

Material Name: **C9 Resin Oil**

MSDS ID: NOVA-0005

Section 1 - Product and Company Identification**Synonyms:** C₉₊Mixed Aromatic Hydrocarbons; Low DCPD Resin Oil; High Indene Resin Oil**Chemical Name:** Distillates (petroleum), steam-cracked, C₈₋₁₂ fraction**Chemical Family:** Aromatic Hydrocarbons**Material Use:** Industrial applications; Organic syntheses**Chemical Formula:** Not available; complex mixture**NOVA Chemicals**

P.O. Box 2518, Station M

Calgary, Alberta, Canada T2P 5C6

Product Information: 1-412-490-4063**MSDS Information Email:**msdsemail@novachem.com**EMERGENCY Telephone Numbers:****North America (Canada and US):**

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

1-800-424-9300 (CHEMTREC-USA) (24 hours)

1-613-996-6666 (Canutec-Canada) (24 hours)

Section 2 - Hazards Identification**HMIS Ratings: Health: 2* Fire: 2 Physical Hazard: 1 Personal Protection:** chemical goggles, gloves, respirator, coveralls*Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard***NFPA Ratings: Health: 2 Fire: 2 Reactivity: 1***Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe***Emergency Overview**

DANGER! FLAMMABLE! TOXIC! POSSIBLE CANCER HAZARD! Product is a clear yellow liquid with a distinct aromatic odour. Vapour is heavier than air and may spread long distances. Distant ignition and flashback are possible. Liquid and vapour can accumulate static charge. Liquid can float on water and may travel to distant locations and/or spread fire. Harmful if inhaled, if in contact with skin and if swallowed. This product is irritating to the eyes and skin. Excessive inhalation of this product may result in possible liver and kidney damage, reproductive effects and central nervous system effects including headache, sleepiness, dizziness, nausea, loss of coordination and in extreme conditions coma and possibly death. Ingestion may cause central nervous system effects and possible kidney and liver damage. Small amounts of this product, if aspirated into the lungs, may cause mild to severe pulmonary injury.

Potential Health Effects: Eye

Contact with liquid or vapour may cause irritation.

Potential Health Effects: Skin

Prolonged and/or repeated contact may cause irritation, dermatitis and possible chemical burns. Product contains component(s) that may be easily absorbed through the skin. Prolonged contact may cause allergic skin reactions. Similar petroleum distillates have produced skin tumours on laboratory animals following prolonged and repeated application.

Potential Health Effects: Ingestion

Harmful if swallowed. Ingestion may result in central nervous system effects including headache, sleepiness, dizziness, nausea, loss of coordination and in extreme conditions coma and possibly death. Small amounts of this product, if aspirated into the lungs, may cause mild to severe pulmonary injury. Ingestion may cause kidney and liver damage and blood disorders. Ingestion may also cause methemoglobinemia.

Potential Health Effects: Inhalation

May be harmful if inhaled. Excessive inhalation may result in heartbeat irregularities and central nervous system effects including headache, sleepiness, dizziness, nausea, loss of coordination and in extreme conditions coma and possibly death. May cause injury to lungs, liver, kidney and reproductive systems. Small amounts of this product, if aspirated into the lungs, may cause mild to severe pulmonary injury.

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Section 3 - Composition/Information on Ingredients

CAS #	Component	Percent by Wt.
68477-54-3	Distillates (petroleum), steam-cracked, C ₈₋₁₂ fraction *	100
	The above listed CAS number and product is comprised of the following components: **	
95-13-6	Indene	10- 30
25013-15-4	Vinyltoluenes	10-25
29036-25-7	Methylindenes	1-5
29036-25-7	Methylindenes	5-10
29036-25-7	Methylindenes	10-20
25551-13-7	Trimethylbenzene	9-13
98-83-9	α -Methyl styrene	1-5
98-83-9	α -Methyl styrene	5-10
100-42-5	Styrene	0.1-1
100-42-5	Styrene	1-5
100-42-5	Styrene	5-10
77-73-6	Dicyclopentadiene	0.1-1
77-73-6	Dicyclopentadiene	1-5
496-11-7	Indane	1-4
91-20-3	Naphthalene	1-4
Mixture	Heavy ends	0.1-1
Mixture	Heavy ends	1-3
637-50-3	β -Methyl styrene	0.1-1
637-50-3	β -Methyl styrene	1-2
100-41-4	Ethylbenzene	0.1-1

Additional Information

* Butylated Hydroxytoluene (BHT) is added (minimum 50 ppm) to stabilize product while in storage.

** Product may also contain low, variable levels of xylenes (CAS # 1330-20-7).

The actual components and weight % concentrations vary based on operating conditions.

This product is hazardous under 29 CFR 1910.1200 (Hazard Communication).

This material is a controlled product under Canadian WHMIS regulations.

This material is regulated as a hazardous material /dangerous goods for transportation.

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

Section 4 - First Aid Measures

First Aid: Eyes

Remove contact lenses, if it can be done safely. Immediately flush eyes with water for at least 15 minutes, while holding eyelids open. Seek medical attention if symptoms develop or persist.

First Aid: Skin

Remove contaminated clothing and shoes. Wash immediately with soap and water. Seek medical attention if symptoms develop or persist. Completely decontaminate clothing, shoes and other protective equipment before reuse or discard.

