association</p>

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NIOSH - National Institute for Occupational Safety & Health
NPRI - National Pollutant Release Inventory
NTP - National Toxicology Program
OSHA - Occupational Safety & Health Administration
PEL - Permissible Exposure Limit
RCRA - Resource Conservation and Recovery Act
SARA - Superfund Amendments and Reorganization Act
SD - Single Dose
STEL - Short Term Exposure Limit (15 minutes)

TDG - Transportation Dangerous Goods (Canada)
TDLo/TCLo - Lowest Published Toxic Dose/Concentration
TLV-TWA - Threshold Limit Value - Time Weighted Average
TSCA - Toxic Substances Control Act
USEPA - United States Environmental Protection Agency
USP - United States Pharmacopoeia
WHMIS - Workplace Hazardous Material Information System

Information Contact ICG Propane Inc. 1-800-424-8807

Prepared by: Williams 99/12/09

Data entry by: Data Business Forms

To the best of our knowledge the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

SHELL JET A

142-012
Revision Number: 6**Shell Canada Limited**
Material Safety Data Sheet

Effective Date: 2002-11-19

Supersedes: 2002-08-14

Class B3 Combustible Class D2B Other Toxic
Liquid Effects - Skin Irritant**1. PRODUCT AND COMPANY IDENTIFICATION**

PRODUCT: SHELL JET A
SYNONYMS: Aviation Turbine Fuel (Kerosene Type)
PRODUCT USE: Fuel Solvent
MSDS Number: 142-012

MANUFACTURER
Shell Canada Limited
P.O. Box 100, Station M
400-4th Ave. S.W.
Calgary, AB Canada
T2P 2H5

TELEPHONE NUMBERS
Shell Emergency Number 1-800-661-7378
CANUTEC 24 HOUR EMERGENCY NUMBER 613-996-6666

For general information: 1-800-661-1600
For MSDS information: 403-691-3982
(From 7:30 to 4:30 Mountain Time) 403-691-2220

This MSDS was prepared by the Toxicology and Product Stewardship Section of Shell Canada Limited.

*An asterisk in the product name designates a trade-mark(s) of Shell Canada Limited, used under license by Shell Canada Products.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component Name	CAS Number	% Range	WHMIS Controlled
Kerosine (Petroleum)	8008-20-6	97 - 100	Yes
Naphthalene	91-20-3	<3	Yes

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

Physical Description: Liquid Bright Clear Typical Gasoline Odour

Routes of Exposure: Exposure may occur via inhalation, ingestion, skin absorption and skin or eye contact.

Hazards:

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Handling:

Combustible Liquid.
Irritating to skin.
Vapours are moderately irritating to the eyes.
Prolonged immersion in liquid may lead to chemical burns.
Vapours are moderately irritating to the respiratory passages. The liquid when accidentally aspirated into the lungs can cause a severe inflammation of the lung.
Eliminate all ignition sources.
Avoid prolonged exposure to vapours.
Wear suitable gloves and eye protection.
Bond and ground transfer containers and equipment to avoid static accumulation.
Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.

For further information on health effects, see Section 11.

4. FIRST AID

Eyes: Flush eyes with water for at least 15 minutes while holding eyelids open. If irritation occurs and persists, obtain medical attention.

Skin: Wash contaminated skin with mild soap and water for 15 minutes. If irritation occurs and persists, obtain medical attention.

Ingestion: DO NOT INDUCE VOMITING! OBTAIN MEDICAL ATTENTION IMMEDIATELY. Guard against aspiration into lungs by having the individual turn on to their left side. If vomiting occurs spontaneously keep head below hips to prevent aspiration of liquid into the lungs.

Inhalation: Remove victim from further exposure. Obtain medical attention.

Notes to Physician: The main hazard following accidental ingestion is aspiration of the liquid into the lungs producing chemical pneumonitis. If more than 2.0 mL/kg has been ingested, vomiting should be induced with supervision. If symptoms such as loss of gag reflex, convulsions or unconsciousness occur before vomiting, gastric lavage with a cuffed endotracheal tube should be considered.

5. FIRE FIGHTING MEASURES

Extinguishing Media: Carbon Dioxide
Foam
Dry Chemical
Water Fog

Firefighting Instructions: Caution - Combustible. Vapour forms a flammable/explosive mixture with air between upper and lower flammable limits. Vapours may travel along ground and flashback along vapour trail may occur. Flashback may occur along vapour trail. Do not use a direct stream of water as it may spread fire. Use water to cool fire exposed containers. Product will float and can be reignited on surface of water. Containers exposed to intense heat from fires should be cooled with water to prevent vapour pressure buildup which could result in container rupture. Container areas exposed to direct flame contact should be cooled with large quantities of water as needed to prevent weakening of container structure. Do not enter confined fire space without adequate protective clothing and an approved positive pressure self-contained breathing apparatus.

