

SAFETY DATA SHEET

Classified in accordance with Health Canada Hazardous Products Regulations (SOR/2015-17)

1. Identification

Product identifier: Pyrolysis Fuel Oil - Joffre**Other means of identification****Common name(s),
synonym(s):** PFO; Heavy Fuel Oils; Olefins Manufacturing Tower Bottoms
SDS number: NOVA-0036**Recommended use and restriction on use****Recommended use:** Petrochemical feedstocks, fuels.
Restrictions on use: All uses other than the identified.**Manufacturer/Importer/Supplier/Distributor Information****Manufacturer****Company Name:** NOVA Chemicals
Address: P.O. Box 2518, Station M
Calgary, Alberta, Canada T2P 5C6
Telephone: Product Information: 1-412-490-4063
SDS Information Email: msdsemail@novachem.com**Emergency telephone number:**

1-800-561-6682, 1-403-314-8767 (NOVA Chemicals) (24 hours)

2. Hazard(s) identification

Hazard Classification According to Hazardous Products Regulations**Physical Hazards**

Flammable liquids Category 3

Health HazardsSkin Corrosion/Irritation Category 2
Serious Eye Damage/Eye Irritation Category 2A
Germ Cell Mutagenicity Category 1B
Carcinogenicity Category 1A
Toxic to reproduction Category 2
Specific Target Organ Toxicity -
Repeated Exposure Category 1
Specific Target Organ Toxicity -
Repeated Exposure Category 2
Aspiration Hazard Category 1**Environmental Hazards**Acute hazards to the aquatic
environment Category 2
Chronic hazards to the aquatic
environment Category 2**Label Elements****Hazard Symbol:**



Signal Word: Danger

Hazard Statement: Flammable liquid and vapour.
Causes skin irritation.
Causes serious eye irritation.
May cause genetic defects.
May cause cancer.
Suspected of damaging fertility or the unborn child.
Causes damage to organs through prolonged or repeated exposure.
(Blood)
(Auditory system)
May cause damage to organs through prolonged or repeated exposure.
(Central nervous system)
(Hearing organs)
May be fatal if swallowed and enters airways.
Toxic to aquatic life with long lasting effects.

Precautionary Statements:

Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Ground and bond container and receiving equipment. Use explosion-proof [electrical/ventilating/lighting] equipment. Use non-sparking tools. Take action to prevent static discharges. Do not breathe dust/fume/gas/mist/vapours/spray. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection.

Response: IF SWALLOWED: Immediately call a POISON CENTRE/doctor. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing and wash it before reuse. Rinse skin with water [or shower]. If skin irritation occurs: Get medical advice/attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. IF exposed or concerned: Get medical advice/attention. In case of fire: Use dry chemical, foam, carbon dioxide (CO₂), water spray or fog to extinguish. Collect spillage.

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

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients**Mixtures**

Chemical Identity	Common name and synonyms	CAS number	Content in percent (%)*
Fuel Oil, Pyrolysis **	PFO	69013-21-4	100%
Naphthalene	Naphthalene	91-20-3	10 - 25%
1H-Indene	Indene, Benzocyclopentadiene	95-13-6	2 - 10%
4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydro-	Dicyclopentadiene, DCPD	77-73-6	1 - 10%
Benzene	Benzol	71-43-2	0 - 5%
1-Pentene	Pent-1-ene	109-67-1	0 - 3%
n-Undecane	Undecane	1120-21-4	0.6 - 2%
Benzene, ethenyl-	Styrene	100-42-5	0.1 - 2%
Toluene	Methylbenzene	108-88-3	0.01 - 1%
Benzene, dimethyl-	Xylene (mixed isomers)	1330-20-7	0.01 - 1%
Benzene, ethyl-	Ethylbenzene, Phenylethane	100-41-4	0 - 1%
1,3-Butadiene, 2-methyl-	Isoprene	78-79-5	0 - 1%
1,1'-Biphenyl	Biphenyl	92-52-4	0 - 1%
2-Octene	Octene-2	111-67-1	0 - 0.5%

* All concentrations are percent by weight.