First Aid: Inhalation

Move affected individual to non-contaminated air. Loosen tight clothing such as a collar, tie, belt or waistband to facilitate breathing. Seek immediate medical attention if the individual is not breathing, is unconscious or if any other symptoms persist. WARNING: Contact through mouth-to-mouth resuscitation may pose a secondary risk to the rescuer. Avoid mouth-to-mouth contact by using a mouth shield or guard to perform artificial respiration.

First Aid: Ingestion

DO NOT INDUCE VOMITING. Loosen tight clothing such as a collar, tie, belt or waistband. Seek immediate medical attention.

First Aid: Notes to Physician

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

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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

See Section 9: Physical Properties for flammability limits, flash point and auto-ignition information.

General Fire Hazards

Fire and container explosion hazards are serious when this product is exposed to heat or flame. Vapours are heavier than air and may travel along the ground to some distant source of ignition and flash back. Consider need for immediate emergency isolation and evacuation for at least 300 metres (984 feet). If tank is involved in a fire, ISOLATE for 800 metres (1/2 mile) in all directions.

Explosion Hazards

Vapours may form explosive mixture with air. Keep containers away from source of heat or fire. Evacuate personnel to a distance of at least 0.8 to 1.6 kilometres (1/2 to one mile) if a fire or rupture of a rail car, tank car, or major vessel is possible.

Hazardous Combustion Products

Upon decomposition, this product emits carbon monoxide, carbon dioxide and other low molecular weight hydrocarbons, including possible toxic or irritating compounds.

Extinguishing Media

Dry chemical, foam, carbon dioxide, and water fog. Use water to cool fire-exposed containers and to protect personnel. Water spray may be an ineffective extinguishing medium. Use of an inert foam extinguishing material may also assist in short term flammable vapour suppression. Monitor water run-off for flammability, and prevent from entering sewers, drains, ditches or other confined or underground spaces.

Fire Fighting Equipment/Instructions

Reference 2008 Emergency Response Guidebook, Guide No. 128 for additional details and instructions. Position upwind. Keep unnecessary 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 discolouration of a container. Fire fighters should wear full-face, self-contained breathing apparatus and thermal protective clothing. Avoid inhaling any smoke and combustion materials. Remove and clean or destroy any contaminated clothing. Cool containers with flooding quantities of water until well after the fire is out. Control runoff waters to prevent entry into sewers, drains, ditches, underground or confined spaces and waterways.

Section 6 - Accidental Release Measures

Evacuation Procedures

Isolate area. Keep unnecessary personnel away. Alert stand-by emergency and fire fighting personnel. Monitor surrounding area for buildup of flammable concentrations in air.

Small Spills

Eliminate ignition sources. Spill or leak area should be isolated immediately for 25 to 50 metres (82 to 164 feet) in all directions. Keep upwind and out of low areas. Stop discharge if safe to do so. Contain discharge by booming on water or diking on ground. Spills on water will volatilize rapidly, making containment or recovery difficult. Remove liquid material with approved non-sparking pumps, skimmers or vacuum equipment. Absorb/adsorb residual materials and clean up with non-sparking tools. Prevent entry into sewers, drains, ditches, underground or confined spaces, water intakes and waterways.

Large Spills

Evacuate downwind for 300 metres (984 feet). Isolate, contain and attempt to recover. Absorb with DRY earth, sand or other non-combustible material. Contaminated soils may require remediation. Prevent entry into sewers, drains, ditches, underground or confined spaces, water intakes and waterways.

Special Procedures

Contact local police/emergency services and appropriate emergency telephone numbers provided in Section 1. Ensure that statutory and regulatory reporting requirements in the applicable jurisdiction are met. Wear appropriate protective equipment and clothing during cleanup. Individuals without appropriate protective equipment should be excluded from area of spill until cleanup has been completed.

See Section 8 for recommended Personal Protective Equipment and see Section 13 for waste disposal considerations.

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Section 7 - Handling and Storage

Handling Procedures

Keep locked up or secured. Handle in fully grounded, properly designed and approved equipment systems that are suitable for flammable liquids. Collect and flare vents. Use with adequate ventilation. Do not ingest or inhale. Keep away from heat and ignition sources. No smoking or open flames permitted in storage, use or handling areas. Dissipate static electricity during transfer by grounding and bonding containers and equipment. Take special precautions when cold cutting or breaking into lines or when cleaning and disposing of empty containers. Do not breathe gas, fumes, vapour or spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately. Avoid contact with skin and eyes. Keep away from incompatible materials such as oxidizing agents, acids and alkalis. After handling, always wash hands thoroughly with soap and water.

Storage Procedures

Storage area should be clearly identified, well-illuminated, clear of obstruction and accessible only to trained and authorized personnel. Adequate security must be provided so that unauthorized personnel do not have access to product. Store in grounded, properly designed and approved vessels and away from incompatible materials. Store and use away from heat, sparks, open flame, or any other ignition source. Store according to applicable regulations for flammable materials for storage tanks, containers, piping, buildings, rooms, cabinets, allowable quantities and minimum storage distances. Use non-sparking ventilation systems, approved explosion-proof equipment and intrinsically safe electrical systems. Have appropriate extinguishing capability in storage area (e.g. portable fire extinguishers (dry chemical, foam or carbon dioxide)) and flammable gas detectors. Keep absorbents for leaks and spills readily available. Consider use of internal floating roof tanks or where venting to atmosphere is permissible, equip storage tank vents with flame arrestors. Inspect vents during winter conditions for vapour ice buildup. Storage tanks should be above ground and diked to hold entire contents.

