

SAFETY DATA SHEET

1. Identification

GHS Product identifier: NOVAPOL® Polyethylene - Not Coloured (All Grades)

Other means of identification

Common name(s), synonyms: HDPE, HPLDPE, LDPE, LLDPE, MDPE Polyethylene resins, ethylene polymers

SDS number: NOVA-0029

Recommended use and restriction on use

Recommended use: Thermoplastic resin extruded into film, sheet or molded into containers and other shapes.

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)

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

2. Hazard(s) identification

Hazard Classification

OSHA hazard(s)

Combustible dust

Label Elements

Hazard Symbol: No symbol

Signal Word: Warning

Hazard Statement: *If small particles are generated during further processing, handling or by other means, may form combustible dust concentrations in air.*

Precautionary Statements:

Prevention: Keep out of reach of children. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Ground and bond container and receiving equipment. Use explosion-proof [electrical/ventilating/lighting/] equipment. Wash hands thoroughly after handling. 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] wear respiratory protection.

Response: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. Get medical advice/attention. IF ON SKIN: Wash with plenty of water/soap. If skin

irritation occurs: Get medical advice/attention. IF INHALED: Remove person to fresh air and keep comfortable for breathing. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Storage: Store in accordance with local/regional/national regulations. Protect from sunlight.

Disposal: Dispose of contents/container in accordance with local/regional/national/international regulations. Refer to manufacturer or supplier for information on recovery or recycling.

Other hazards which do not result in GHS classification: Spilled product may create a dangerous slipping hazard.

3. Composition/information on ingredients

Mixtures

Chemical Identity	Common name and synonyms	CAS number	Content in percent (%)*
Silica, cristobalite	Crystalline silica	14464-46-1	0 - 0.3%
Phenol, nonyl-, 1,1',1''-phosphite	Trisnonylphenyl Phosphite (TNPP)	26523-78-4	0 - 0.2%

* All concentrations are percent by weight.

Additional Information: The silica, cristobalite is inextricably bound or coated in the resin.

4. First-aid measures

Ingestion: IF SWALLOWED: Do NOT induce vomiting. Get medical advice/attention.

Inhalation: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Get medical advice/attention.

Skin Contact: IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention.

Eye contact: IF IN EYES: flush eyes with water. Remove contact lenses, if present and easy to do. Continue rinsing.

Most important symptoms/effects, acute and delayed

Symptoms: Thermal burns. Respiratory irritation. Mechanical irritation. The silica, cristobalite is inextricably bound or coated in the resin, which minimizes the likelihood of exposure.

Indication of immediate medical attention and special treatment needed

Treatment: After adequate first aid, no further treatment is required unless symptoms reappear. For more detailed medical emergency support information, call 1-800-561-6682 or 1-403-314-8767 (24 hours, NOVA Chemicals Emergency Response). Burns should be treated as thermal burns. Molten resin will come off as healing occurs; therefore, immediate removal from the skin is not necessary. Treatment should be directed at the control of symptoms and the clinical condition of the patient. No adverse effects due to ingestion are expected. The silica, cristobalite is inextricably bound or coated in the resin, which minimizes the likelihood of exposure.

5. Fire-fighting measures

General Fire Hazards: Solid resins support combustion but do not meet combustible definition. Product will burn at high temperatures but is not considered flammable. Under fire conditions, product will readily burn and emit irritating smoke. Powdered material may form explosive dust-air mixtures.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Water fog or water spray. Small fires: Dry chemical, carbon dioxide (CO₂) or foam.

Unsuitable extinguishing media: Avoid water in straight hose stream; will scatter and spread fire.

Specific hazards arising from the chemical: Upon heating, polyethylene may emit various oligomers, waxes and oxygenated hydrocarbons as well as carbon dioxide, carbon monoxide and small amounts of other organic vapors (e.g. aldehydes, acrolein). Inhalation of these decomposition products may be hazardous. Powdered material may form explosive dust-air mixtures. Risk of dust-air explosion is increased if flammable vapors are also present. Static discharge: material can accumulate static charges which may cause an incendiary electrical discharge.