Additional Information:

** This product has been assigned a CAS # of 69013-21-4 - Fuel Oil, Pyrolysis. It is comprised of the above listed components. Polycyclic aromatic hydrocarbons (no CAS # available) are also present (12-17 wt%). Asphaltene (heptane insoluble) (no CAS # is available) is also present (0.1-1.3 wt%). This product is considered hazardous by the Hazardous Products Regulations, 2015.

4. First-aid measures

Inhalation:	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Get medical advice/attention.
Ingestion:	IF SWALLOWED: Immediately call a POISON CENTRE/doctor. Do NOT induce vomiting.
Skin Contact:	IF ON SKIN (or hair): Take off immediately all contaminated clothing and wash it before reuse. Rinse skin with water [or shower]. If skin irritation occurs: Get medical advice/attention.
Eye contact:	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

Most important symptoms/effects, acute and delayed

Symptoms: Eye irritation. Skin irritation. Blood disorders.

Indication of immediate medical attention and special treatment needed

Treatment: For more detailed medical emergency support information, call 1-800-561-6682 or 1-403-314-8767 (24 hours, NOVA Chemicals Emergency Response). Ensure thorough eye and skin decontamination. Treat unconsciousness, nausea, hypotension, seizures and cardiac arrhythmias in the conventional manner. 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. Observe hospitalized patients for delayed chemical pneumonia, acute tubular necrosis, encephalopathy and dysrhythmias. Monitor for urinary phenol within 72 hours of acute exposure.

5. Fire-fighting measures

General Fire Hazards: Flammable liquid. Vapours are heavier than air and may travel to a source of ignition and flash back. Closed containers may rupture violently when heated. Burns readily when heated to high temperatures. Consider initial downwind evacuation for at least 300 metres (1000 feet). If tank is involved in fire, ISOLATE for 800 metres (1/2 mile) in all directions. Heated vapours may form explosive mixture with air. Keep containers away from source of heat or fire.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Use dry chemical, foam, carbon dioxide (CO₂), water spray or fog to extinguish. Use water to cool fire-exposed containers and to protect personnel.

Unsuitable extinguishing media: Do not use straight/direct streams as this may actually spread flames.

Specific hazards arising from the chemical: Upon combustion, this product emits carbon monoxide, carbon dioxide, low molecular weight hydrocarbons, acidic gases, nitrogen oxides, oxides of sulphur.

Special protective equipment and precautions for firefighters

Special fire fighting procedures: Keep upwind. Keep unauthorized personnel away. Move containers from fire area if you can do so without risk. Fight fire from maximum distance or use unmanned holders or monitor nozzles. Immediately withdraw in case of fire and container venting or heat discoloration of a container. Avoid inhaling any smoke and combustion materials. Remove and isolate contaminated clothing and shoes. Cool containers with flooding quantities of water until well after the fire is out. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply. Reference Emergency Response Guidebook No. 128 for additional details and instructions.

Special protective equipment for firefighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures: Isolate area. Keep unauthorized personnel away. Monitor surrounding area for buildup of flammable concentrations in air. Alert stand-by emergency and fire fighting personnel.

Methods and material for containment and cleaning up: Wear appropriate personal protective equipment. Do not touch or walk through spilled material. In case of leakage, eliminate all ignition sources. Keep upwind. Keep out of low areas. Stop leak if safe to do so. Contain discharge by booming on water or diking on ground. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply.

Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Use non-sparking tools.

Large Spills: Consider downwind evacuation for 300 metres (1000 feet). A vapour-suppressing foam may be used to reduce vapours. Remove pooled liquid material with approved, non-sparking pumps, skimmers or vacuum equipment. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Soil remediation may be required.

7. Handling and storage

Precautions for safe handling:

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Ground and bond container and receiving equipment. Use explosion-proof [electrical/ventilating/lighting] equipment. Use non-sparking tools. Take action to prevent static discharges. Take special precautions when cold cutting or breaking into lines, or when cleaning and disposing of empty containers. Parts and equipment should be steam cleaned prior to maintenance procedures. Do not breathe dust/fume/gas/mist/vapours/spray. Avoid contact with skin and eyes. Keep away from incompatible materials such as oxidizing agents and acids. Wash hands thoroughly after handling. Do not eat, drink or smoke when using the product. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection. In case of inadequate ventilation, use respiratory protection.

