NOVA Chemicals®

Material Safety Data Sheet

Material Name: VGO (Vacuum Gas Oil)

MSDS ID: NOVA-0009

Section 1 - Product and Company Identification

Synonyms: Vacuum Gas Oil ; V.G.O.; Heavy petroleum distillates (vacuum)
Chemical Name: Gas Oils (petroleum), heavy vacuum
Chemical Family: Hydrocarbon
Material Use: Industrial feedstock
Chemical Formula: Not available; complex mixture

NOVA Chemicals (Canada) Ltd.
P.O. Box 3060, Sarnia,
Ontario, CANADA N7T 8C7

In case of Emergency

1-800-561-6682 1-403-314-8767 (NOVA Chemicals)(24 hours)
1-800-424-9300 (CHEMTREC-USA)
1-613-996-6666 (Canutec-Canada)(24 hours)

Section 2 - Composition / Information on Ingredients

CAS #	Component	Percent by Wt.
64741-57-7	Gas oils, petroleum, heavy vacuum	100

Additional Information

Product contains <1% total sulfur compounds by weight.

This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).
This material is a controlled product under Canadian WHMIS regulations.
This material is not regulated as a hazardous material/dangerous goods for transportation.

See Section 8 for applicable exposure limits. See Section 11 for applicable toxicity data.

Section 3 - Hazards Identification

HMIS Ratings: Health: 1* **Fire:** 2 **Reactivity:** 0 **Pers. Prot.:** chemical goggles, gloves, respirator
*Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard*

NFPA Ratings: Health: 0 **Fire:** 2 **Reactivity:** 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Emergency Overview

WARNING This product is flammable when heated to high temperatures. Material is a darkly colored, thick waxy liquid with a heavy fuel oil odor. If released, prevent entry into ditches, sewers, and waterways. Small amounts of this product, if aspirated into the lungs, may cause mild to severe pulmonary injury. This product may be irritating to the eyes, skin, and respiratory system. Ingestion or inhalation of heated vapors or mists may result in central nervous system effects including headache, sleepiness, dizziness, slurred speech and blurred vision. May cause skin cancer.

Potential Health Effects: Eyes

This product may cause irritation to the eyes on contact with heated vapours or liquid.

Potential Health Effects: Skin

Skin contact with this product may cause irritation/dermatitis. Prolonged and/or repeated contact may cause severe irritation/dermatitis, chemical blistering and possible skin cancer.

Potential Health Effects: Ingestion

Ingestion can cause gastrointestinal irritation, nausea, vomiting and diarrhea. Ingestion of this product may result in central nervous system effects including headache, sleepiness, dizziness, slurred speech and blurred vision. Swallowing or vomiting of liquid may cause aspiration into the lungs, and subsequent pulmonary injury.

Potential Health Effects: Inhalation

Excessive inhalation of this material causes headache, dizziness, nausea and loss of coordination. Inhalation of heated vapors or mists may cause headache, dizziness, nausea and loss of coordination. Aspiration of liquid into the lungs can cause mild to severe pulmonary injury.

Section 4 - First Aid Measures

First Aid: Eyes

Immediately flush eyes with water for at least 15 minutes, while holding eyelids open. Seek medical attention at once.

First Aid: Skin

Remove contaminated clothing. For skin contact, wash immediately with soap and water. Seek medical attention if irritation or dermatitis persists.

First Aid: Inhalation

Remove to fresh air. Assist breathing if necessary. Obtain medical attention.

First Aid: Ingestion

If the material is swallowed, get immediate medical attention or advice -- DO NOT INDUCE VOMITING.

First Aid: Notes to Physician

For more detailed medical emergency support information call 1-800-561-6682 (NOVA Chemicals Emergency Response, 24 hours).