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. Apply extinguishing media carefully to avoid creating airborne dust. Water may be used to flood the area. Use water spray to cool fire exposed surfaces and to protect personnel. Avoid inhaling any smoke and combustion materials. Remove and isolate contaminated clothing and shoes. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.

Special protective equipment for fire-fighters: 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. Alert stand-by emergency and fire fighting personnel. Dust Deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration.

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. Stop leak if safe to do so. Prevent entry into waterways, sewer, basements or confined areas. Spilled product may create a dangerous slipping hazard. Use appropriate tools to put the spilled solid in an appropriate disposal or recovery container. Recover and reclaim or recycle, if practical. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air).

7. Handling and storage

Precautions for safe handling: Keep out of reach of children. Keep away from uncontrolled heat and incompatible materials. Ground all material handling and transfer equipment. Wash hands thoroughly after handling. Prevent dust accumulation to minimize explosion hazard. For additional information on control of static and minimizing potential dust and fire hazards, refer to NFPA-654, "Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids, 2013 Edition". Use in a well-ventilated area. Avoid release to the environment - water. Wear eye protection/protective gloves as needed/wear full face-shield during thermal processing if contact with molten material is possible/wear respirator if dusty. Spilled product may create a dangerous slipping hazard.

Conditions for safe storage, including any incompatibilities: Store in accordance with all current regulations and standards. Storage area should be clearly identified, well-illuminated and clear of obstruction. Store in closed, grounded and properly designed vessels. Keep away from uncontrolled heat and incompatible materials. Protect from sunlight. Outdoor storage of product in bags requires protection from ultra-violet sunlight by use of a UV stabilized bag or alternate means. Avoid accumulation of dust by frequent cleaning and suitable construction of storage and handling areas. Keep shovels and vacuum systems readily available for cleanup of loose material. DO NOT enter filled bulk containers and attempt to walk over product, due to risk of slipping and possible suffocation. Use a fall arrest system when working near open bulk containers.

8. Exposure controls/personal protection**Control Parameters****Occupational Exposure Limits**

During dusty conditions ACGIH recommends for Particles (insoluble or poorly soluble) not otherwise specified a TWA of 10 mg/m³ (inhalable particles), 3 mg/m³ TWA (respirable particles); OSHA recommends for Nuisance particulates a TWA of 15 mg/m³ (total dust), 5 mg/m³ TWA (respirable fraction).

The silica, cristobalite is inextricably bound or coated in the resin, which minimizes the likelihood of exposure.

Chemical Identity	Type	Exposure Limit Values	Source
Silica, cristobalite - Respirable fraction.	TWA	0.025 mg/m ³	US. ACGIH Threshold Limit Values (03 2014)
Silica, cristobalite - Respirable dust.	TWA	0.05 mg/m ³	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
Silica, cristobalite - Respirable.	TWA	1.2 millions of particles per cubic foot of air	US. OSHA Table Z-3 (29 CFR 1910.1000) (2000)
	TWA	0.05 mg/m ³	US. OSHA Table Z-3 (29 CFR 1910.1000) (2000)
Silica, cristobalite - Respirable dust.	PEL	0.05 mg/m ³	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (03 2016)

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. It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen-deficient environment. Use only appropriately classified electrical equipment and powered industrial trucks.