Conditions for safe storage, including any incompatibilities:

Storage area should be clearly identified, well-illuminated and clear of obstruction. Store in a well-ventilated place. Store locked up. Only allow access to authorized persons. Store and handle in properly designed pressure vessels and equipment. Store and use away from heat, sparks, open flame, or any other ignition source. Use non-sparking ventilation systems, approved explosion-proof equipment, and intrinsically safe electrical systems. Have appropriate extinguishing capability in storage area (e.g. sprinkler system, portable fire extinguishers) and flammable gas detectors. Keep absorbents for leaks and spills readily available. Prevent soil contamination. Equip storage vessel vents with a flame arrestor. Inspect vents during winter conditions for vapour ice buildup. Storage tanks should be above ground and diked to hold entire contents. Store away from incompatible materials. Store according to applicable regulations and standards for flammable materials.

Recommended maximum temperature for storage and loading is below the flashpoint.

8. Exposure controls/personal protection

Control Parameters

Occupational Exposure Limits

1,3-Butadiene, 2-methyl-: While no peer-reviewed workplace exposure limit has been established for isoprene, based on the current literature, adoption of an internal Isoprene 8 hr. TWA exposure limit of 10 ppm or 28 mg/m³ is recommended.

Chemical Identity	type	Exposure Limit Values		Source
Naphthalene	STEL	15 ppm	79 mg/m ³	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
	TWA	10 ppm	52 mg/m ³	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended

Naphthalene	TWA	10 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
	STEL	15 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
Naphthalene	TWA	10 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
Naphthalene	TWA	10 ppm	52 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
	STEL	15 ppm	79 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
Naphthalene	TWA	10 ppm		US. ACGIH Threshold Limit Values, as amended
Naphthalene	REL	10 ppm	50 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards, as amended
Naphthalene	STEL	15 ppm	75 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards, as amended
Naphthalene	IDLH	250 ppm		US. NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended
1H-Indene	TWA	10 ppm	48 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
1H-Indene	TWA	10 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
1H-Indene	TWA	5 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
1H-Indene	TWA	10 ppm	48 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
1H-Indene	TWA	5 ppm		US. ACGIH Threshold Limit Values, as amended
1H-Indene	REL	10 ppm	45 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards, as amended
4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydro-	TWA	5 ppm	27 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydro-	TWA	5 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydro-	TWA	5 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydro-	TWA	5 ppm	27 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydro-	REL	5 ppm	30 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards, as amended
4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydro-	STEL	1 ppm		US. ACGIH Threshold Limit Values, as amended
	TWA	0.5 ppm		US. ACGIH Threshold Limit Values, as amended
Benzene	TWA	0.5 ppm	1.6 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
	STEL	2.5 ppm	8 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
Benzene	STEL	2.5 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
	TWA	0.5 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)

Benzene	STEL	2.5 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
	TWA	0.5 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
Benzene	STEL	5 ppm	15.5 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
	TWA	1 ppm	3 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
Benzene	TWA	0.5 ppm		US. ACGIH Threshold Limit Values, as amended
	STEL	2.5 ppm		US. ACGIH Threshold Limit Values, as amended
Benzene	REL	0.1 ppm		US. NIOSH: Pocket Guide to Chemical Hazards, as amended
Benzene	STEL	1 ppm		US. NIOSH: Pocket Guide to Chemical Hazards, as amended
Benzene	IDLH	500 ppm		US. NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended
Benzene, ethenyl-	STEL	40 ppm	170 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
	TWA	20 ppm	85 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
Benzene, ethenyl-	TWA	50 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
	STEL	75 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
Benzene, ethenyl-	STEL	100 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
	TWA	35 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
Benzene, ethenyl-	TWA	50 ppm	213 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
	STEL	100 ppm	426 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
Benzene, ethenyl-	STEL	40 ppm		US. ACGIH Threshold Limit Values, as amended
	TWA	20 ppm		US. ACGIH Threshold Limit Values, as amended
Benzene, ethenyl-	REL	50 ppm	215 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards, as amended
Benzene, ethenyl-	STEL	100 ppm	425 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards, as amended
Benzene, ethenyl-	IDLH	700 ppm		US. NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended
Toluene	TWA	50 ppm	188 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
Toluene	TWA	20 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
Toluene	TWA	20 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
Toluene	TWA	50 ppm	188 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
Toluene	TWA	20 ppm		US. ACGIH Threshold Limit Values, as amended
Toluene	STEL	150 ppm	560 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards, as amended