Ensure thorough eye and skin decontamination. Treat unconsciousness, nausea, seizures and cardiac arrhythmia's in the conventional manner. This material, if aspirated into the lungs, may cause chemical pneumonitis; treat the affected person appropriately. Aspiration of this product during induced emesis can result in lung injury. If evacuation of stomach contents is considered necessary use the method least likely to cause aspiration, such as gastric lavage after protecting the airway.

Section 5 - Fire Fighting Measures

Flammability Class:	Flammable when heated	**Flash Point:**	>70ºC (>158ºF)
Upper flammability limit:	5% (estimated)	**Flash Point Method:**	PMCC
Lower flammability limit:	1% (estimated)	**Auto Ignition:**	>260ºC, (>500ºF, estimated)

General Fire Hazards

This product is flammable when heated to high temperatures. Empty containers when heated may pose a firerisk. Fire and container explosion hazards are serious when this product is exposed to heat or flame. Vapors may travel to some distant source of ignition and flash back.

If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also consider initial evacuation for 800 meters (1/2 mile) in all directions.

Hazardous Combustion Products

Upon decomposition, this product emits carbon monoxide, carbon dioxide, sulfur oxides and/or low molecular weight hydrocarbons and toxic (acidic) gases.

Extinguishing Media

Dry chemical, foam, carbon dioxide, water fog. Use water to cool fire-exposed containers and to protect personnel. Water may be an ineffective extinguishing medium.

Fire Fighting Equipment/Instructions

Position upwind. Keep unnecessary personnel away. Move containers from fire area if you can do it without risk. Set up to fight fire at a safe distance. Fire fighters should wear full-face, self-contained breathing apparatus and thermal protective clothing. Fire fighters should avoid inhaling any combustion products. ALWAYS stay away from tanks engulfed in fire. Immediately withdraw in case of fire and tank venting or heat discoloration of a tank. Control runoff waters to prevent entry into sewers, drains, underground or confined spaces and waterways.

Section 6 - Accidental Release Measures

Evacuation Procedures

Isolate area. Keep unnecessary personnel away. Ground all approved equipment used in area.

Small Spills

Absorb spill with inert material. Shovel material into appropriate container for disposal.

Large Spills

Eliminate ignition sources. Spill or leak area should be isolated immediately. Keep upwind and out of low areas. Stop or reduce discharge if safe to do so. Prevent entry into ditches, sewers and waterways. Contain discharge by booming on water or diking on ground. Remove material with non-sparking, approved pumps, skimmers or vacuum equipment. Absorb/adsorb residual materials with DRY earth, sand or other non-combustible materials. Soil remediation may be required.

Special Procedures

Contact local police and appropriate emergency telephone numbers provided in Section 1. Ensure statutory and regulatory reporting requirements in the applicable jurisdiction are met.

Persons not wearing appropriate protective equipment should be excluded from area of spill until clean-up has been completed. Wear appropriate protective equipment and clothing during clean-up.

Section 7 - Handling and Storage

Handling Procedures

Handle in fully grounded, properly designed and approved containers and equipment systems. Control temperature in shipping and handling to recommended levels. Keep away from welding operations, sparks, flames or other ignition sources. No smoking or open flame in storage, use or handling areas. Empty containers when heated may pose a fire risk. Provide local and general exhaust ventilation to effectively remove and prevent buildup of any heated vapors or mists generated from the handling of this product. Avoid skin and eye contact. Wear suitable protective equipment including impervious gloves and eye protection. After handling, always wash hands thoroughly with soap and water.

Incompatibility

This product may react with oxidizing agents. This product may react with strong acids. Heated vapors or mists may from explosive mixtures in air.

Storage Procedures

Storage area should be clearly identified, well illuminated, clear of obstruction and accessible only to authorized personnel. Store in fully grounded, properly designed and approved containers. Store away from heat, sparks, open flame, or any other ignition source. Store away from incompatible materials, such as strong acids. Have appropriate extinguishing capability in storage area (e.g. sprinkler system, portable fire extinguishers). Storage tanks should be above ground and diked to hold entire contents.