See Section 8: Exposure Controls/Personal Protection for appropriate Personal Protective Equipment. See Section 10 for information on Incompatibilities.

Section 8 - Exposure Controls / Personal Protection

Exposure Guidelines

A: General Product Information

Refer to published exposure limits - 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.

B: Component Exposure Limits

ACGIH, OSHA, NIOSH, EPA, Alberta, and Ontario exposure limit lists have been checked for major components listed with CAS registry numbers. Other exposure limits may apply, check with proper authorities.

*Note: The Vacated OSHA Permissible Exposure Limits (PELs) are those provided in the 1989 update to OSHA's Air Contaminants Standard 29 CFR 1910.1000. These limits were vacated by the U.S. Court of Appeals, Eleventh Circuit but may be enforceable in some states.

Indene (95-13-6)

ACGIH: 5 ppm TWA; 24 mg/m³ TWA
OSHA (Vacated)*: 10 ppm TWA; 45 mg/m³ TWA
NIOSH: 10 ppm TWA; 45 mg/m³ TWA
Alberta: 10 ppm TWA; 48 mg/m³ TWA
Ontario: 5 ppm TWA

Vinyltoluenes (25013-15-4)

ACGIH: 50 ppm TWA; 242 mg/m³ TWA; 100 ppm STEL; 483 mg/m³ STEL
OSHA (Vacated)*: 100 ppm TWA; 480 mg/m³ TWA
OSHA (Final): 100 ppm TWA; 480 mg/m³ TWA
NIOSH: 100 ppm TWA; 480 mg/m³ TWA
400 ppm IDLH
Alberta: 50 ppm TWA; 242 mg/m³ TWA; 100 ppm STEL; 483 mg/m³ STEL
Ontario: 50 ppm TWA; 100 ppm STEL

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Trimethylbenzene (25551-13-7)

ACGIH: 25 ppm TWA; 123 mg/m3 TWA
OSHA (Vacated)*: 25 ppm TWA; 125 mg/m3 TWA
NIOSH: 25 ppm TWA; 125 mg/m3 TWA (related to Trimethyl Benzene, all isomers)
Alberta: 25 ppm TWA; 123 mg/m3 TWA
Ontario: 25 ppm TWA

α -Methyl styrene (98-83-9)

ACGIH: 10 ppm TWA; 48 mg/m3 TWA
OSHA (Vacated)*: 50 ppm TWA; 240 mg/m3 TWA; 100 ppm STEL; 485 mg/m3 STEL
OSHA (Final): 100 ppm Ceiling; 480 mg/m3 Ceiling
NIOSH: 50 ppm TWA; 240 mg/m3 TWA; 100 ppm STEL; 485 mg/m3 STEL
700 ppm IDLH
Alberta: 50 ppm TWA; 242 mg/m3 TWA; 100 ppm STEL; 483 mg/m3 STEL
Ontario: 50 ppm TWA; 100 ppm STEL

Styrene (100-42-5)

ACGIH: 20 ppm TWA; 85 mg/m3 TWA; 40 ppm STEL; 170 mg/m3 STEL; BEI
OSHA (Vacated)*: 50 ppm TWA; 215 mg/m3 TWA; 100 ppm STEL; 425 mg/m3 STEL
OSHA (Final): 100 ppm TWA; 200 ppm Ceiling
NIOSH: 50 ppm TWA; 215 mg/m3 TWA; 100 ppm STEL; 425 mg/m3 STEL
700 ppm IDLH
Alberta: 20 ppm TWA; 85 mg/m3 TWA; 40 ppm STEL; 170 mg/m3 STEL
Ontario: 35 ppm TWA; 100 ppm STEL

Dicyclopentadiene (77-73-6)

ACGIH: 5 ppm TWA; 27 mg/m3 TWA
OSHA (Vacated)*: 5 ppm TWA; 30 mg/m3 TWA
NIOSH: 5 ppm TWA; 30 mg/m3 TWA
Alberta: 5 ppm TWA; 27 mg/m3 TWA
Ontario: 5 ppm TWA

Naphthalene (91-20-3)

ACGIH: 10 ppm TWA; 52 mg/m3 TWA; 15 ppm STEL; 79 mg/m3 STEL
Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA (Vacated)*: 10 ppm TWA; 50 mg/m3 TWA; 15 ppm STEL; 75 mg/m3 STEL
OSHA (Final): 10 ppm TWA; 50 mg/m3 TWA
NIOSH: 10 ppm TWA; 50 mg/m3 TWA; 15 ppm STEL; 75 mg/m3 STEL
250 ppm IDLH
Alberta: 10 ppm TWA; 52 mg/m3 TWA; 15 ppm STEL; 79 mg/m3 STEL
Substance may be readily absorbed through intact skin
Ontario: 10 ppm TWA; ; 15 ppm STEL
Skin - Danger of cutaneous absorption

Ethylbenzene (100-41-4)

ACGIH: 20 ppm TWA; 87 mg/m3 TWA; 125 ppm STEL; 543 mg/m3 STEL; BEI
OSHA (Vacated)*: 100 ppm TWA; 435 mg/m3 TWA; 125 ppm STEL; 545 mg/m3 STEL
OSHA (Final): 100 ppm TWA; 435 mg/m3 TWA
NIOSH: 100 ppm TWA; 435 mg/m3 TWA; 125 ppm STEL; 545 mg/m3 STEL
800 ppm IDLH (10% LEL)
Alberta: 100 ppm TWA; 434 mg/m3 TWA; 125 ppm STEL; 543 mg/m3 STEL
Ontario: 100 ppm TWA; 125 ppm STEL

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.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Wear safety glasses; to prevent eye irritation from hot vapours wear chemical goggles. Use face shield if splashing is possible.