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Hazardous Combustion Products:

A complex mixture of airborne solid, liquid, particulates and gases will evolve when this material undergoes pyrolysis or combustion. Carbon dioxide, carbon monoxide and unidentified organic compounds may be formed upon combustion.

6. ACCIDENTAL RELEASE MEASURES

Issue warning "Combustible". Eliminate all ignition sources. Isolate hazard area and restrict access. Handling equipment must be grounded. Try to work upwind of spill. Avoid direct contact with material. Wear appropriate breathing apparatus (if applicable) and protective clothing. Stop leak only if safe to do so. Dike and contain land spills; contain water spills by booming. Use water fog to knock down vapours; contain runoff. Absorb residue or small spills with absorbent material and remove to non-leaking containers for disposal. Recommended materials: Clay or Sand Flush area with water to remove trace residue. Dispose of recovered material as noted under Disposal Considerations. Notify appropriate environmental agency(ies).

7. HANDLING AND STORAGE

Handling: Avoid excessive heat, sparks, open flames and all other sources of ignition. Fixed equipment as well as transfer containers and equipment should be grounded to prevent accumulation of static charge. Vapours are heavier than air and will settle and collect in low areas and pits, displacing breathing air. Extinguish pilot lights, cigarettes and turn off other sources of ignition prior to use and until all vapours are gone. Vapours may accumulate and travel to distant ignition sources and flashback. Do not cut, drill, grind, weld or perform similar operations on or near containers. Empty containers are hazardous, may contain flammable/explosive dusts, residues or vapours. Do not pressurize drum containers to empty them. Never siphon by mouth. Wash with soap and water prior to eating, drinking, smoking, applying cosmetics or using toilet facilities. Launder contaminated clothing prior to reuse. Use good personal hygiene.

Storage: Use explosion-proof ventilation to prevent vapour accumulation. Keep container tightly closed.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

THE FOLLOWING INFORMATION, WHILE APPROPRIATE FOR THIS PRODUCT, IS GENERAL IN NATURE. THE SELECTION OF PERSONAL PROTECTIVE EQUIPMENT WILL VARY DEPENDING ON THE CONDITIONS OF USE.

OCCUPATIONAL EXPOSURE LIMITS (Current ACGIH TLV/TWA unless otherwise noted):

North American exposure limits have not been established for the product. Consult local authorities for acceptable provincial values.

Recommend SHELL guideline of 125 mg/m³ for vapours (8 hour shift).

Naphthalene: 10 ppm (STEL: 15 ppm)

Mechanical Ventilation:

Use explosion-proof ventilation as required to control vapour concentrations. Concentrations in air should be maintained below lower explosive limit at all times or below the recommended threshold limit value if unprotected personnel are involved. Make up air should always be supplied to balance air exhausted (either generally or locally). For personnel entry into confined spaces (i.e. bulk storage tanks) a proper confined space entry procedure must be followed including ventilation and testing of tank atmosphere.

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Revision Number: 6**PERSONAL PROTECTIVE EQUIPMENT:**

- Eye Protection:** Chemical safety goggles and/or full face shield to protect eyes and face, if product is handled such that it could be splashed into eyes. Provide an eyewash station in the area.
- Skin Protection:** Impervious gloves (viton, nitrile) should be worn at all times when handling this material. In confined spaces or where the risk of skin exposure is much higher, impervious clothing should be worn. Safety showers should be available for emergency use.
- Respiratory Protection:** If exposure exceeds occupational exposure limits, use an appropriate NIOSH-approved respirator. Use a NIOSH-approved chemical cartridge respirator with organic vapour cartridges or use a NIOSH-approved supplied-air respirator. For high airborne concentrations, use a NIOSH-approved supplied-air respirator, either self-contained or airline breathing apparatus, operated in positive pressure mode.