Section 8 - Exposure Controls / Personal Protection

Exposure Guidelines

A: General Material Information

Follow all applicable exposure limits. When handling heated material, use non-sparking, grounded ventilation systems separate from other exhaust systems.

B: Component Exposure Limits

Gas oils, petroleum, heavy vacuum (64741-57-7)

ACGIH:	5 mg/m^3 TWA (as sampled by a method that does not collect vapor) (related to Oil mist, mineral) 10 mg/m^3 STEL (as sampled by a method that does not collect vapor) (related to Oil mist, mineral) 0.2 mg/m3 TWA (inhalable fraction); A2 - suspected human carcinogen (poorly and mildly refined); A4 - not classifiable as a human carcinogen (highly refined); TLV basis: respiratory (related to Mineral oil) (Notice of Intended Changes) 0.005 mg/m^3 (proposed for the sum total of 15 polynuclear aromatic hydrocarbons (PAHs) listed as carcinogens by the U.S. National Toxicology Program.)
OSHA:	5 mg/m^3 TWA (related to Oil mist, mineral)
NIOSH	5 mg/m^3 TWA (related to Oil mist, mineral) 10 mg/m^3 STEL (related to Oil mist, mineral)
Ontario:	5 mg/m3 TWAEV (related to Oil (mineral) mist) 10 mg/m3 STEV (mist) (related to Oil, mineral)

Engineering Controls

Provide local and general exhaust ventilation to effectively remove and prevent buildup of any vapors or mists generated from the handling of this product.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Wear safety glasses; chemical goggles are recommended if splashing is possible or to prevent eye irritation from heated vapors or mists.

Personal Protective Equipment: Skin/Hands/Feet

Wear impervious gloves for repeated or prolonged contact. Wear impervious footwear (not leather), with good traction to avoid slipping. If splashing or contact with hot material is possible, wear thermal protective clothing. Remove contaminated clothing and clean thoroughly before reuse Synthetic clothing can generate static electricity and is not recommended where flammable heated vapor release may occur.

Personal Protective Equipment: Respiratory

Not required in normal conditions. In poorly ventilated areas NIOSH approved organic vapor cartridge respirators or SCBA should be used. Air supplied breathing apparatus must be used when airborne concentrations may exceed the limits of the air-purifying respirator used.

Personal Protective Equipment: General

Personal protective equipment (PPE) must not be considered a long term solution to exposure control. PPE must be accompanied by employer programs to properly select, maintain, clean, fit and use equipment. Consult a competent industrial hygiene resource to determine hazard potential and/or the PPE manufacturers and applicable regulations to ensure adequate protection.

Section 9 - Physical & Chemical Properties

Physical state and appearance:	Thick waxy liquid	**Color:**	Dark, orange to brown
Viscosity :	varies between 40-65 cSt @50°C / 122 ºF	**Odor:**	Fuel oil, heavy
Odor threshold:	Not available	**pH:**	Not applicable
Vapor Pressure:	6 mm of Hg @20ºC	**Vapor Density (Air=1):**	Estimate: 1
Boiling Point:	315 to 595ºC (> 600 ºF)	**Melting Point:**	12- 40ºC (54- 104ºF)
Solubility (H2O):	Negligible	**Specific Gravity (Water=1):**	0.91
Softening Point:	Not available	**Evaporation Rate (n-Butyl Acetate=1):**	slow; only partially volatile
		Dispersion properties:	Limited dispersion in hot or cold water

Section 10 - Stability & Reactivity Information

Chemical Stability

This is a stable material when handled and stored at recommended temperatures.

Chemical Stability: Conditions to Avoid

Keep away from uncontrolled heat, sparks, or open flame.

Incompatibility

This product may react with oxidizing agents. This product may react with strong acids. Heated vapors or mists may from explosive mixtures in air.

Hazardous Polymerization

Not likely to occur.

Corrosivity

Not considered to be corrosive.