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Personal Protective Equipment: Skin/Hands/Feet

Use chemically resistant gloves when handling product. Wear chemical-resistant safety footwear with good traction to prevent slipping. Work clothing that sufficiently prevents skin contact should be worn, such as coveralls and/or long sleeves and pants. If splashing or contact with liquid 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. Static Dissipative (SD) rated footwear is recommended.

Personal Protective Equipment: Respiratory

If engineering controls and ventilation are not sufficient to prevent buildup of aerosols or vapours, appropriate NIOSH approved air-purifying respirators or self-contained breathing apparatus (SCBA) appropriate for exposure potential 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.

Personal Protective Equipment: General

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.

Section 9 - Physical & Chemical Properties

Physical State and Appearance:	Oily liquid	Colour:	Clear, yellow
Odour:	Aromatic, distinctive	Odour Threshold:	Estimated at 5 to 10 ppm (based on components)
pH:	Not applicable	Vapour Pressure:	Range: 7 to 15 mm Hg at 20°C (68°F)
Vapour Density at 0°C (Air=1):	Estimated at 4 (based on components)	Boiling Point:	Range: 155°C to 210°C (311°F to 410°F)
Freezing Point:	<-50°C (<-58°F)	Solubility (H2O):	133 mg/L
Specific Gravity (Water=1):	Range: 0.91 to 0.92 at 15°C (60°F)	Evaporation Rate (n-Butyl Acetate=1):	Not available
Percent Volatile:	Estimated at 100% (based on components)	Octanol/H2O Coeff.:	Log Kow = 2.88 to 4.94
Auto Ignition:	Estimate lowest as 465°C (869°F) (based on components)	Flash Point:	Range: 45°C to 55°C (113°F to 131°F)
Flash Point Method:	TAG	Upper Flammable Limit (UFL):	Estimate 11% (based on components)
Lower Flammable Limit (LFL):	Estimate 1% (based on components)	Flammability Classification:	Flammable

Section 10 - Stability & Reactivity Information

Chemical Stability

This is a stable material if inhibitor levels are maintained in storage at ambient temperatures.

Instability

May polymerize or oxidize very slowly without generating high temperatures.

Chemical Stability: Conditions to Avoid

Keep away from heat, sparks or open flame.

Incompatibility

May react with strong oxidizing agents such as peroxides, halogens and oxygen, metals, strong acids, and alkalis. May polymerize on contact with Lewis acids (i.e. AlCl₃, BF₃).

Possibility of Hazardous Reactions or Hazardous Polymerization

Hazardous polymerization not likely to occur; however may slowly polymerize if inhibitor is depleted.

Corrosivity

Not corrosive to the common metals.

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Hazardous Decomposition

Upon decomposition, this product emits carbon monoxide, carbon dioxide and other low molecular weight hydrocarbons, including possible toxic or irritating compounds.

Special Remarks

Avoid elevated temperatures and pressures, chemical incompatibilities and sources of ignition. Some components become unstable at elevated temperatures or pressures.

Section 11 - Toxicological Information

A: Acute Toxicity - General Product Information

This product has been evaluated under the EPA's High Production Volume (HPV) Chemical Challenge Program in the Resin Oils and CycloDiene Dimer Concentrates category. This product has been tested for acute toxicity by the inhalation route of exposure, eye and skin irritation and mutagenicity. Liquid, mist or vapours can cause eye, skin and respiratory tract irritation and central nervous system (CNS) depression. This product was not mutagenic in Salmonella test. Mixture is an aspiration hazard resulting in CNS depression, possible chemical pneumonitis and death due to respiratory failure. The following additional information has been found for its components:

Indene - Contact can irritate the skin and eyes. Inhalation can irritate the mucous membranes causing coughing and wheezing.

Vinyltoluenes - Causes irritation to the eyes, skin, nose and mucous membranes. The major effect of acute exposure is CNS depression, with effects including headache, weakness, dizziness and lightheadedness. Ingestion carries a risk of pulmonary aspiration and chemical pneumonitis.

Trimethylbenzene - Is a skin and respiratory irritant. Inhalation can cause CNS depression and may produce nausea, headache, weakness, dizziness, sleepiness, loss of coordination or consciousness and coma or death. Ingestion carries a risk of pulmonary aspiration and chemical pneumonitis.

Styrene - Contact can irritate the eyes and skin. Vapours irritate the eyes and respiratory system and at high concentrations may result in central nervous system (CNS) depression, causing headache, dizziness, nausea, loss of coordination, and unconsciousness.

Dicyclopentadiene (DCPD) - Contact can irritate the eyes and skin. Inhalation can irritate the nose, throat and lungs, causing coughing, wheezing and/or shortness of breath. DCPD is toxic to the central nervous system (CNS) and exposure may cause CNS depression, causing headache, dizziness, nausea, vomiting, loss of coordination and unconsciousness.

