

MATERIAL SAFETY DATA SHEET

SODIUM HYPOCHLORITE, 1 - 15 % (8318, 8378, 8389, 8555, 8619)

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Brenntag Canada Inc.
43 Jutland Rd.
Toronto, ON
M8Z 2G6
(416) 259-8231

WHMIS#: 00060708
Index: GCD0044/16A
Effective Date: 2016 January 28
Date of Revision: 2016 January 28

Website: <http://www.brenntag.ca>

EMERGENCY TELEPHONE NUMBER (For Emergencies Involving Chemical Spills or Releases)

1 855 273 6824

PRODUCT IDENTIFICATION

Product Name: Sodium Hypochlorite, 1 - 15 % (8318, 8378, 8389, 8555, 8619).
 Chemical Name: Hypochlorous acid, sodium salt.
 Synonyms: Sodium Hypo 1.5 %, 4 %, 5.4 % (6 % Trade), 6 %, 10.8 % (12 % Trade), 13.06 % (15 % Trade), 15.21 % (18 % Trade), 19 %; Superchlor; Sodium Hypo Basic 12; Sodium Hypo (Brite n White), (Sanitizer LT150), (Riverside Blend), (Riverside Blend #2); RM Weak Sodium Hypo Sol'n; Exolab XY-12 (58530); EC Sodium Hypo 12 % Atlantic, Lavo; Superchlor; Soda bleach liquor; Javel water; Sodium oxychloride; Clorox; Javex; Sodium Hypo High Alkalinity; Brenntag 307 Bleach Agent.
 Chemical Family: Aqueous mixture of Hypochlorous acid salt.
 Molecular Formula: NaOCl.
 Product Use: Industrial laundry bleach. Chemical intermediate. Laboratory reagent. Oxidizing agent. Bleaching agent. Water treatment. Fungicide.

WHMIS Classification / Symbol:

D-2B: Toxic (skin sensitizer)
E: Corrosive



READ THE ENTIRE MSDS FOR THE COMPLETE HAZARD EVALUATION OF THIS PRODUCT.

2. COMPOSITION, INFORMATION ON INGREDIENTS (Not Intended As Specifications)

<i>Ingredient</i>	<i>CAS#</i>	<i>ACGIH TLV (TWA)</i>	<i>% Concentration</i>
Sodium Hypochlorite	7681-52-9	---	1 - 15

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Corrosive! Toxic effects are principally related to its corrosive properties. May be fatal if swallowed. Causes severe skin and eye burns. Mists or sprays are extremely irritating to eyes and respiratory tract. May cause corneal damage and conjunctivitis. May cause skin sensitization or other allergic responses. See "Other Health Effects" Section. Can decompose at high temperatures forming toxic gases. Contents may develop pressure on prolonged exposure to heat.

POTENTIAL HEALTH EFFECTS

Inhalation:	Corrosive! Product may cause severe irritation of the nose, throat and respiratory tract. Repeated and/or prolonged exposures may cause productive cough, running nose, bronchopneumonia, pulmonary edema (fluid build-up in lungs), and reduction of pulmonary function. If mixed with acids or warmed to temperatures greater than 40 °C Sodium Hypochlorite solutions release Chlorine gas. This gas can cause severe irritation of the nose and throat. Exposure to high levels of Chlorine gas may result in severe lung damage. (4) See "Other Health Effects" Section.
Skin Contact:	Corrosive! Burns (chemical) can occur if not promptly removed. Concentrated solutions may cause pain and deep and severe burns to the skin. Prolonged and repeated exposure to dilute solutions often causes irritation, redness, pain and drying and cracking of the skin. Prolonged and repeated contact may lead to dermatitis. Toxic effects may be delayed. Avoid handling when the skin is moist, wet or abraded.
Skin Absorption:	Skin absorption is a secondary concern to the continual destruction of tissue while the product is in contact with the skin.
Eye Contact:	Extremely corrosive! This product causes corneal scarring and clouding. Glaucoma, cataracts and permanent blindness may occur.
Ingestion:	Corrosive! This product causes severe burning and pain in the mouth, throat and abdomen. Vomiting, diarrhea and perforation of the esophagus and stomach lining may occur.
Other Health Effects:	<p>Corrosive effects on the skin and eyes may be delayed, and damage may occur without the sensation or onset of pain. Strict adherence to first aid measures following any exposure is essential.</p> <p>May cause skin sensitization or other allergic responses. See Section 11, "Other Studies Relevant to Material".</p> <p>Ingestion of very high levels may cause shock, coma or death. May cause pulmonary edema or central nervous system (CNS) depression. Pulmonary edema is the build-up of fluid in the lungs that might be fatal. Symptoms of pulmonary edema, such as shortness of breath, may not appear until several hours after exposure and are aggravated by physical exertion. (4) CNS depression is characterized by headache, dizziness, drowsiness, nausea, vomiting and incoordination. Severe overexposures may lead to coma and possible death due to respiratory failure.</p>

