



Copper-Ammonia Reagent

Safety Data Sheet E-4897

according to the Hazardous Products Regulation (February 11, 2015)

Date of issue: 01-01-1986

Revision date: 07-28-2023

Supersedes: 01-01-2021

Version: 1.0

SECTION 1: Identification

1.1. Product identifier

Product form : Mixture
Product name : Copper-Ammonia Reagent
Product group : Core Products

1.2. Recommended use and restrictions on use

Recommended uses and restrictions : Industrial use; Use as directed.

1.3. Supplier

Linde Canada inc.
500 — 5015 Spectrum Way
Mississauga - Canada L4W 0E4
T 1-905-803-1600 - F 1-905-803-1682
www.lindecana.ca

1.4. Emergency telephone number

Emergency number : 1-800-363-0042
Call emergency number 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product.
For routine information, contact your supplier or Linde sales representative.

SECTION 2: Hazard identification

2.1. Classification of the substance or mixture

GHS-CA classification

Skin corrosion/irritation, Category 2 H315
Serious eye damage/eye irritation, Category 2 H319

2.2. GHS Label elements, including precautionary statements

GHS-CA labelling

Hazard pictograms



GHS07

Signal word

: WARNING

Hazard statements

: CAUSES SKIN IRRITATION
CAUSES SERIOUS EYE IRRITATION

Precautionary statements

: Do not handle until all safety precautions have been read and understood
Wash exposed skin thoroughly after handling
Wear protective gloves, protective clothing, eye protection, respiratory protection, and/or face protection.
IF ON SKIN: Wash with plenty of water
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Specific treatment (see First aid measures on this label)
IF SKIN IRRITATION OCCURS: Get medical advice/attention
IF EYE IRRITATION PERSISTS: Get medical advice/attention
Take off contaminated clothing and wash it before reuse.

2.3. Other hazards

Other hazards which do not result in : Asphyxiant in high concentrations.

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classification

2.4. Unknown acute toxicity (GHS CA)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Name	CAS No.	% (Vol)	Common Name (synonyms)
Water	(CAS No) 7732-18-5	> 98	AQUA / Aqua
Ammonium hydroxide	(CAS No) 1336-21-6	< 2	Ammonia, aqueous solution / Ammonium hydroxide ((NH ₄)(OH)) / Ammonia aqueous / Ammonia solution / AMMONIUM HYDROXIDE / Ammonia, aqueous / Ammonia solutions / Ammonia...% / Ammonia ...% / Ammonia water
Sulfuric acid, copper(2-plus) salt (1 to 1), pentahydrate	(CAS No) 7758-99-8	< 1	Copper(II) sulfate, pentahydrate (1:1:5) / Sulfuric acid, copper(2+) salt, pentahydrate / Copper sulphate pentahydrate / Copper sulphate, pentahydrate / Copper sulfate pentahydrate / Copper(II) sulfate, pentahydrate / Copper(II) sulfate pentahydrate / Calcanthite / Copper(II) sulfate pentahydrate (1:1:5) / Cupric sulphate pentahydrate / Copper(II) sulphate pentahydrate / Cupic sulfate / Copper sulfate / Cupric sulfate
Starch	(CAS No) 9005-25-8	< 1	Starch, potato / Tapioca starch / Starches (cornstarch, potato starch, tapioca starch, wheat starch) / Pregelatinized potato starch / Starches / AVENA SATIVA STARCH / Corn starch / Wheat starch / High amylose cornstarch / Starch, edible / ORYZA SATIVA (RICE) STARCH / Avena sativa (oat) starch / Solanum tuberosum starch / Starch (High-polymeric carbohydrate material usually derived from cereal grains such as corn, wheat and sorghum, and from roots and tubers such as potatoes and tapioca. Includes starch which has been pregelatinized by heating in the presence of water.) / High amylose maize resistant starch / Zea mays (corn) starch

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures after inhalation	: Move to fresh air. Call a physician if symptoms persist or if a large amount of mist has been inhaled. Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician.
First-aid measures after skin contact	: Remove contaminated clothing, Wash with plenty of soap and water, If irritation persists, consult a doctor, Remove contaminated clothing. Drench affected area with water for at least 15 minutes.
First-aid measures after eye contact	: Immediately flush eyes thoroughly with water for at least 15 minutes. Consult an ophthalmologist if irritation persists. Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately.
First-aid measures after ingestion	: If patient is fully conscious, give two glasses of milk or water at once, Induce vomiting if victim completely conscious/alert, Never give anything by mouth to an unconscious person

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/injuries	: No additional information available
Symptoms/injuries after skin contact	: CAUSES SKIN IRRITATION.
Symptoms/injuries after eye contact	: CAUSES SERIOUS EYE IRRITATION.
Most Important Symptoms/Effects	: Asphyxiant in high concentrations.