Naphthalene - Can irritate the skin, eyes, nose and throat. Direct contact with the eye may cause corneal damage. Inhalation of high concentrations may result in central nervous system (CNS) depression, causing headache, fatigue, confusion, nausea, vomiting, and unconsciousness. Ingestion can cause nausea, vomiting, diarrhoea, liver damage, kidney damage and haemolytic anemia, which may lead to methemoglobinemia.

Ethylbenzene - Causes severe eye, nose, and throat irritation. It is also a skin irritant that may be easily absorbed through the skin in harmful amounts. Inhalation may result in central nervous system (CNS) depression, causing headache, dizziness, nausea, loss of coordination, unconsciousness, and at high concentrations, difficulty breathing and possibly death. Ingestion and subsequent aspiration into the lungs may cause chemical pneumonitis.

B: Acute Toxicity - LD50/LC50

Distillates, petroleum, steam-cracked, C8-12 fraction (68477-54-3)

Inhalation LC50 Rat: 1.65 mg/L/4H; Oral LD50 Rat: >2000 mg/kg

Indene (95-13-6)

Inhalation LC50 Rat: 1400 mg/m³/4H

Vinyltoluenes (25013-15-4)

Inhalation LC50 Mouse: 3020 mg/m³/4H; Oral LD50 Rat: 2255 mg/kg

Trimethylbenzene (25551-13-7)

Oral LD50 Rat: 8970 mg/kg

Styrene (100-42-5)

Inhalation LC50 Rat: 11.8 mg/L/4H; Oral LD50 Rat: 1000 mg/kg

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Dicyclopentadiene (77-73-6)

Inhalation LC50 Rat: 500 ppm/4H; Oral LD50 Rat: 346.5 mg/kg; Dermal LD50 Rat: >2000 mg/kg; Dermal LD50 Rabbit: 4380 mg/kg

Naphthalene (91-20-3)

Inhalation LC50 Rat: >340 mg/m³/1H; Oral LD50 Rat: 490 mg/kg; Dermal LD50 Rat: >2500 mg/kg; Dermal LD50 Rabbit: >20 g/kg

Ethylbenzene (100-41-4)

Inhalation LC50 Rat: 17.2 mg/L/4H; Oral LD50 Rat: 3500 mg/kg; Dermal LD50 Rabbit: 15,354 mg/kg

C: Chronic Toxicity - General Product Information

This product has been evaluated under the EPA's High Production Volume (HPV) Chemical Challenge Program in the Resin Oils and Cycloaddition Dimer Concentrates category. This stream is high in C8 to C12 cycloalkenes and aromatic hydrocarbon components. There is very limited reliable information available on the toxic effects of C8 to C12 cycloalkenes following repeated exposure. The proposed testing is a full SIDS (Screening Information Data Set) human health test battery (except for acute toxicity). Prolonged and/or repeated skin contact may result in dermatitis or more serious skin disorders. Materials with similar boiling point ranges and identified as "heavy" and "aromatic" petroleum naphthas have been reported to induce skin tumours on mice following prolonged and repeated application. This product was found to have no mutagenic effect (bacterial assay tests). The following additional information has been found for its components:

Indene - Prolonged and repeated contact may cause allergic skin sensitization. If an allergy develops, very low future exposure can cause itching and a skin rash. Chronic exposure may damage the liver and kidneys.

Trimethylbenzene - Chronic exposure may produce symptoms of asthmatic bronchitis, headache, drowsiness, nervousness, anemia and blood abnormalities. Prolonged or repeated skin contact may cause a defatting dermatitis.

Styrene - Chronic exposure at high concentration may result in CNS depression and may have an effect on hearing. It also may result in neurological defects known as "styrene sickness". Prolonged skin contact may produce irritation and defatting dermatitis. Styrene has been classified by IARC as Group 2B (possibly carcinogenic to humans) based on "limited evidence" in humans, "limited evidence" in animals, and "other relevant data". The National Toxicology Program (NTP) classified styrene as "reasonably anticipated to be a human carcinogen". Styrene has been shown to be mutagenic in several *in vitro* assays.

Dicyclopentadiene (DCPD) - Prolonged and repeated exposure may damage the liver and the adrenal glands. Signs of intoxication in animals include excessive salivation, anorexia and loss of coordination. At higher doses, effects include convulsions, gastrointestinal disturbance and haemorrhage of the lungs and intestines. Testing indicates that DCPD is not a skin sensitizer.

Naphthalene - Prolonged and repeated exposure can cause cataracts of the eyes and may cause allergic skin reactions. If allergy develops, very low future exposure can cause itching and a skin rash. Chronic exposure may result in jaundice, optical neuritis, aplastic anemia, liver damage, kidney damage and haemolytic anemia, which may lead to methemoglobinemia. Naphthalene has been shown to cause nasal and lung cancer in animal tests and has been classified by IARC as Group 2B (possibly carcinogenic to humans). NTP has listed naphthalene as Reasonably Anticipated to be a Carcinogen. Naphthalene was not mutagenic in the Ames Salmonella microsome assay.

Ethylbenzene - Prolonged and repeated exposure may be harmful to the central nervous system (CNS), upper respiratory tract and/or may cause liver disorders. It may also cause drying, scaling and blistering of the skin. Ethylbenzene has been classified by IARC as Group 2B (possibly carcinogenic to humans) based on the National Toxicology Program's two year study of very high exposure levels on rats and mice (NTP, 1999).