4. FIRST AID MEASURES

FIRST AID PROCEDURES

General Guidelines:	Prompt removal of the material and obtaining medical attention are essential for all contact. Remove all contaminated clothing and immediately wash the exposed areas with copious amounts of water. Continue the flushing during transportation to the emergency department. Corrosive effects may be delayed (up to 72 hours), and damage may occur without the sensation or onset of pain. Contact local poison control centre for further guidance.
Inhalation:	Move victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Give cardiopulmonary resuscitation (CPR) if there is no breathing AND no pulse. Oxygen administration may be beneficial in this situation but should only be administered by personnel trained in its use. Obtain medical attention IMMEDIATELY.
Skin Contact:	Prompt removal of the material from the skin is essential. Remove all contaminated clothing and immediately wash the exposed areas with copious amounts of soap and water for a minimum of 30 minutes or up to 60 minutes for critical body areas. Immerse the exposed part immediately in ice water to relieve pain and to prevent swelling and blistering. Place cold packs, ice or wet cloths on the burned area if immersion is not possible. Cover the exposed part with a clean, preferably sterile, lint-free dressing. Obtain medical attention IMMEDIATELY and monitor breathing and treat for shock for severe exposure. See "Note to Physicians" below.
Eye Contact:	Immediately flush eyes with running water for a minimum of 30 minutes, preferably up to 60 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing. Do not transport victim until the recommended flushing period is completed unless flushing can be continued during transport. Where possible, consult an ophthalmologist.
Ingestion:	Do not attempt to give anything by mouth to an unconscious person. IMMEDIATELY contact local Poison Control Centre. If victim is alert and not convulsing, rinse mouth out and give 1 to 2 glasses of milk. Water may be used if milk is not available but it is not as effective. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more milk or water. IMMEDIATELY transport victim to an emergency facility. Do not attempt to neutralize the acid with weak bases since the exothermic reaction may extend the corrosive injury. Do not use buffering agents (e.g., antacids) they produce significant exothermic reactions without significantly altering the pH. Since reexposure of the mucosa to acid is harmful, be careful to avoid further vomiting and limit fluid to one to two glasses for an adult. (3)

Note to Physicians:	<p>Treatment for corrosive chemical contact with skin after initial flushing procedures:</p> <ol style="list-style-type: none"> 1. Immerse the exposed part immediately in ice water to relieve pain and to prevent swelling and blistering. Place cold packs, ice or wet cloths on the burned area if immersion is not possible. 2. Remove anything that is constrictive, such as rings, bracelets or footwear, before swelling begins. 3. Cover the exposed part with a clean, preferably sterile, lint-free dressing. 4. For severe exposure, immediately seek medical attention and monitor breathing and treat for shock. <p>Immediate consultation with the local Poison Control Centre should be initiated. Severe and sometimes delayed (up to 72 hours) local and systemic reactions can occur.</p> <p>Due to the severely irritating or corrosive nature of the material, swallowing may lead to ulceration and inflammation of the upper alimentary tract with hemorrhage and fluid loss. Also, perforation of the esophagus or stomach may occur, leading to mediastinitis or peritonitis and the resultant complications. Mucosal injury following ingestion of this corrosive material may contraindicate the induction of vomiting in the treatment of possible intoxication. Similarly, if gastric lavage is performed, intubation should be done with great care. If oral burns are present or a corrosive ingestion is suspected by the patient's history, perform esophagoscopy as soon as possible. Scope should not be passed beyond the first burn because of the risk of perforation.</p> <p>This product contains materials that may cause severe pneumonitis if aspirated. If ingestion has occurred less than 2 hours earlier, carry out careful gastric lavage; use endotracheal cuff if available, to prevent aspiration. Observe patient for respiratory difficulty from aspiration pneumonitis. Give artificial resuscitation and appropriate chemotherapy if respiration is depressed.</p> <p>Medical conditions that may be aggravated by exposure to this product include diseases of the skin, eyes or respiratory tract.</p>
---------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