Toluene	REL	100 ppm	375 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards, as amended
Toluene	IDLH	500 ppm		US. NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended
Benzene, dimethyl-	STEL	150 ppm	651 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
	TWA	100 ppm	434 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
Benzene, dimethyl-	TWA	100 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
	STEL	150 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
Benzene, dimethyl-	STEL	150 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
	TWA	100 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
Benzene, dimethyl-	TWA	100 ppm	434 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
	STEL	150 ppm	651 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
Benzene, dimethyl-	TWA	100 ppm		US. ACGIH Threshold Limit Values, as amended
	STEL	150 ppm		US. ACGIH Threshold Limit Values, as amended
Benzene, dimethyl-	REL	100 ppm	435 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards, as amended
Benzene, dimethyl-	STEL	150 ppm	655 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards, as amended
Benzene, ethyl-	STEL	125 ppm	543 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
	TWA	100 ppm	434 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
Benzene, ethyl-	TWA	20 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
Benzene, ethyl-	TWA	20 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
Benzene, ethyl-	TWA	100 ppm	434 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
	STEL	125 ppm	543 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
Benzene, ethyl-	TWA	20 ppm		US. ACGIH Threshold Limit Values, as amended
Benzene, ethyl-	REL	100 ppm	435 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards, as amended
Benzene, ethyl-	STEL	125 ppm	545 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards, as amended
Benzene, ethyl-	IDLH	800 ppm		US. NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended
1,1'-Biphenyl	TWA	0.2 ppm	1.3 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
1,1'-Biphenyl	TWA	0.2 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
1,1'-Biphenyl	TWA	0.2 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended

1,1'-Biphenyl	TWA	0.2 ppm	1.3 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
1,1'-Biphenyl	TWA	0.2 ppm		US. ACGIH Threshold Limit Values, as amended
1,1'-Biphenyl	REL	0.2 ppm	1 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards, as amended
1,1'-Biphenyl	IDLH		100 mg/m3	US. NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended

Biological Limit Values

Chemical Identity	Exposure Limit Values	Source
Benzene (t,t-Muconic acid: Sampling time: End of shift.)	500 µg/g (Creatinine in urine)	ACGIH BEI
Benzene (S-Phenylmercapturic acid: Sampling time: End of shift.)	25 µg/g (Creatinine in urine)	ACGIH BEI
Benzene, ethenyl- (Mandelic acid plus phenylglyoxylic acid: Sampling time: End of shift.)	400 mg/g (Creatinine in urine)	ACGIH BEI
Benzene, ethenyl- (styrene: Sampling time: End of shift.)	40 µg/l (Urine)	ACGIH BEI
Toluene (toluene: Sampling time: End of shift.)	0.03 mg/l (Urine)	ACGIH BEI
Toluene (toluene: Sampling time: Prior to last shift of work week.)	0.02 mg/l (Blood)	ACGIH BEI
Toluene (o-Cresol, with hydrolysis: Sampling time: End of shift.)	0.3 mg/g (Creatinine in urine)	ACGIH BEI
Benzene, dimethyl- (Methylhippuric acids: Sampling time: End of shift.)	1.5 g/g (Creatinine in urine)	ACGIH BEI
Benzene, ethyl- (Sum of mandelic acid and phenylglyoxylic acid: Sampling time: End of shift.)	0.15 g/g (Creatinine in urine)	ACGIH BEI

Exposure guidelines

Chemical Identity	Notations	Source
Naphthalene	Can be absorbed through the skin.	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
	Can be absorbed through the skin.	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
	Can be absorbed through the skin.	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
Benzene	Can be absorbed through the skin.	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
	Can be absorbed through the skin.	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
	Can be absorbed through the skin.	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
Benzene, ethenyl-	Can be absorbed through the skin.	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
Toluene	Can be absorbed through the skin.	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended
	Can be absorbed through the skin.	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended

Appropriate Engineering Controls

Engineering methods to reduce hazardous exposure are preferred controls. Methods include mechanical ventilation (dilution and local exhaust) process or personal enclosure, remote and automated operation, control of process conditions, leak detection and repair systems, and other process modifications. Ensure all exhaust ventilation systems are discharged to outdoors, away from air intakes and ignition sources. Supply sufficient replacement air to make up for air removed by exhaust systems. Administrative (procedure) controls and use of personal protective equipment may also be required.