Hazardous Decomposition

Upon decomposition, this product emits carbon monoxide, carbon dioxide, sulfur oxides and/or low molecular weight hydrocarbons and toxic (acidic) gases.

Special Remarks

This product is flammable when heated to high temperatures. Empty containers when heated may pose a fire risk

Section 11 - Toxicological Information

Acute Toxicity

A: General Material Information

Severe skin irritation or dermatitis is possible on prolonged contact. Product is eye, skin, and respiratory tract irritant Eye irritation testing in animals indicates a mild irritation that clears in 48 hours. Skin Irritation: 4.3 (unrefined) to 5.4 (highly refined) Draize Tests in rabbits.

Product is a CNS depressant. Exposure can cause headache, nausea, weakness, dizziness, sleepiness, loss of coordination and even loss of consciousness. It is a pulmonary aspiration hazard.

Unrefined lube base oils are not skin sensitizers when tested in animals.

B: Acute Toxicity - LD50/LC50

Oral LD50 Rats: > 5000 mg/kg (unrefined & highly refined Lube Oil Base samples, API, CONCAWE))

Dermal LD50 Rabbits: > 5000 mg/kg (unrefined & highly refined Lube Oil Base samples, API, CONCAWE)

Inhalation (aerosol) LC50 Rats: 2.18 mg/l

C: Chronic Toxicity-General Material Information

Petroleum distillates of this type have been shown to cause skin cancer in laboratory animals following prolonged and frequent skin contact. Based on skin painting studies on other refinery streams, this product has the potential to cause skin cancer. No Adverse Observed Effect (NOAEL) for all other toxic effects (lung, liver, thymus and blood) is 125 mg/kg/day. Material is likely to contain polycyclic aromatic hydrocarbons, some of which are known to be carcinogenic.

A similar VGO was tested in the Modified Pre-incubation Mutagenesis assay (Ames TA98 & S9) and demonstrated a Mutagenicity Index of 3.8. Therefore VGO is predicted to produce tumours in standard mouse skin painting bioassay.

D: Chronic Toxicity - Carcinogenic Effects

ACGIH, IARC, OSHA, and NTP carcinogen lists have been checked for those components with CAS registry numbers.

Gas oils, petroleum, heavy vacuum (64741-57-7)

OSHA: Present (related to Mineral oils, untreated and mildly treated) (Select Carcinogen)

IARC: Supplement 7, 1987; Monograph 33, 1984 (related to Mineral oils, untreated and mildly treated) (Group 1 (carcinogenic to humans))

Section 12 - Ecological Information

Ecotoxicity

Similar materials have been tested and reported in API's HPV's data summary for Lubricating Oil Basestocks (Mar. 2003). Material is considered environmentally toxic and damaging on contact with plants, birds, and water mammals.

Testing of various base oil samples:

Fish (rainbow trout) 96-h LC50: 1000 mg/L (measured); algae 96-h NOEC: 50% WAF (measured); daphnid 48-h LC-50: 10mg/l (measured); daphnid 21-d LL_0: 1000mg/l WAF(measured).

Environmental Fate

This product has not been tested. In ambient conditions, the product has minimal to no volatility into air. Any volatile component degrades by reaction with hydroxyl radicals, in the troposphere, under the influence of sunlight, with half-lives less than one day. These waxy hydrocarbon mixtures are not subject to hydrolysis reactions with water. This complex petroleum mixture is expected to partition primarily to soil and/or sediment.

Mobility

This material is very waxy and sets up at normal room temperature. Mobility in the aquatic and atmospheric environment of these hydrocarbon mixtures is low due to low water solubility and low vapor pressure. These components will partition rapidly to the terrestrial compartment, where the main fate process is expected to be slow biodegradation of base oil components in soil and sediment.