5. FIRE-FIGHTING MEASURES

<i>Flashpoint (°C)</i>	<i>Autolgnition Temperature (°C)</i>	<i>Flammability Limits in Air (%):</i>	
		<i>LEL</i>	<i>UEL</i>
Non-combustible (does not burn).	Not applicable.	Not applicable.	Not applicable.
Flammability Class (WHMIS):	Not regulated.		
Hazardous Combustion Products:	Thermal decomposition products are toxic and may include oxygen, chlorine gas, oxides of chlorine and sodium. Sodium Hypochlorite solutions decompose slowly. Decomposition is accelerated by heat (temperatures above 40 °C) and light. (4)		
Unusual Fire or Explosion Hazards:	Solutions are non-flammable by themselves, but are strong oxidizers which can cause ignition of combustible or oxidizable materials. May decompose violently on contact with metals, or their salts, dusts or other contaminants. Sodium Hypochlorite is a strong oxidant, but solutions do not support combustion.		
Sensitivity to Mechanical Impact:	Not expected to be sensitive to mechanical impact.		
Rate of Burning:	Not available.		
Explosive Power:	Not available.		
Sensitivity to Static Discharge:	Not expected to be sensitive to static discharge.		
EXTINGUISHING MEDIA			
Fire Extinguishing Media:	Sodium hypochlorite solutions do not burn. Extinguish fire using extinguishing agents suitable for the surrounding fire and not contraindicated for use with sodium hypochlorite.		
	DO NOT use dry chemical fire extinguishing agents containing ammonium compounds (such as some A:B:C agents), since an explosive compound can be formed.		

Instructions to the Fire Fighters: Fire-exposed containers should be kept cool by spraying with water to reduce pressure. This should be done from a safe distance since containers may rupture. Spilled material may cause floors and contact surfaces to become slippery.

Fire Fighting Protective Equipment: Use self-contained breathing apparatus and protective clothing. Protective clothing for skin and eye protection should be worn to protect against highly alkaline materials.

6. ACCIDENTAL RELEASE MEASURES

Information in this section is for responding to spills, leaks or releases in order to prevent or minimize the adverse effects on persons, property and the environment. There may be specific reporting requirements associated with spills, leaks or releases, which change from region to region.

Containment and Clean-Up Procedures: In all cases of leak or spill contact vendor at Emergency Number shown on the front page of this MSDS. See Section 13, "Deactivating Chemicals".

Wear respirator, protective clothing and gloves. Spilled material may cause floors and contact surfaces to become slippery. Do not use combustible materials such as sawdust as an absorbent. For small spill, absorb with an inert dry material. For large spill, absorb with dry earth, sand or other non-combustible material. Replace damaged containers immediately to avoid loss of material and contamination of surrounding atmosphere. Use spark-resistant tools. Eliminate all sources of ignition. Collect product for recovery or disposal. For release to land, or storm water runoff, contain discharge by constructing dikes or applying inert absorbent; for release to water, utilize damming and/or water diversion to minimize the spread of contamination. Ventilate enclosed spaces. Notify applicable government authority if release is reportable or could adversely affect the environment.

7. HANDLING AND STORAGE

HANDLING

Handling Practices: Use normal "good" industrial hygiene and housekeeping practices. Containers exposed to heat may be under internal pressure. These should be cooled and carefully vented before opening. A face shield and apron should be worn.

When diluting, add this material/product to water in small amounts to avoid splattering. Never add water to this material/product. Clean all containers of residues before adding the product. This will avoid potential violent reaction with unknown residues. (4) Add small quantities of this material slowly to large quantities of water, stirring constantly all the while. Constant stirring is necessary to avoid concentration of the product at the bottom of the mix vessel. Such concentration of the product may result in a violent exotherm with boiling of the liquid resulting in splashing, spattering or a violent eruption of a highly corrosive solution if the addition is too rapid or without sufficient stirring.

Ventilation Requirements: Do not use in poorly ventilated or confined areas without proper respiratory protection. See Section 8, "Engineering Controls".

Other Precautions: Use only with adequate ventilation and avoid breathing aerosols (vapours or mists). Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling. Wash contaminated clothing thoroughly before re-use.