D: Chronic Toxicity - Carcinogenic Effects

ACGIH, EPA, IARC, OSHA, and NTP carcinogen lists have been checked for selected similar materials or those components with CAS registry numbers.

Vinyltoluenes (25013-15-4)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 60 [1994] (Group 3 (not classifiable))

α-Methyl styrene (98-83-9)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

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Styrene (100-42-5)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
NTP: Reasonably Anticipated To Be A Human Carcinogen
IARC: Monograph 82 [2002], Monograph 60 [1994] (Group 2B (possibly carcinogenic to humans))

Naphthalene (91-20-3)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
EPA: Classification: possible human carcinogen.
NTP: Reasonably Anticipated To Be A Carcinogen
IARC: Monograph 82 [2002] (Group 2B (possibly carcinogenic to humans))

Ethylbenzene (100-41-4)

ACGIH: A3 - Confirmed animal carcinogen with unknown relevance to humans
EPA: Classification: not classifiable as to human carcinogenicity.
IARC: Monograph 77 [2000] (Group 2B (possibly carcinogenic to humans))

Section 12 - Ecological Information

Ecotoxicity

A: General Product Information

This product has been evaluated under the EPA's High Production Volume (HPV) Chemical Challenge Program in the Resin Oils and Cyclodiene Dimer Concentrates category. Product is volatile and is moderately adsorbed into soils. It is hazardous to aquatic life and mammals. Product will float on water and may be recovered in a similar manner as other oily-type materials.

B: Component Analysis - Ecotoxicity - Aquatic/Terrestrial Toxicity

Distillates, petroleum, steam-cracked, C8-12 fraction (68477-54-3)

Test and Species	Results and Conditions
96 Hr LC50 Brachydanio rerio	13.5 mg/L [semi-static]
96 Hr LC50 Chaetogammarus marinus	1.4 mg/L

Vinyltoluenes (25013-15-4)

Test and Species	Results and Conditions
96 Hr LC50 Pimephales rafinesque	23.4 mg/L

Trimethylbenzene (Mixed isomers) (25551-13-7)

Test and Species	Results and Conditions
96 Hr LC50 Pimephales promelas	7.72 mg/L [flow-through]

α -Methyl styrene (98-83-9)

Test and Species	Results and Conditions
48 Hr LC50 Leuciscus idus	28 mg/L

Styrene (100-42-5)

Test and Species	Results and Conditions
96 Hr LC50 Pimephales promelas	3.24-4.99 mg/L [flow-through]
96 Hr LC50 Lepomis macrochirus	19.03-33.53 mg/L [static]
96 Hr LC50 Pimephales promelas	6.75-14.5 mg/L [static]
96 Hr LC50 Poecilia reticulata	58.75-95.32 mg/L [static]
72 Hr EC50 Pseudokirchneriella subcapitata	1.4 mg/L
96 Hr EC50 Pseudokirchneriella subcapitata	0.72 mg/L
72 Hr EC50 Pseudokirchneriella subcapitata	0.46-4.3 mg/L [static]
96 Hr EC50 Pseudokirchneriella subcapitata	0.15-3.2 mg/L [static]
48 Hr EC50 Daphnia magna	3.3-7.4 mg/L

Dicyclopentadiene (77-73-6)

Test and Species	Results and Conditions
96 Hr LC50 Lepomis macrochirus	11.5-17.6 mg/L [static]
96 Hr LC50 Lepomis macrochirus	23 mg/L
96 Hr LC50 Oncorhynchus mykiss	13-19.5 mg/L [static]
96 Hr LC50 Pimephales promelas	10-14.2 mg/L [static]
96 Hr EC50 Pseudokirchneriella subcapitata	>100 mg/L
48 Hr EC50 Daphnia magna	11 mg/L

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Material Name: **C9 Resin Oil**

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Naphthalene (91-20-3)

Test and Species

96 Hr LC50 Pimephales promelas
96 Hr LC50 Oncorhynchus mykiss
96 Hr LC50 Oncorhynchus mykiss
96 Hr LC50 Pimephales promelas
96 Hr LC50 Lepomis macrochirus
72 Hr EC50 Skeletonema costatum
48 Hr LC50 Daphnia magna
48 Hr EC50 Daphnia magna
48 Hr EC50 Daphnia magna

Results and Conditions

5.74-6.44 mg/L [flow-through]
1.6 mg/L [flow-through]
0.91-2.82 mg/L [static]
1.99 mg/L [static]
31.0265 mg/L [static]
0.4 mg/L
2.16 mg/L
1.96 mg/L [Flow through]
1.09-3.4 mg/L [Static]

Ethylbenzene (100-41-4)

Test and Species

72 Hr EC50 Pseudokirchneriella subcapitata
96 Hr EC50 Pseudokirchneriella subcapitata
72 Hr EC50 Pseudokirchneriella subcapitata
96 Hr EC50 Pseudokirchneriella subcapitata
48 Hr EC50 Daphnia magna

Results and Conditions

4.6 mg/L
>438 mg/L
2.6-11.3 mg/L [static]
1.7-7.6 mg/L [static]
1.8-2.4 mg/L

Environmental Fate/Mobility

When released to soil or water, product will begin to volatilize. Product has low water solubility. Product is expected to have some mobility in soils and ground waters. In soils, product has moderate adsorption (13 to 62%, based on soil type) and subsequent desorption (52 to 58%). Dicyclopentadiene (DCPD) is less mobile and may be less accessible to ground water than benzene and toluene components. DCPD has a high affinity for soil adsorption.