Persistence/Degradability

Similar products have been measured and shown to biodegrade in the environment under both aerobic (20-26% in 28 days) and anaerobic (86% in 28 days) with rates dependent of soil moisture, bacteria, and other conditions. Possibly hazardous short-term degradation products are not likely. Product is sticky, will solidify, and strongly adhere to soils and sediment. Recovery time for land and waters following a major spill is estimated to extend into months, possibly years.

Bioaccumulation/Accumulation

This product has not been tested, but is not expected to bioaccumulate in either terrestrial or aquatic systems. Spilled product will accumulate on the surface of plants, waterfowls and mammals, resulting in serious injury and possible death.

Section 13 - Disposal Considerations

North American Waste Number & Descriptions

A: General Material Information

This product is not known to be a hazardous waste according to US RCRA and Canadian regulations. The use, mixing or processing of this material may alter this product. Contact federal, provincial/state and local authorities in order to generate or ship a waste material associated with this product to ensure materials are handled appropriately and meet all criteria for disposal of hazardous waste. Vent to a burning flame at an appropriate facility. DO NOT ATTEMPT TO DISPOSE OF BY UNCONTROLLED IGNITION.

B: Component Waste Numbers

No EPA Waste Numbers are applicable for this product's components.

Section 14 - Transportation Information

US DOT Information

Shipping Name: Not regulated as a hazardous material for transportation.
Additional Information: This material is regulated under 49 CFR 130 (Regulations applicable to oil spill prevention and response plans) when transported by highway or rail.

TDG Information

Shipping Name: Not regulated as a hazardous material for transportation.

International Air Transport Association (IATA) Regulations

Shipping Name: Not regulated as a hazardous material for transportation.

International Maritime Dangerous Goods (IMDG) Code

Shipping Name: Not regulated as a hazardous material for transportation.

Section 15 - Regulatory Information

A: International Regulations

Components of this product have been checked against the following Chemical Control Inventories.

Component	CAS #	US - TSCA	CANADA - DSL	EU - EINECS
Gas oils, petroleum, heavy vacuum	64741-57-7	Yes	Yes	Yes

B: USA Federal & State Regulations

General Material Information

Federal, state, or local regulations may apply to spills or other emissions. Check individual U.S. state requirements.

USA OSHA Hazard Communication Class

HCS CLASS: MAY CAUSE CANCER
HCS CLASS: Irritating substance.

USA Right-to-Know - Federal

None of this product's components are listed under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), or CERCLA (40 CFR 302.4).

USA Right-to-Know - State

Trace components appear on one or more of the following state hazardous substances lists. Some components (including those present only in trace quantities, and therefore not listed in this document) may be included on the Right To Know lists of other U.S. states. The reader is therefore cautioned to contact his or her NOVA Chemicals representative or NOVA Chemicals' Product Integrity group for further U.S. State Right To Know information.

Component	CAS #	NJ	PA
Gas oils, petroleum, heavy vacuum ([1] related to Mineral oil mist)	64741-57-7	No	Yes[1]

C: Canadian Regulations - Federal and Provincial

Canadian Federal WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	
Gas oils, petroleum, heavy vacuum	64741-57-7	1% (English item 1224, French Item 977) (related to Oil, mineral)

WHMIS Classification

Workplace Hazardous Materials Information Systems (WHMIS): This product has been classified in accordance with the hazard criteria of the Canadian Controlled Product Regulations (CPR), and the MSDS contains all of the information required by the Controlled Products Regulations.

WHMIS Class D2A: Carcinogen

WHMIS Class D2B: Material causing other toxic effects.

Canadian Provincial Regulations

Federal, provincial or local regulations may apply to spills or other emissions. Check individual provincial and local requirements.

Section 16 - Other Information

Label Information

PRECAUTIONS: WARNING! This product is flammable when heated to high temperatures. This product is a darkly colored, thick waxy liquid with a heavy fuel oil odor. Prevent entry into ditches, sewers, and waterways. Small amounts of this product, if aspirated into the lungs, may cause mild to severe injury. This product may be irritating to the eyes, skin, and respiratory system. Ingestion or inhalation of heated vapors or mists may result in central nervous system effects including headache, sleepiness, dizziness, slurred speech and blurred vision. May cause skin cancer.