Corrosive residue is most likely to be deposited at process vents or storage tanks, especially during filling operations. The use of compressed air to force corrosive materials from delivery trucks is of special concern. Scrubbing the exhaust of these vents is highly recommended. Jurisdictional regulations should be consulted to determine required practices.

STORAGE

Storage Temperature (°C): Store below 29 °C. Do not freeze.

Ventilation Requirements: Ventilation should be corrosion proof. Strong solutions (greater than 10% available Chlorine) may slowly give off oxygen during storage, especially when warm (above 18 degrees Celsius). Vent caps may be required to prevent a build-up of pressure that could cause containers to burst.

Storage Requirements: Store in a clean, cool well ventilated area, away from organic chemicals, strong bases, strong acids, metal powders, carbides, sulfides, and any readily oxidizable material. Protect from direct sunlight. Protect against physical damage. Storage area should be equipped with corrosion-resistant floors, sumps and should have controlled drainage to a recovery tank. Storage tanks should be in a contained area to control any spills or leaks. Protect from direct sunlight. Protect against physical damage.

Special Materials to be Used for Packaging or Containers: Materials of construction for storing the product include: polyethylene, polypropylene, PVC, Teflon, ceramic or Rubber lined steel. Equipment for storage, handling or transport should NOT be made from the following material, or, where applicable, its alloys: aluminum, stainless steel, cast iron, brass, bronze, nylon or phenolic resin. Some metals accelerate the decomposition of Sodium Hypochlorite. Confirm suitability of any material before using.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Recommendations listed in this section indicate the type of equipment, which will provide protection against overexposure to this product. Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.

ENGINEERING CONTROLS

Engineering Controls: Local exhaust ventilation required. Ventilation should be corrosion proof. Make up air should be supplied to balance air that is removed by local or general exhaust ventilation. Ventilate low lying areas such as sumps or pits where dense vapours may collect.

For personnel entry into confined spaces (i.e. bulk storage tanks) a proper procedure must be followed. It must include consideration of, among other things, ventilation, testing of tank atmosphere, provision and maintenance of SCBA, and emergency rescue. Use the "buddy" system. The second person should be in view and trained and equipped to execute a rescue. (6)

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye Protection: Safety glasses with side shields are recommended to prevent eye contact. Use full face-shield and chemical safety goggles when there is potential for contact. Contact lenses should not be worn when working with this material.

Skin Protection: Gloves and protective clothing made from butyl rubber, neoprene, natural rubber, nitrile rubber, polyethylene, viton or PVC should be impervious under conditions of use. Prior to use, user should confirm impermeability. Discard contaminated gloves.

Respiratory Protection: No specific guidelines available. A NIOSH/MSHA-approved full facepiece air-purifying respirator equipped with chlorine cartridges for concentrations up to 5 ppm for Chlorine vapours. An air-supplied respirator if concentrations are higher or unknown.

Other Personal Protective Equipment: Wear an impermeable apron and boots. Locate safety shower and eyewash station close to chemical handling area. Take all precautions to avoid personal contact.

EXPOSURE GUIDELINES

9. PHYSICAL AND CHEMICAL PROPERTIES (Not intended as Specifications)

Physical State:	Liquid.
Appearance:	Green to yellow, watery liquid with a chlorine (bleach) odour.
Odour:	Characteristic odour.
Odour Threshold (ppm):	Not available.
Boiling Range (°C):	40 (decompose). (3)
Melting/Freezing Point (°C):	-25 (12%). (3)
Vapour Pressure (mm Hg at 20° C):	17.5. (3)
Vapour Density (Air = 1.0):	Not available.
Relative Density (g/cc):	1.1 - 1.2. (4)
Bulk Density:	1 100 - 1 200 kg/m ³ .
Viscosity:	Similar to water.
Evaporation Rate (Butyl Acetate = 1.0):	Not available.
Solubility:	Miscible in water.
% Volatile by Volume:	Not available.
pH:	11- 14. (3)
Coefficient of Water/Oil Distribution:	Not available.
Volatile Organic Compounds (VOC):	Not available.
Flashpoint (°C):	Non-combustible (does not burn).