Persistence/Degradability

It is anticipated that most components will photodegrade in air over a period of days or weeks. Dicyclopentadiene in air will photodegrade, with an estimated half-life of 1 to 3 hours. Reported photodegradation half-lives for vinyltoluenes, indene and methylindenes are 44.5, 53 and 50.2 hours, respectively. These components are all biodegradable individually although reported degradation rates of low DCPD resin oil is lower than the individual components.

Bioaccumulation/Accumulation

The product's log Kow is 2.88 to 4.94. Dicyclopentadiene has a reported Kow of 2.98. DCPD has been detected as a long-term soil contaminant from pesticide manufacturing and in water effluent discharges from some industrial complexes or incinerators. Low bioconcentration in fish and aquatic organisms may occur. No significant bioaccumulation has been found in fresh water birds, plants and exposed mammals.

Section 13 - Disposal Considerations

U.S./Canadian Waste Information

A: General Product Information

This product may be a hazardous waste according to US and Canadian regulations. The use, mixing or processing of this product may alter its properties or hazards. 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. **DO NOT ATTEMPT TO DISPOSE OF BY UNCONTROLLED IGNITION.** Since emptied containers retain product residue, follow safe handling/label warnings even after container is emptied.

See Section 7: Handling and Storage and Section 8: Exposure Controls/Personal Protection for additional handling information that may be applicable for safe handling and the protection of employees.

Waste generator is advised to carefully consider hazardous properties and control measures needed for other materials that may be found in the waste.

B: Component Waste Numbers

Naphthalene (91-20-3)

RCRA: waste number U165

Material Safety Data Sheet

Material Name: **C9 Resin Oil**

MSDS ID: NOVA-0005

Section 14 - Transportation Information

US DOT Information

Shipping Name: Petroleum distillates, n.o.s. (Vinyltoluenes, Trimethylbenzene)

UN/NA #: UN1268 **Hazard Class:** 3 **Packing Group:** III

Required Label(s): FLAMMABLE LIQUID

Additional Info.: NOTE: The Reportable Quantity for naphthalene is 100 lbs. (45.4 kg). The Reportable quantity for styrene is 1000 lbs (454kg).

2008 Emergency Response Guidebook: Guide No. 128

Canadian TDG Information

Shipping Name: PETROLEUM DISTILLATES, N.O.S. (Vinyltoluenes, Trimethylbenzene)

UN#: UN1268 **Hazard Class:** 3 **Packing Group:** III

Required Label(s): FLAMMABLE LIQUID

Additional Info.: 2008 Emergency Response Guidebook: Guide No. 128

International Air Transport Association (IATA) and International Civil Aviation Organization (ICAO) Information

Shipping Name: Petroleum distillates, n.o.s. (Vinyltoluenes, Trimethylbenzene)

UN #: UN1268 **Hazard Class:** 3 **Packing Group:** III

Required Label(s): FLAMMABLE LIQUID

International Maritime Dangerous Goods (IMDG) Code

Shipping Name: Petroleum distillates, n.o.s. (Vinyltoluenes, Trimethylbenzene)

UN #: UN1268 **Hazard Class:** 3 **Packing Group:** III

Required Label(s): FLAMMABLE LIQUID

Additional Info.: EmS No.: F-E, S-E

Marine Pollutant: No

Section 15 - Regulatory Information

A: International Regulations

Component Analysis - International Inventory Status

Component	CAS #	US - TSCA	CANADA - DSL	EU - EINECS
Distillates, petroleum, steam-cracked, C8-12 fraction	68477-54-3	Yes	Yes	Yes
Indene	95-13-6	Yes	Yes	Yes
Vinyltoluenes	25013-15-4	Yes	Yes	Yes
Methylindenes	29036-25-7	No	No	Yes
Trimethylbenzene	25551-13-7	Yes	Yes	Yes
α -Methyl styrene	98-83-9	Yes	Yes	Yes
Styrene	100-42-5	Yes	Yes	Yes
Dicyclopentadiene	77-73-6	Yes	Yes	Yes
Indane	496-11-7	Yes	No	Yes
Naphthalene	91-20-3	Yes	Yes	Yes
β -Methyl styrene	637-50-3	No	No	Yes
Ethylbenzene	100-41-4	Yes	Yes	Yes

B: USA Federal & State Regulations

Ongoing occupational hygiene, medical surveillance programs, site emission or spill reporting may be required by Federal or State regulations. Check for applicable regulations.

USA OSHA Hazard Communication Class

This product is hazardous under 29 CFR 1910.1200 (Hazard Communication). HCS Classes:

HCS CLASS: Toxic

HCS CLASS: MAY CAUSE CANCER

HCS CLASS: Combustible liquid having a flash point between 37.8°C (100°F) and 93.3°C (200°F).

HCS CLASS: Irritating substance.

HCS CLASS: Sensitizing substance

HCS CLASS: Target organ effects.