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. Wear a face shield when working with molten material.
Skin Protection	
Hand Protection:	Wear gloves to protect against thermal burns.
Other:	Wear appropriate clothing to prevent any possibility of skin contact. Wear work clothes with long sleeves and pants. Safety footwear with good traction is recommended to help prevent slipping. Static Dissipative (SD) rated footwear is also recommended.
Respiratory Protection:	Appropriate NIOSH approved air-purifying respirator 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:	solid
Form:	Pellets or Granular powder
Color:	white / colorless / translucent
Odor:	Minimal, Mild
Odor threshold:	No data available.
pH:	not applicable
Melting point/freezing point:	105 - 135 °C (221 - 275 °F) (Melting point) 85 - 127 °C (185 - 261 °F) (Softening point)
Initial boiling point and boiling range:	not applicable
Flash Point:	not applicable
Evaporation rate:	not applicable

Flammability (solid, gas):	May form combustible dust concentrations in air.
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	not applicable
Flammability limit - lower (%):	not applicable
Vapor pressure:	not applicable
Vapor density:	not applicable
Relative density:	0.905 - 0.965
Solubility(ies)	
Solubility in water:	Insoluble in water
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	not applicable
Auto-ignition temperature:	330 - 410 °C (626 - 770 °F)
Decomposition temperature:	> 300 °C (> 572 °F)
Viscosity:	not applicable

10. Stability and reactivity

Reactivity:	Contact with incompatible materials. Sources of ignition. Exposure to heat.
Chemical Stability:	Material is stable under normal conditions.
Possibility of hazardous reactions:	Hazardous polymerization not likely to occur.
Conditions to avoid:	Avoid exposing to heat and contact with strong oxidizing substances. Avoid processing material over 300°C (572°F).
Incompatible Materials:	Strong oxidizing agents. Organic solvents, ether, gasoline, lubricating oils, chlorinated hydrocarbons and aromatic hydrocarbons may react with and degrade polyethylene. Powdered material may form explosive dust-air mixtures. Risk of dust-air explosion is increased if flammable vapors are also present.
Hazardous Decomposition Products:	Upon decomposition, polyethylene may emit various oligomers, waxes and oxygenated hydrocarbons as well as carbon dioxide, carbon monoxide and small amounts of other organic vapors (e.g. aldehydes, acrolein). Inhalation of these decomposition products may be hazardous.

11. Toxicological information

Information on likely routes of exposure

Ingestion:	Ingestion of this product is not a likely route of exposure.
Inhalation:	During processing, thermal fumes and inhalation of fine particles may cause respiratory irritation. The silica, cristobalite is inextricably bound or coated in the resin, which minimizes the likelihood of exposure.
Skin Contact:	During processing, contact with powder or fines may cause mechanical irritation. Molten material will produce thermal burns. The silica, cristobalite is inextricably bound or coated in the resin, which minimizes the likelihood of exposure.
Eye contact:	During processing, contact with powder or fines may cause mechanical irritation. Molten material will produce thermal burns. The silica, cristobalite is inextricably bound or coated in the resin, which minimizes the likelihood of exposure.

Symptoms related to the physical, chemical and toxicological characteristics

Ingestion:	No adverse effects due to ingestion are expected.
Inhalation:	Respiratory irritation.
Skin Contact:	Mechanical irritation. Thermal burns. Negligible irritation of the skin based on chemical structure (polymer).
Eye contact:	Mechanical irritation. Thermal burns. May cause mild, short-lasting discomfort to eyes.

Information on toxicological effects**Acute toxicity (list all possible routes of exposure)****Oral**

Product: LD 50: > 5,000 mg/kg (estimated)

Dermal

Product: Not classified for acute toxicity based on available data.

Inhalation

Product: Not classified for acute toxicity based on available data.

Repeated dose toxicity

Product: No data available.

Skin Corrosion/Irritation

Product: No data available.

Specified substance(s):

Silica, cristobalite Irritating. May cause abrasion to skin. The silica, cristobalite is inextricably bound or coated in the resin, which minimizes the likelihood of exposure.

Serious Eye Damage/Eye Irritation

Product: No data available.

Specified substance(s):

Silica, cristobalite Irritating. May cause abrasion to cornea. The silica, cristobalite is inextricably bound or coated in the resin, which minimizes the likelihood of exposure.

Respiratory or Skin Sensitization

Product: The product may contain a small amount of a substance which may provoke an allergic reaction among sensitive individuals. The product has been tested and was found not to be a sensitizer by the Guinea Pig (Maximization) test.