4.3. Immediate medical attention and special treatment, if necessary

Other medical advice or treatment	: In cases of massive exposure, chelation with EDTA (ethylenediaminetetra- acetic acid) may be helpful to reduce toxic effects of absorbed copper. Obtain medical assistance.
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SECTION 5: Fire-fighting measures

5.1. Suitable extinguishing media

Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire. Use extinguishing media appropriate for surrounding fire.

5.2. Unsuitable extinguishing media

No additional information available

5.3. Specific hazards arising from the hazardous product

Fire hazard : Not flammable.
Reactivity : No reactivity hazard other than the effects described in sub-sections below.
Reactivity in case of fire : No reactivity hazard other than the effects described in sub-sections below.

5.4. Special protective equipment and precautions for fire-fighters

Firefighting instructions : **WARNING Irritating liquid and vapor**

Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with their provincial and local fire code regulations.

Protection during firefighting : Compressed gas: asphyxiant. Suffocation hazard by lack of oxygen.
Special protective equipment for fire fighters : Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.
Other information : Containers are equipped with a pressure relief device. (Exceptions may exist where authorized.).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : **WARNING Irritating liquid and vapor** . Do not get on skin, in eyes, or on clothing. Ventilate area of spill, or move leaking container to a well-ventilated area. Use chemically protective clothing.

Personal Precautions, Protective Equipment and Emergency Procedures : General measures : Ensure adequate ventilation. Personal Precautions, Protective Equipment and Emergency Procedures : EVACUATE ALL PERSONNEL FROM AFFECTED AREA. Use appropriate protective equipment. If leak is on user's equipment, be certain to purge piping before attempting repairs. If leak is on a container or container valve contact the closest Linde Canada location.

6.2. Methods and materials for containment and cleaning up

For containment : Use solid absorbent to pick up spilled material. Try to stop release if safe to do so.
Methods for cleaning up : Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.



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SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Protect containers against physical damage.

Do not get in eyes, on skin, or on clothing.

Provide readily accessible eye wash stations and safety showers.

Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work

Keep container closed when not in use

Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g. wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Store in a cool, well-ventilated place.

Store in an area appropriate for chemical solutions.

Store in a cool, well-ventilated place. Store and use with adequate ventilation. Store only where temperature will not exceed 52 °C (125 °F). Firmly secure containers upright to keep them from falling or being knocked over. Install valve protection cap firmly in place by hand. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods.

OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Starch (9005-25-8)		
USA - ACGIH	ACGIH OEL TWA	10 mg/m ³
USA - OSHA	OSHA PEL TWA [1]	15 mg/m ³ (total dust) 5 mg/m ³ (respirable fraction)
Canada (Quebec)	VEMP (OEL TWA)	10 mg/m ³ (containing no Asbestos and <1% Crystalline silica-total dust)
Alberta	OEL TWA	10 mg/m ³
British Columbia	OEL TWA	10 mg/m ³ (total dust)
Manitoba	OEL TWA	10 mg/m ³
New Brunswick	OEL TWA	10 mg/m ³
New Foundland & Labrador	OEL TWA	10 mg/m ³
Nova Scotia	OEL TWA	10 mg/m ³

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Starch (9005-25-8)		
Nunavut	OEL STEL	20 mg/m ³
Nunavut	OEL TWA	10 mg/m ³
Northwest Territories	OEL STEL	20 mg/m ³
Northwest Territories	OEL TWA	10 mg/m ³
Ontario	OEL TWA	10 mg/m ³
Prince Edward Island	OEL TWA	10 mg/m ³
Québec	VEMP (OEL TWA)	10 mg/m ³ (containing no Asbestos and <1% Crystalline silica-total dust)
Saskatchewan	OEL STEL	20 mg/m ³
Saskatchewan	OEL TWA	10 mg/m ³
Yukon	OEL STEL	20 mg/m ³
Yukon	OEL TWA	30 mppcf

8.2. Appropriate engineering controls

Appropriate engineering controls : Provide adequate general and local exhaust ventilation. Ensure exposure is below occupational exposure limits (where available). Mechanical (General): Not recommended as a primary ventilation system to control worker's exposure.