Individual protection measures, such as personal protective equipment

General information: Personal protective equipment (PPE) should not be considered a long-term solution to exposure control. Employer programs to properly select, fit, maintain and train employees to use equipment must accompany PPE. Consult a competent industrial hygiene resource, the PPE manufacturer's recommendation, and/or applicable regulations to determine hazard potential and ensure adequate protection.

Eye/face protection: Safety glasses. Chemical goggles are recommended if splashing is possible or to prevent eye irritation from heated vapours or mists.

Skin Protection

Hand Protection: Chemical resistant gloves.

Skin and Body Protection: Wear appropriate clothing to prevent any possibility of skin contact. Wear work clothes with long sleeves and pants. If splashing or contact with liquid material is possible, consider the need for an impervious overcoat. Fire resistant (i.e., Nomex) or natural fibre clothing (i.e., cotton or wool) is recommended. Synthetic clothing can generate static electricity and is not recommended where a flammable vapour release may occur. Wear chemical-resistant safety footwear with good traction to prevent slipping. Static Dissipative (SD) rated footwear is also recommended.

Respiratory Protection: Appropriate NIOSH approved air-purifying respirator that meets the requirements of CSA Standard CAN/CSA-Z94.4, or self-contained breathing apparatus should be used. Air supplied breathing apparatus must be used when oxygen concentrations are low or if airborne concentrations exceed the limits of the air-purifying respirators.

Hygiene measures: Use effective control measures and PPE to maintain worker exposure to concentrations that are below these limits. Ensure that eyewash stations and safety showers are in close proximity to work locations.

9. Physical and chemical properties**Appearance**

Physical state:	liquid
Form:	Oily
Colour:	Dark
Odour:	Pungent, Disagreeable
Odour Threshold:	< 1 ppm (various components)
pH:	not applicable
Melting point/freezing point:	-57 - -36 °C (-71 - -33 °F)
Initial boiling point and boiling range:	80 - 522 °C (176 - 972 °F)
Flash Point:	28 - 80 °C (82 - 176 °F) (PMCC)
Evaporation rate:	No data available.
Flammability (solid, gas):	not applicable
Upper/lower limit on flammability or explosive limits	

Flammability limit - upper (%):	5.9 %(V) (Naphthalene)
Flammability limit - lower(%):	0.9 %(V) (Naphthalene)
Vapour pressure:	< 1 mm HG (20 °C (68 °F)) (estimated)
Vapour density:	> 2 (estimated) (various components) (Air=1)
Density:	1,005 - 1,042 kg/m ³
Relative density:	1.005 - 1.042 (15 °C (59 °F)) (Water=1)
Solubility(ies)	
Solubility in water:	Insoluble in water
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	No data available.
Auto-ignition temperature:	No data available.
Decomposition temperature:	No data available.
Viscosity:	5.0 - 9.9 mm ² /s (40 °C (104 °F))

10. Stability and reactivity

Reactivity:	Reacts with oxidizing agents, can readily cause fire or explosion when in contact with open flame or excessive heat.
Chemical Stability:	Material is stable under normal conditions.
Possibility of Hazardous Reactions:	No data available.
Conditions to Avoid:	Exposure to open flame or excessive heat can cause fire or explosion. Keep away from heat, sparks and open flame.
Incompatible Materials:	Oxidizing agents.
Hazardous Decomposition Products:	Upon decomposition, this product emits carbon monoxide, carbon dioxide, low molecular weight hydrocarbons, acidic gases, nitrogen oxides, oxides of sulphur.

11. Toxicological information

Information on likely routes of exposure

Inhalation:	Known to cause human aspiration toxicity hazards or to be regarded as if they cause human aspiration toxicity hazard.
Ingestion:	May be fatal if swallowed and enters airways. Minute amounts aspirated into the lungs during ingestion may cause severe lung damage. Ingestion may also cause blood disorders.
Skin Contact:	Causes skin irritation.
Eye contact:	Causes serious eye irritation.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation:	Headache, dizziness, confusion, loss of appetite and/or loss of consciousness.
Ingestion:	Vomiting, nausea, abdominal pain and central nervous system effects.
Skin Contact:	Skin irritation.
Eye contact:	Eye irritation.