Carcinogenicity

Product: Not classified

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:

Silica, cristobalite Overall evaluation: 1. Carcinogenic to humans.

US. National Toxicology Program (NTP) Report on Carcinogens:

Silica, cristobalite Known To Be Human Carcinogen.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):

No carcinogenic components identified

Germ Cell Mutagenicity**In vitro****Product:** There are no known or reported genetic effects.**In vivo****Product:** There are no known or reported genetic effects.**Reproductive toxicity****Product:** There are no known or reported reproductive effects.**Specific Target Organ Toxicity - Single Exposure****Product:** No data available.**Specific Target Organ Toxicity - Repeated Exposure****Product:** No data available.**Specified substance(s):**

Silica, cristobalite

Lungs, Respiratory system - The silica, cristobalite is inextricably bound or coated in the resin, which minimizes the likelihood of exposure.

Aspiration Hazard**Product:** Not classified.**Other effects:** No data available.**12. Ecological information****Ecotoxicity:****Acute hazards to the aquatic environment:****Fish****Product:** No data available.**Specified substance(s):**

Silica, cristobalite

LL 0 (Zebra Fish, 96 h): 10,000 mg/l

Phenol, nonyl-, 1,1',1''-
phosphite

LC 50 (Danio rerio, 96 h): < 10 mg/l experimental result

Aquatic Invertebrates**Product:** No data available.**Specified substance(s):**

Silica, cristobalite

LC 50 (Water Flea, 24 h): 10,000 mg/l

Phenol, nonyl-, 1,1',1''-
phosphite

EC 50 (Water Flea, 48 h): 0.3 mg/l

Toxicity to Aquatic Plants**Product:** No data available.**Chronic hazards to the aquatic environment:****Fish****Product:** No data available.**Aquatic Invertebrates****Product:** No data available.

Toxicity to Aquatic Plants**Product:** No data available.**Persistence and Degradability****Biodegradation****Product:** Not readily degradable. Under optimal oxidation conditions, >99% of polyethylene will remain intact after exposure to microbial actions. Product will slowly change (embrittle) in the presence of sunlight, but will not fully breakdown. Product buried in landfill has been found to be stable over time. No toxic degradation products are known to be produced.**BOD/COD Ratio****Product:** No data available.**Bioaccumulative potential****Bioconcentration Factor (BCF)****Product:** Pellets may accumulate in the digestive systems of birds and aquatic life, causing injury and possible death due to starvation.**Partition Coefficient n-octanol / water (log Kow)****Product:** Log Kow: not applicable**Mobility in soil:** Biologically persistent. This product has not been found to migrate through soils.**Other adverse effects:** Pellets are persistent in aquatic and terrestrial systems.**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. Preferred disposal methods for polyethylene in order of preference are: 1) clean and reuse if possible, 2) recover and resell through plastic recyclers or resin brokers, 3) incinerate with waste heat recovery and 4) landfill. **DO NOT ATTEMPT TO DISPOSE OF BY UNCONTROLLED INCINERATION.** Open burning of plastics at landfills should not be undertaken.**Contaminated Packaging:** Check local, federal and state environmental regulations prior to disposal.**14. Transport information****DOT**

Not regulated.

IMDG

Not regulated.

IATA

Not regulated.

15. Regulatory information**US Federal Regulations****TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)**

None present or none present in regulated quantities.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):

None present or none present in regulated quantities.

Superfund Amendments and Reauthorization Act of 1986 (SARA)**Hazard categories**

Not listed.

SARA 302 Extremely Hazardous Substance

None present or none present in regulated quantities.

SARA 304 Emergency Release Notification

None present or none present in regulated quantities.

SARA 311/312 Hazardous Chemical

<u>Chemical Identity</u>	<u>Threshold Planning Quantity</u>
Silica, cristobalite	10,000 lbs
Phenol, nonyl-, 1,1',1''- phosphite	10,000 lbs

SARA 313 (TRI Reporting)

None present or none present in regulated quantities.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)

None present or none present in regulated quantities.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):

None present or none present in regulated quantities.