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY

Under Normal Conditions:	Unstable. Sodium Hypochlorite solutions decompose slowly. Decomposition is accelerated by heat (temperatures above 40 °C) and light. Some metals accelerate the decomposition of Sodium Hypochlorite.
Under Fire Conditions:	Not flammable.
Hazardous Polymerization:	Will not occur.
Conditions to Avoid:	High temperatures, sparks, open flames and all other sources of ignition. Temperatures above 40 °C (104 °F). Avoid direct sunlight. The heat of sunlight can contribute to instability. Avoid a decrease in pH.
Materials to Avoid:	Strong oxidizers. Strong acids. (hydrochloric acid) Contact with acids will liberate. corrosive chlorine gas. Reducing agents. Strong bases. Combustibles. Organic materials. Alcohols. Amines. Ethylene Glycol. Lewis or mineral acids. Methanol. Some metals accelerate the decomposition of Sodium Hypochlorite. Nickel. Copper. Cobalt. Tin.. Iron and its alloys. Manganese. Nitrogen containing compounds. Ammonium hydroxide and ammonium salts. Contact with nitrogen compounds (ammonia, urea, primary amines and isocyanurates) can form toxic, reactive chloramines. Contact with Ammonium salts can form explosive nitrogen trichloride if acid is present. (4) Incompatible materials for storage include aluminum, cast bronze, cast iron, stainless steel, brass, nylon and phenolic resin. (3)
Decomposition or Combustion Products:	Thermal decomposition products are toxic and may include oxygen, chlorine gas, oxides of chlorine and sodium. Sodium Hypochlorite solutions decompose slowly. Decomposition is accelerated by heat (temperatures above 40 °C) and light. (4)

11. TOXICOLOGICAL INFORMATION**TOXICOLOGICAL DATA:**

SUBSTANCE	LD50 (Oral, Rat)	LD50 (Dermal, Rabbit)	LC50 (Inhalation, Rat, 4h)
Sodium Hypochlorite	8910 mg/kg (3)	> 10 000 (1)	5250 mg/m3 (3)
Carcinogenicity Data:	The ingredient(s) of this product is (are) not classed as carcinogenic by ACGIH, IARC, OSHA or NTP.		
Reproductive Data:	Reproductivity tests in animals have been negative.		
Mutagenicity Data:	Mutagenicity tests in animals have been negative.		
Teratogenicity Data:	No adverse teratogenic effects are anticipated.		
Respiratory / Skin Sensitization Data:	Sodium Hypochlorite may cause skin sensitization or other allergic responses. Sensitization is the process whereby a biological change occurs in the individual because of previous exposure to a substance and, as a result, the individual reacts more strongly when subsequently exposed to the substance. Once sensitized, an individual can react to extremely low airborne levels, even below the TLV, or to skin contact.		
Synergistic Materials:	None known.		
Other Studies Relevant to Material:	Rats were fed drinking water containing 0, 0.025, 0.05, 0.1, 0.2 and 0.4% Sodium Hypochlorite for 13 weeks. Slight damage to the liver was observed in the 0.2 and 0.4% groups. Some organ weights (lungs, liver and spleen in males; salivary glands, lungs, heart and brain in females) were significantly lower in the high-dose group. (4) High doses of Sodium Hypochlorite in drinking water caused a small but significant increase in abnormal sperm in mice. (4) Sodium Hypochlorite caused mutations in several short-term studies using bacteria and cultured mammalian cells. The significance of these tests is unclear. It was not mutagenic in tests (chromosome aberration and micronucleus) on live animals. (4)		

12. ECOLOGICAL INFORMATION

Ecotoxicity:	Sodium Hypochlorite: 96-hour LC50 (Fathead minnows) = 5.9 mg/l (3) 48-hour LC50 (Rainbow Trout) = 0.07 mg/L (3)
Environmental Fate:	Not available. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds, or rivers. Can be dangerous if allowed to enter drinking water intakes.

13. DISPOSAL CONSIDERATIONS

Deactivating Chemicals:	Apply cautiously a dilute solution of a reducing agent such as sodium sulphite or sodium bisulphite to the contained spill. Confirm pH using pH paper. Neutralization is expected to be exothermic. Effervescence may result. Flush spill area with water.
Waste Disposal Methods:	This information applies to the material as manufactured. Reevaluation of the product may be required by the user at the time of disposal since the product uses, transformations, mixtures and processes may influence waste classification. Dispose of waste material at an approved (hazardous) waste treatment/disposal facility in accordance with applicable local, provincial and federal regulations. Do not dispose of waste with normal garbage, or to sewer systems.
Safe Handling of Residues:	See Section 13, "Deactivating Chemicals".
Disposal of Packaging:	Empty containers retain product residue (liquid and/or vapour) and can be dangerous. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. Treat package in the same manner as the product.