FIRST AID: For more detailed medical emergency support information call 1-800-561-6682 ((NOVA Chemicals Emergency Response, 24 hours).

SKIN: Remove contaminated clothing. For skin contact, wash immediately with soap and water. Seek medical attention if irritation or dermatitis persists.

EYES: Immediately flush eyes with water for at least 15 minutes, while holding eyelids open. Seek medical attention at once.

INHALATION: Remove to fresh air. Assist breathing if necessary. Obtain medical attention.

INGESTION: If the material is swallowed, get immediate medical attention or advice -- DO NOT INDUCE VOMITING.

IN CASE OF A LARGE SPILL: Eliminate ignition sources. Keep upwind and out of low areas. Spill or leak area should be isolated immediately. Prevent entry into water intakes and waterways. Stop or reduce discharge if safe to do so. Contain discharge by booming on water or diking on ground. Remove material with non-sparking, approved pumps, skimmers or vacuum equipment. Absorb/adsorb residual materials with DRY earth, sand or other non-combustible materials. Soil remediation may be required.

References

Available on request.

Key/Legend

ACGIH = American Conference of Governmental Industrial Hygienists; BOD = Biochemical Oxygen Demand; CAS = Chemical Abstracts Service; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; CPR = Controlled Products Regulations; DOT = Department of Transportation; DSL = Domestic Substances List; EINECS = European Inventory of Existing Commercial Substances; EPA = Environmental Protection Agency; EU = European Union; FDA = Food and Drug Administration; IARC = International Agency for Research on Cancer; IDL = Ingredient Disclosure List; Kow = Octanol/water partition coefficient; LEL = Lower Explosive Limit; NIOSH = National Institute for Occupational Safety and Health; NJTSR = New Jersey Trade Secret Registry; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; RCRA = Resource Conservation and Recovery Act; SARA = Superfund Amendments and Reauthorization Act; TDG = Transportation of Dangerous Goods; TSCA = Toxic Substances Control Act.

Validated by Business Review Team & ChemADVISOR Verified by Product Steward. Jan.13, 2004

Contact: Responsible Care Services
NOVA Chemicals Inc.
Westpointe Center
1550 Coraopolis Heights Road
Moon Township, Pennsylvania
USA 15108

Contact Phone: (412) 490-4063; backups: (412) 490-4000 or (905) 542-6980

Other Information

Notice to Reader

ALTHOUGH THE INFORMATION CONTAINED IN THIS DOCUMENT IS PRESENTED IN GOOD FAITH, BASED ON AVAILABLE INFORMATION BELIEVED TO BE RELIABLE AT THE TIME OF PREPARATION OF THIS DOCUMENT, **NOVA CHEMICALS MAKES NO WARRANTIES OR REPRESENTATIONS WITH RESPECT TO THE INFORMATION OR THE PRODUCTS DESCRIBED HEREIN, AND EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES AND CONDITIONS (INCLUDING ALL WARRANTIES AND CONDITIONS OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE). THIS INFORMATION IS SUBJECT TO CHANGE WITHOUT NOTICE. PLEASE CONTACT NOVA CHEMICALS FOR THE MOST CURRENT VERSION OF THIS MSDS. NOVA CHEMICALS DOES NOT ASSUME RESPONSIBILITY FOR MSDS OBTAINED FROM THIRD PARTY SOURCES.**

RESPONSIBILITY FOR USE, STORAGE, HANDLING AND DISPOSAL OF THE PRODUCTS DESCRIBED HEREIN, WHETHER ALONE OR IN COMBINATION WITH ANY OTHER SUBSTANCE, IS THAT OF THE PURCHASER AND/OR END USER.

This is the end of MSDS # NOVA-0009