US State Regulations**US. California Proposition 65**

No ingredient regulated by CA Prop 65 present.

US. New Jersey Worker and Community Right-to-Know Act**Chemical Identity**

Silica, cristobalite

US. Pennsylvania RTK - Hazardous Substances

No ingredient regulated by PA Right-to-Know Law present.

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: 03/10/2017

Revision Date: 03/10/2017

Version #: 6.3

Other Information:

Exposure to the Hazardous Combustion and Decomposition Products as described in the SDS, Sections 5 and 10 may be linked with various acute and chronic health effects. These effects include irritation of eyes and upper respiratory tract primarily from the aldehydes, breathing difficulties, systemic toxicity such as liver, kidney, and central nervous system effects.

NOVA Chemicals has monitored worker exposures to emissions during commercial-scale processing of polyethylene. Concentrations of hazardous decomposition products were determined to be well below established exposure limits in the workplace. "Quantitation of Employee Exposure to Emission Products Generated By Commercial-Scale Processing of Polyethylene" is available in the Am. Ind. Hyg. Assoc. J. 56:809-814 (1995) and "Quantification of Emission Compounds Generated During Commercial-Scale Processing of Advanced SCLAIRTECH™ Polyethylene" is available in the Journal of Plastic Film & Sheeting Volume 26 Issue 2, April 2010.

For information on ventilation considerations for the control of volatile air contaminants from polyethylene, please request a copy of NOVA Chemicals' publication, "Ventilation Guidelines for Heat-Processing Polyethylene Resins".

For additional information on unloading hopper cars containing plastic resins, refer to NOVA Chemicals' publication, "Hopper Car Unloading Guide".

For information on processing properties, selection of NOVAPOL resin grades, refer to the NOVAPOL Product Data Sheets available on our web site, under Products & Applications: <http://www.novachemicals.com>.

For additional information on preventing pellet loss, refer to published plastic industry publications and resources under 'Operation Clean Sweep'; now downloadable from the web at <http://www.opcleansweep.org/>.

Polyethylene fines and dust particles are listed as a Class I combustible dust by the National Fire Protection Association (see NFPA-68, Table F.1 (e)). For additional information on control of static and minimizing potential dust and fire hazards, refer to NFPA-654, "Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids, 2013 Edition".

Explosivity testing was done on one NOVAPOL® LLDPE, one LDPE and one HDPE resins with $P_{max} = 4.8-5.7$ bar, $K_{st} = 12-17$ (bar m/s) and Minimum Ignition Energy (MIE) = 1000-10,000; dust explosion class = St 1; this data was obtained for polyethylene with a final particle size of 100% <250 um and moisture content between 0 and 0.2%. Similar results are expected for the remaining NOVAPOL® polyethylene resin grades.

For NOVAPOL resin grade specific information including food contact compliance statements, please contact your sales representative or refer to NOVA Chemicals' polyethylene Product Data Sheets.

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; CFR = Code of Federal Regulations; DOT = Department of Transportation; DSL = Domestic Substances List; EC50 = Effective Concentration 50%; EPA = Environmental Protection Agency; FDA = Food and Drug Administration; GHS = Globally Harmonized System for the Classification and Labelling of Chemicals; IARC = International Agency for Research on Cancer; IATA = International Air Transport Association ICAO = International Civil Aviation Organization; IMDG = International Maritime Dangerous Goods; Kow = Octanol/water partition coefficient; LC50 = Lethal Concentration 50%; LD50 = Lethal Dose 50%; LL0 = Lethal Level 0; NIOSH = National Institute for Occupational Safety and Health; NJTSR = New Jersey Trade Secret Registry; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PPE = Personal Protective Equipment; RCRA = Resource Conservation and Recovery Act; SARA = Superfund Amendments and Reauthorization Act; SCBA = Self Contained Breathing Apparatus; SDS = Safety Data Sheet; SEPA = State Environmental Protection Administration; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average

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