14. TRANSPORTATION INFORMATION

CANADIAN TDG ACT SHIPPING DESCRIPTION:

UN1791, HYPOCHLORITE SOLUTION, Class 8, PG II.

Label(s): Corrosives. Placard: Corrosives.

ERAP Index: ----- Exemptions:

This product is NOT REGULATED BY TRANSPORT at a concentration below 7%.

US DOT CLASSIFICATION (49CFR 172.101, 172.102):

UN1791, HYPOCHLORITE SOLUTION, Class 8, PG II.

Label(s): Corrosive. Placard: Corrosive.

CERCLA-RQ: 100 lb/45.4 kg. Exemptions:

This product is NOT REGULATED BY TRANSPORT at a concentration below 7%.

15. REGULATORY INFORMATION

CANADA

CEPA - NSNR: All components of this product are included on the DSL.

CEPA - NPRI: Not included.

Controlled Products Regulations Classification (WHMIS):

D-2B: Toxic (skin sensitizer)

E: Corrosive

USA

Environmental Protection Act: All components of this product are included on the TSCA inventory.

OSHA HCS (29CFR 1910.1200): Skin Sensitizer. Corrosive.

NFPA: 3 Health, 0 Fire, 1 Reactivity (6)

HMIS: 3 Health, 0 Fire, 1 Reactivity (3)

INTERNATIONAL

All components of this product are found on the following inventories: Australia (ACQIN), China Inventory (IECS), EINECS (European Inventory of Existing Commercial Chemical Substances), Japan (MITI), Korea (ECL), New Zealand (NZIoC) and Philippines Inventory of Chemicals and Chemical Substances (PICCS).

16. OTHER INFORMATION

REFERENCES

1. RTECS-Registry of Toxic Effects of Chemical Substances, Canadian Centre for Occupational Health and Safety RTECS

database.

2. Clayton, G.D. and Clayton, F.E., Eds., Patty's Industrial Hygiene and Toxicology, 3rd ed., Vol. IIA,B,C, John Wiley and Sons, New York, 1981.
 3. Supplier's Material Safety Data Sheet(s).
 4. CHEMINFO chemical profile, Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada.
 5. Guide to Occupational Exposure Values, 2011, American Conference of Governmental Industrial Hygienists, Cincinnati, 2011.
 6. Regulatory Affairs Group, Brenntag Canada Inc.
 7. The British Columbia Drug and Poison Information Centre, Poison Managements Manual, Canadian Pharmaceutical Association, Ottawa, 1981.
 8. NFPA 325M Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids, 1994 Edition, Quincy, MA, 1994.
-

The information contained herein is offered only as a guide to the handling of this specific material and has been prepared in good faith by technically knowledgeable personnel. It is not intended to be all-inclusive and the manner and conditions of use and handling may involve other and additional considerations. No warranty of any kind is given or implied and Brenntag Canada Inc. will not be liable for any damages, losses, injuries or consequential damages which may result from the use of or reliance on any information contained herein. This Material Safety Data Sheet is valid for three years.

To obtain revised copies of this or other Material Safety Data Sheets, contact your nearest Brenntag Canada Regional office.

British Columbia: 20333-102B Avenue, Langley, BC, V1M 3H1
Phone: (604) 513-9009 Facsimile: (604) 513-9010

Alberta: 6628 - 45 th. Street, Leduc, AB, T9E 7C9
Phone: (780) 986-4544 Facsimile: (780) 986-1070

Manitoba: 681 Plinquet Street, Winnipeg, MB, R2J 2X2
Phone: (204) 233-3416 Facsimile: (204) 233-7005

Ontario: 43 Jutland Road, Toronto, ON, M8Z 2G6
Phone: (416) 259-8231 Facsimile: (416) 259-5333

Quebec: 2900 Jean Baptiste Des., Lachine, PQ, H8T 1C8
Phone: (514) 636-9230 Facsimile: (514) 636-0877

Atlantic: A-105 Akerley Boulevard, Dartmouth, NS, B3B 1R7
Phone: (902) 468-9690 Facsimile: (902) 468-3085

Prepared By: Regulatory Affairs Group, Brenntag Canada Inc., (416) 259-8231.