Material Safety Data Sheet

Material Name: **C9 Resin Oil**

MSDS ID: NOVA-0005

USA Right-to-Know - Federal

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Styrene (100-42-5)

SARA 313: 0.1 % de minimis concentration
CERCLA: 1000 lb final RQ; 454 kg final RQ

Dicyclopentadiene (77-73-6)

SARA 313: 1.0 % de minimis concentration

Naphthalene (91-20-3)

SARA 313: 0.1 % de minimis concentration
CERCLA: 100 lb final RQ; 45.4 kg final RQ

Ethylbenzene (100-41-4)

SARA 313: 0.1 % de minimis concentration
CERCLA: 1000 lb final RQ; 454 kg final RQ

USA Right-to-Know - State

The following 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
Indene	95-13-6	Yes	Yes
Vinyltoluenes	25013-15-4	Yes	Yes
Trimethylbenzene	25551-13-7	Yes	Yes
α -Methyl styrene	98-83-9	Yes	No
Styrene	100-42-5	Yes	Yes
Dicyclopentadiene	77-73-6	Yes	Yes
Naphthalene	91-20-3	Yes	Yes
Ethylbenzene	100-41-4	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

C: Canadian Regulations - Federal and Provincial

Canadian Environmental Protection Act (CEPA): All components of this product are on the Domestic Substances List (DSL) or are exempt and are acceptable for use under the provisions of CEPA.

WHMIS Ingredient Disclosure List (IDL)

The following components are identified under the Canadian Hazardous Products Act - Ingredient Disclosure List (IDL):

Component	CAS #	Minimum Concentration
Indene	95-13-6	1 %
Vinyltoluenes	25013-15-4	1 %
Trimethylbenzene	25551-13-7	1 %
α -Methyl styrene	98-83-9	1 %
Styrene	100-42-5	0.1 %
Dicyclopentadiene	77-73-6	1 %
Naphthalene	91-20-3	1 %
Indane	496-11-7	1 %
Ethylbenzene	100-41-4	0.1 %

WHMIS Classification

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

WHMIS CLASS B3: Combustible liquid with a flashpoint between 37.8°C (100°F) and 93.3°C (200°F).

WHMIS CLASS D1A: Very Toxic (Dicyclopentadiene, if $\geq 1\%$)

WHMIS CLASS D2A: Carcinogen (α -Methyl styrene, Styrene, Naphthalene, Ethylbenzene)

WHMIS CLASS D2B: Toxic (skin sensitization)

Material Safety Data Sheet

Material Name: **C9 Resin Oil**

MSDS ID: NOVA-0005

Other Regulations

Ongoing occupational hygiene, medical surveillance programs, site emission or spill reporting may be required by Federal or Provincial regulations. Check for applicable regulations.

Section 16 - Other Information

Label Information

DANGER! FLAMMABLE! TOXIC! POSSIBLE CANCER HAZARD! Product is a clear yellow liquid with a distinct aromatic odour. Vapour is heavier than air and may spread long distances. Distant ignition and flashback are possible. Liquid and vapour can accumulate static charge. Liquid can float on water and may travel to distant locations and/or spread fire. Harmful if inhaled, if in contact with skin and if it is swallowed. This product is irritating to the eyes and skin. Excessive inhalation of this product may result in possible liver and kidney damage, reproductive effects, and central nervous system effects including headache, sleepiness, dizziness, nausea, loss of coordination and in extreme conditions coma and possibly death. Ingestion may cause central nervous system effects and possible kidney and liver damage. Small amounts of this product, if aspirated into the lungs, may cause mild to severe pulmonary injury.

FIRST AID:

SKIN: Remove contaminated clothing and shoes. Wash immediately with soap and water. Seek medical attention if symptoms develop or persist. Completely decontaminate clothing, shoes and other protective equipment before reuse or discard.

EYES: Remove contact lenses, if it can be done safely. Immediately flush eyes with water for at least 15 minutes, while holding eyelids open. Seek medical attention if symptoms develop or persist.

INHALATION: Move affected individual to non-contaminated air. Loosen tight clothing such as a collar, tie, belt or waistband to facilitate breathing. Seek immediate medical attention if the individual is not breathing, is unconscious or if any other symptoms persist. **WARNING:** Contact through mouth-to-mouth resuscitation may pose a secondary risk to the rescuer. Avoid mouth-to-mouth contact by using a mouth shield or guard to perform artificial respiration.

INGESTION: DO NOT INDUCE VOMITING. Loosen tight clothing such as a collar, tie, belt or waistband. Seek immediate medical attention.

IN CASE OF A LARGE SPILL: Evacuate downwind for 300 metres (984 feet). Isolate, contain, and attempt to recover. Absorb with DRY earth, sand or other non-combustible material. Contaminated soils may require remediation. Prevent entry into sewers, drains, underground or confined spaces, water intakes and waterways.

References

Available on request.

Key/Legend

ACGIH = American Conference of Governmental Industrial Hygienists; 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; HMIS = Hazardous Materials Information System; IARC = International Agency for Research on Cancer; IDL = Ingredient Disclosure List; IDLH = Immediately Dangerous to Life or Health; Kow = Octanol/water partition coefficient; LEL = Lower Explosive Limit; NFPA = National Fire Protection Association; 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; STEL = Short Term Exposure Limit; TDG = Transportation of Dangerous Goods; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average

MSDS Prepared by: NOVA Chemicals

MSDS Information Phone Number: 1-412-490-4063

Other Information

Notice to Reader:

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This is the end of MSDS # NOVA-0005.