Information on toxicological effects**Acute toxicity (list all possible routes of exposure)****Oral****Product:** LD50 (Rat): > 5,000 mg/kg**Dermal****Product:** LD50 (Rabbit): > 2,000 mg/kg**Inhalation****Product:** LC 50 (Rat, 4 h): > 3.7 mg/l Dusts, mists and fumes: Not classified
LC 50 was not reached at the dose of 3.7 mg/l (maximum dose tested).

LC 50 : Vapour: Not classified

Repeated dose toxicity**Product:** No data available.**Components:**Benzene
LOAEL (Rat, Oral): 25 mg/kg (Target Organ(s): Blood)
LOAEL (Rat, Inhalation - vapour): 0.958 mg/l (Target Organ(s): Blood)
LOAEL (Human, Inhalation - vapour): 0.0018 mg/l (Target Organ(s): Blood)**Skin Corrosion/Irritation****Product:** Causes skin irritation.**Serious Eye Damage/Eye Irritation****Product:** Causes serious eye irritation.**Respiratory or Skin Sensitization****Product:** No data available.**Components:**4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydro-
Skin sensitization, Draize (Guinea Pig): Not a skin sensitizer.**Carcinogenicity****Product:** May cause cancer.**IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:**Naphthalene Overall evaluation: 2B. Possibly carcinogenic to humans.
Benzene Overall evaluation: 1. Carcinogenic to humans.
Benzene, ethenyl- Overall evaluation: 2A. Probably carcinogenic to humans.
Benzene, ethyl- Overall evaluation: 2B. Possibly carcinogenic to humans.
1,3-Butadiene, 2-methyl- Overall evaluation: 2B. Possibly carcinogenic to humans.**US. National Toxicology Program (NTP) Report on Carcinogens:**Naphthalene Reasonably Anticipated to be a Human Carcinogen.
Benzene Known To Be Human Carcinogen.
Benzene, ethenyl- Reasonably Anticipated to be a Human Carcinogen.
1,3-Butadiene, 2-methyl- Reasonably Anticipated to be a Human Carcinogen.**ACGIH Carcinogen List:**

Benzene Group A1: Confirmed human carcinogen.

Germ Cell Mutagenicity**In vitro****Product:** May cause genetic defects.

In vivo

Product: May cause genetic defects.

Reproductive toxicity

Product: Suspected of damaging fertility or the unborn child.

Specific Target Organ Toxicity - Single Exposure

Product: No data available.

Specific Target Organ Toxicity - Repeated Exposure

Product: Blood, Auditory system - Causes damage to organs through prolonged or repeated exposure.

Central nervous system, hearing organs - May cause damage to organs through prolonged or repeated exposure.

Aspiration Hazard

Product: May be fatal if swallowed and enters airways.

Other effects: No data available.

12. Ecological information

Ecotoxicity:
Acute hazards to the aquatic environment:
Fish

Product: LC 50 (Fathead minnow, 96 h): 3.2 mg/l
Toxic to aquatic life.

Aquatic Invertebrates

Product: LC 50 (Water flea, 48 h): 2.16 mg/l
Toxic to aquatic life.

Toxicity to aquatic plants

Product: EC 50 (Green algae (Selenastrum capricornutum), 48 h): 2.96 mg/l
Toxic to aquatic life.

Chronic hazards to the aquatic environment:
Fish

Product: Toxic to aquatic life with long lasting effects.

Aquatic Invertebrates

Product: Toxic to aquatic life with long lasting effects.

Toxicity to aquatic plants

Product: Toxic to aquatic life with long lasting effects.

Persistence and Degradability
Biodegradation

Product: Exhibited a range, 7 to 57% biodegradation under standard testing procedures after 28 days.

BOD/COD Ratio

Product: No data available.