8.3. Individual protection measures/Personal protective equipment

Personal protective equipment : Gloves. Face shield. Safety glasses.



Hand protection : Nitrile rubber (NBR). Neoprene rubber (HNBR). Wear work gloves when handling containers. Wear heavy rubber gloves where contact with product may occur.

Eye protection : Wear safety glasses with side shields. Select eye protection in accordance with OSHA 29 CFR 1910.133. Safety eye wear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. Select in accordance with the current CSA standard Z94.3, "Industrial Eye and Face Protection", and any provincial regulations, local bylaws or guidelines.

Skin and body protection : Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138.

Respiratory protection : When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable). Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA). Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres. **Respiratory protection:** Use air supplied respirator when working in confined space or where local exhaust or ventilation does not keep exposure below OEL (if applicable). Select in accordance with provincial regulations, local bylaws or guidelines. Respirators should also be approved by NIOSH and MSHA. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).

Thermal hazard protection : Wear cold insulating gloves when transfilling or breaking transfer connections.

Other information : Do not eat, drink or smoke during use. **Other protection :** Safety shoes for general handling at customer sites. Metatarsal shoes and cuffless trousers for cylinder handling at packaging and filling plants. Select in accordance with the current CSA standard Z195, "Protective Foot Wear", and any provincial regulations, local bylaws or guidelines. For working with flammable and oxidizing materials, consider the use of flame resistant anti-static safety clothing.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

- | | |
|--------------------|------------------------|
| (a) Physical state | : Liquid |
| (b) Colour | : Blue. |
| (c) Odour | : Irritating. Pungent. |

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Odour threshold	: No data available
(d) Melting point	: No data available
Freezing point	: -16 °C (3.2 °F)
(e) Boiling point	: 100.5 °C (212.9 °F)
(f) Flammability	: Non flammable
(g) Flammability (solid, gas)	:
(h) Flash point	: No data available
(i) Auto-ignition temperature	: No data available
(j) Decomposition temperature	: No data available
(k) pH	: 11
(l) Viscosity, kinematic	: Not applicable.
(m) Solubility	: Water: No data available
(n) Partition coefficient – n-octanol/water [log Pow/log Kow]	: Not applicable.
(o) Vapour pressure	: 0.024 bar (0.3481 psig)
(p) Density	:
Relative gas density	: No data available
(r) Particle characteristics	: No data available
(v) Oxidizing properties	: None.
(w) Relative evaporation rate (butylacetate=1)	: No data available
Relative evaporation rate (ether=1)	: Not applicable.

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

Reactivity	: No reactivity hazard other than the effects described in sub-sections below.
Chemical stability	: Stable under normal conditions.
Possibility of hazardous reactions	: May occur.
Conditions to avoid	: Heat.
Incompatible materials	: Water reactive compounds such as. Alkali metals. Complex hydrides. Metal hydrides. Metal halides. Metal oxides. non-metal halides. and their oxides. Oxidizing agents. Nitrates. Permanganates. Gold, silver, mercury. Acetylene. Hydrazine. Nitromethane.

SECTION 11: Toxicological information

11.1 Likely routes of exposure : Inhalation

11.2 Symptoms related to the physical, chemical, and toxicological characteristics : No additional information available

11.3 Delayed and immediate effects and chronic effects

Acute toxicity (oral)	: Not classified
Acute toxicity (dermal)	: Not classified
Acute toxicity (inhalation)	: Not classified
Skin corrosion/irritation	: CAUSES SKIN IRRITATION. pH: 11

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Serious eye damage/irritation	: CAUSES SERIOUS EYE IRRITATION. pH: 11
Respiratory or skin sensitization	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified
Reproductive toxicity	: Not classified
Specific target organ toxicity (single exposure)	: Not classified
Specific target organ toxicity (repeated exposure)	: Not classified
Aspiration hazard	: Not classified