9. PHYSICAL DATA

Physical State:	Liquid
Appearance:	Bright Clear
Odour:	Typical Gasoline Odour
Odour Threshold:	Not available
Freezing/Pour Point:	<-40 degrees C
Boiling Point:	145 - 300 degrees C
Density:	775 - 840 kg/m3 @ 15 degrees C
Vapour Density (Air = 1):	Not available
pH:	Not available
Flash Point:	Method Tag Closed Cup >38 degrees C
Lower Explosion Limit:	0.7 % (vol.)
Upper Explosion Limit:	5 % (vol.)
Autoignition Temperature:	210 degrees C
Viscosity:	<8 cSt @ -20 degrees C
Evaporation Rate (n-BuAc = 1):	Not available
Partition Coefficient (K_{OW}):	Not available
Water Solubility:	Insoluble
Other Solvents:	Hydrocarbon Solvents

10. STABILITY AND REACTIVITY

Chemically Stable:	Yes
Hazardous Polymerization:	No
Sensitive to Mechanical Impact:	No
Sensitive to Static Discharge:	Yes
Hazardous Decomposition Products:	Thermal decomposition products are highly dependent on combustion conditions.
Incompatible Materials:	Avoid strong oxidizing agents.
Conditions of Reactivity:	Avoid excessive heat, open flames and all ignition sources.

11. TOXICOLOGICAL INFORMATION

Ingredient (or Product if not specified)	Toxicological Data
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Kerosine (Petroleum)	LD50 Oral Rat >5000 mg/kg LD50 Dermal Rabbit >2000 mg/kg
Naphthalene	

Routes of Exposure:	Exposure may occur via inhalation, ingestion, skin absorption and skin or eye contact.
Irritancy:	This product is expected to be irritating to skin but is not predicted to be a skin sensitizer.
Chronic Effects:	Prolonged and repeated contact with skin can cause defatting and drying of the skin resulting in skin irritation and dermatitis. Prolonged exposure to high vapour concentration can cause headache, dizziness, nausea, blurred vision and central nervous system depression.
Pre-existing Conditions:	Pre-existing eye, skin and respiratory disorders may be aggravated by exposure to this product.
Carcinogenicity and Mutagenicity:	The International Agency for Research on Cancer (IARC) considers that this product is not classifiable as to its carcinogenicity to humans. Middle distillates have caused skin cancers in laboratory animals when applied repeatedly and left in place between applications. This effect is believed to be caused by the continuous irritation of the skin. Good personal hygiene should be maintained to avoid this risk.

12. ECOLOGICAL INFORMATION

Environmental Effects:	Do not allow product or runoff from fire control to enter storm or sanitary sewers, lakes, rivers, streams, or public waterways. Block off drains and ditches. Provincial regulations require and federal regulations may require that environmental and/or other agencies be notified of a spill incident. Spill area must be cleaned and restored to original condition or to the satisfaction of authorities. May cause physical fouling of aquatic organisms.
Biodegradability:	Rapid volatilization. Not readily biodegradable. Potential for bioaccumulation.

13. DISPOSAL CONSIDERATIONS

Waste management priorities (depending on volumes and concentration of waste) are: 1. recycle (reprocess), 2. energy recovery (cement kilns, thermal power generation), 3. incineration, 4. disposal at a licenced waste disposal facility. Do not attempt to combust waste on-site. Incinerate at a licenced waste disposal site with approval of environmental authority.

14. TRANSPORTATION INFORMATION

Canadian Road and Rail Shipping Classification:

UN Number	UN1863
Proper Shipping Name	FUEL, AVIATION, TURBINE ENGINE
Hazard Class	Class 3 Flammable Liquids
Packing Group	PG III
Shipping Description	FUEL, AVIATION, TURBINE ENGINE Class 3 UN1863 PG III

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15. REGULATORY INFORMATION

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

WHMIS Class: Class B3 Combustible Liquid
Class D2B Other Toxic Effects - Skin Irritant

DSL/NDSL Status: This product, or all components, are listed on the Domestic Substances List, as required under the Canadian Environmental Protection Act.

Other Regulatory Status: No Canadian federal standards.

16. ADDITIONAL INFORMATION**LABEL STATEMENTS**

Hazard Statement : Combustible Liquid.
Irritating to skin.

Handling Statement: Eliminate all ignition sources.
Avoid prolonged exposure to vapours.
Wear suitable gloves and eye protection.
Bond and ground transfer containers and equipment to avoid static accumulation.
Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.

First Aid Statement : Wash contaminated skin with soap and water.
Flush eyes with water.
If overcome by vapours remove to fresh air.
Do not induce vomiting.
Obtain medical attention.

Revisions: This MSDS has been reviewed and updated.
Changes have been made to:
Section 2
Section 5
Section 8
Section 14