Bioaccumulative Potential**Bioconcentration Factor (BCF)****Product:** No data available.**Components:**4,7-Methano-1H-indene, Carp, Bioconcentration Factor (BCF): 58.9 - 384
3a,4,7,7a-tetrahydro-**Partition Coefficient n-octanol / water (log Kow)****Product:** No data available.**Components:**Naphthalene 3.30

1H-Indene 2.92

4,7-Methano-1H-indene, 2.89
3a,4,7,7a-tetrahydro-

Benzene 2.13

Benzene, ethenyl- 2.95

Toluene 2.73

Benzene, dimethyl- 3.12 - 3.20

Benzene, ethyl- 3.15

1,3-Butadiene, 2-methyl- 2.42

1,1'-Biphenyl 4.01**Mobility in Soil:** Will partition largely between the air, water, and soil compartments, with a negligible amount partitioning to sediment.**Other Adverse Effects:** This product will accumulate on the surface of plants, waterfowls and mammals, resulting in serious injury and possible death. Contains polycyclic aromatic hydrocarbons which are known to persist and bioaccumulate.**13. Disposal considerations****Disposal instructions:** Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal. Waste generator is advised to carefully consider hazardous properties and control measures needed for other materials that may be found in the waste.**Contaminated Packaging:** Check local, federal and provincial environmental regulations prior to disposal.**14. Transport information****TDG**UN Number: UN 3295
UN Proper Shipping Name: HYDROCARBONS, LIQUID, N.O.S.
Class 3
Packing Group III
Label(s) 3
Subsidiary risk label —

Special precautions for user:

Reference Emergency Response Guidebook No. 128, latest revision.

15. Regulatory information**Canada Federal Regulations****List of Toxic Substances (CEPA, Schedule 1)****Chemical Identity**Naphthalene
Benzene
1,3-Butadiene, 2-methyl-**Export Control List (CEPA 1999, Schedule 3)**

Not regulated

National Pollutant Release Inventory (NPRI)**Canada. Canadian Environmental Protection Act (CEPA). National Pollutant Release Inventory (NPRI) (Parts 1-4)**

NPRI	Naphthalene
	4,7-Methano-1H-indene, 3a,4,7,7a-tetrahydro-
	Benzene
	Benzene, ethenyl-
	Toluene
	Benzene, dimethyl-
	Benzene, ethyl-
	1,3-Butadiene, 2-methyl-
	1,1'-Biphenyl

Canada. National Pollutant Release Inventory (NPRI) Substances, Part 5, VOCs with Additional Reporting Requirements

NPRI PT5	Benzene
	1-Pentene
	Benzene, ethenyl-
	Decane
	Toluene
	Benzene, dimethyl-

Greenhouse Gases

Not regulated

Precursor Control Regulations**Chemical Identity**

Toluene

Canada. Substances Subject to Significant New Activity (SNAc) Reporting Requirements

Not regulated

Inventory status

Canada DSL Inventory List: On or in compliance with the inventory

US TSCA Inventory: On or in compliance with the inventory

16. Other information, including date of preparation or last revision

Issue Date: 12/09/2019

Revision Information: 12/09/2019: SDS Update

Version #: 7.0

Abbreviations and acronyms: ACGIH = American Conference of Governmental Industrial Hygienists; BOD = Biochemical Oxygen Demand; CAS = Chemical Abstracts Service; CEPA = Canadian Environmental Protection Act; COD = Chemical Oxygen Demand; DSL = Domestic Substances List; EC50 = Effective Concentration 50%; EPA = Environmental Protection Agency; GHS = Globally Harmonized System for the Classification and Labelling of Chemicals; IARC = International Agency for Research on Cancer; IDLH = Immediately Dangerous to Life or Health; Kow = Octanol/water partition coefficient; LC50 = Lethal Concentration 50%; LD50 = Lethal Dose 50%; LEL = Lower Explosive Limit; NDSL = Non-Domestic Substances List; NFPA = National Fire Protection Association; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OEL = Occupational Exposure Limit; OSHA = Occupational Safety and Health Administration; PNOC = Particulates Not Otherwise Classified; PPE = Personal Protective Equipment; REL = Recommended Exposure Limit; SCBA = Self Contained Breathing Apparatus; SDS = Safety Data Sheet; STEL = Short Term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average

Further Information: For additional information on equipment bonding and grounding, refer to the American Petroleum Institute (API) Recommended Practice 2003, "Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents" or National Fire Protection Association (NFPA) 77, "Recommended Practice on Static Electricity".

For additional information on storing and handling flammable liquids, refer to the National Fire Protection Association (NFPA) 30, "Flammable and Combustible Liquids Code".

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