11.4 Toxicity

Copper-Ammonia Reagent	
LC50 inhalation rat (ppm)	No data available
Water (7732-18-5)	
LD50 oral rat	> 90 ml/kg
Sulfuric acid, copper(2-plus) salt (1 to 1), pentahydrate (7758-99-8)	
LD50 oral rat	960 mg/kg
LD50 dermal rabbit	> 8 g/kg
Ammonium hydroxide (1336-21-6)	
LD50 oral rat	350 mg/kg

SECTION 12: Ecological information

12.1. Toxicity

Sulfuric acid, copper(2-plus) salt (1 to 1), pentahydrate (7758-99-8)	
LC50 - Fish [1]	0.66 – 1.15 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [semi-static])
LC50 - Fish [2]	0.96 – 1.8 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static])
EC50 - Crustacea [1]	0.147 – 0.227 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])
Ammonium hydroxide (1336-21-6)	
LC50 - Fish [1]	8.2 mg/l (Exposure time: 96 h - Species: Pimephales promelas)
EC50 - Crustacea [1]	0.66 mg/l (Exposure time: 48 h - Species: water flea)
EC50 - Crustacea [2]	0.66 mg/l (Exposure time: 48 h - Species: Daphnia pulex)

12.2. Persistence and degradability

Copper-Ammonia Reagent	
Persistence and degradability	No ecological damage caused by this product.

12.3. Bioaccumulative potential

Copper-Ammonia Reagent	
Log Pow	Not applicable.
Log Kow	Not applicable.
Bioaccumulative potential	No ecological damage caused by this product.

12.4. Mobility in soil

Copper-Ammonia Reagent	
Mobility in soil	No data available.
Log Pow	Not applicable.
Log Kow	Not applicable.

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12.5. Other adverse effects

Effect on the ozone layer : None.
Other information : Avoid release to the environment.

SECTION 13: Disposal considerations

Product/Packaging disposal recommendations : Place into lab packs for pickup by a licensed hazardous waste disposal service or use other authorized means. Do not pour down drains, into sewers, or otherwise release into the environment. Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

SECTION 14: Transport information

14.1. Basic shipping description

In accordance with TDG

TDG

Not regulated for transport

14.2. Air and sea transport

IMDG

No additional information available

IATA

No additional information available

SECTION 15: Regulatory information

15.1. National regulations

Water (7732-18-5)

Listed on the Canadian DSL (Domestic Substances List)

Starch (9005-25-8)

Listed on the Canadian DSL (Domestic Substances List)

Ammonium hydroxide (1336-21-6)

Listed on the Canadian DSL (Domestic Substances List)

15.2. International regulations

Water (7732-18-5)

Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Listed on INSQ (Mexican National Inventory of Chemical Substances)

Sulfuric acid, copper(2-plus) salt (1 to 1), pentahydrate (7758-99-8)

Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Japanese Poisonous and Deleterious Substances Control Law
Japanese Pollutant Release and Transfer Register Law (PRTR Law)



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Starch (9005-25-8)

Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Listed on INSQ (Mexican National Inventory of Chemical Substances)

Ammonium hydroxide (1336-21-6)

Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Japanese Poisonous and Deleterious Substances Control Law
Listed on INSQ (Mexican National Inventory of Chemical Substances)

SECTION 16: Other information

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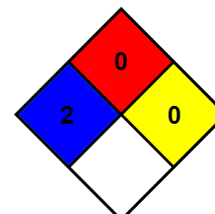
Indication of changes:

Other information : When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Before using any plastics, confirm their compatibility with this product.

Linde Canada asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

The opinions expressed herein are those of qualified experts within Linde Canada Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Linde Canada Inc, it is the user's obligation to determine the conditions of safe use of the product. Linde Canada Inc, SDSs are furnished on sale or delivery by Linde Canada Inc, or the independent distributors and suppliers who package and sell our products. To obtain current SDSs for these products, contact your Linde sales representative, local distributor, or supplier, or download from www.lindecana.ca.

NFPA health hazard : 2 - Intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical attention is given.
NFPA fire hazard : 0 - Materials that will not burn.
NFPA instability : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.



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HMIS III Rating

Health	: 2 Moderate Hazard - Temporary or minor injury may occur
Flammability	: 0 Minimal Hazard - Materials that will not burn
Physical	: 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

SDS Canada (GHS) - Linde NEW

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.