

Copper(II) nitrate trihydrate

sc-227685



The Power to Question

Material Safety Data Sheet

Hazard Alert Code Key: **EXTREME** **HIGH** **MODERATE** **LOW**

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

Copper(II) nitrate trihydrate

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

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EMERGENCY:

ChemWatch
Within the US & Canada: 877-715-9305
Outside the US & Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS

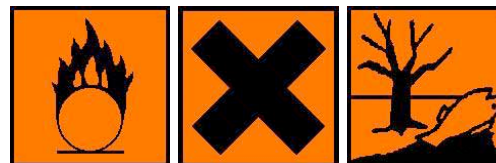
N2-O6.Cu.3H2O, Cu(NO3)2.2H2O, "copper (II) nitrate, trihydrate (1:2:3)", "copper dinitrate trihydrate", "cupric dinitrate trihydrate", "copper (II) nitrate trihydrate", "cupric nitrate trihydrate", gerhardite, "nitric acid, copper (2+) salt, trihydrate"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

	Min	Max
Flammability:	0	
Toxicity:	2	
Body Contact:	3	
Reactivity:	2	
Chronic:	2	

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4



CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

RISK

Harmful if swallowed.

Irritating to eyes and skin.

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.

■ The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.

■ The substance and/or its metabolites may bind to hemoglobin inhibiting normal uptake of oxygen.

This condition, known as "methemoglobinemia", is a form of oxygen starvation (anoxia).

■ A metallic taste, nausea, vomiting and burning feeling in the upper stomach region occur after ingestion of copper and its derivatives. The vomitus is usually green/blue and discolors contaminated skin.

EYE

■ The material can produce chemical burns to the eye following direct contact.

Vapors or mists may be extremely irritating.

■ Copper salts, in contact with the eye, may produce conjunctivitis or even ulceration and turbidity of the cornea.

■ This material can cause eye irritation and damage in some persons.

SKIN

■ The material can produce chemical burns following direct contact with the skin.

■ This material can cause inflammation of the skin on contact in some persons.

■ The material may accentuate any pre-existing dermatitis condition.

■ Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.

■ Open cuts, abraded or irritated skin should not be exposed to this material.

■ Exposure to copper, by skin, has come from its use in pigments, ointments, ornaments, jewellery, dental amalgams and IUDs and as an antifungal agent and an algicide.

Although copper algicides are used in the treatment of water in swimming pools and reservoirs, there are no reports of toxicity from these applications.

■ Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.

Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

■ Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.

■ Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

■ Copper poisoning following exposure to copper dusts and fume may result in headache, cold sweat and weak pulse.

Capillary, kidney, liver and brain damage are the longer term manifestations of such poisoning.

■ There is some evidence to suggest that the material can cause respiratory irritation in some persons.

The body's response to such irritation can cause further lung damage.

CHRONIC HEALTH EFFECTS

■ Repeated or prolonged exposure to corrosives may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis (rarely) of the jaw. Bronchial irritation, with cough, and frequent attacks of bronchial pneumonia may ensue.

Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung.

Copper has fairly low toxicity. Some rare hereditary conditions (Wilson disease or hepatolenticular degeneration) can lead to accumulation of copper on exposure, causing irreversible damage to a variety of organs (liver, kidney, CNS, bone, vision) and lead to death.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
copper nitrate trihydrate	10031-43-3	>99

Section 4 - FIRST AID MEASURES

SWALLOWED

· For advice, contact a Poisons Information Center or a doctor at once. · Urgent hospital treatment is likely to be needed.

EYE

■ If this product comes in contact with the eyes: · Immediately hold eyelids apart and flush the eye continuously with running water. · Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.

SKIN

■ If skin or hair contact occurs: · Immediately flush body and clothes with large amounts of water, using safety shower if available. · Quickly remove all contaminated clothing, including footwear.

INHALED

· If fumes or combustion products are inhaled remove from contaminated area. · Lay patient down. Keep warm and rested. Inhalation of vapors or aerosols (mists, fumes) may cause lung edema. Corrosive substances may cause lung damage (e.g.

NOTES TO PHYSICIAN

■ for copper intoxication:

· Unless extensive vomiting has occurred empty the stomach by lavage with water, milk, sodium bicarbonate solution or a 0.1% solution of potassium ferrocyanide (the resulting copper ferrocyanide is insoluble).
· Administer egg white and other demulcents.

The toxicity of nitrates and nitrites result from their vasodilating properties and their propensity to form methemoglobin.

· Most produce a peak effect within 30 minutes.

· Clinical signs of cyanosis appear before other symptoms because of the dark pigmentation of methemoglobin.

Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung edema often do not manifest until a few hours have passed and they are aggravated by physical effort.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Negligible.
Upper Explosive Limit (%):	Not applicable
Specific Gravity (water=1):	2.32 @ 25 C
Lower Explosive Limit (%):	Not applicable

EXTINGUISHING MEDIA

■ FOR SMALL FIRE:

· USE FLOODING QUANTITIES OF WATER.
· DO NOT use dry chemicals, CO₂ or foam.

FIRE FIGHTING

· Alert Emergency Responders and tell them location and nature of hazard.
· May be violently or explosive reactive.

When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 500 metres in all directions.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

· Will not burn but increases intensity of fire.

· Heating may cause expansion or decomposition leading to violent rupture of containers.

Decomposition may produce toxic fumes of: nitrogen oxides (NO_x), metal oxides.

This material can fuse and melt, under these conditions, application of water can result in intensive scattering of molten material.

FIRE INCOMPATIBILITY

■ Avoid storage with reducing agents.

· Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous.

PERSONAL PROTECTION

Glasses:

Full face- shield.

Gloves:

Respirator:

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

· Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material.

· Check regularly for spills and leaks.

· Clean up all spills immediately.

· No smoking, naked lights, ignition sources.

MAJOR SPILLS

- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Avoid personal contact and inhalation of dust, mist or vapors.
- Provide adequate ventilation.

RECOMMENDED STORAGE METHODS

■ Glass container.

- DO NOT repack. Use containers supplied by manufacturer only.

For low viscosity materials

- Drums and jerricans must be of the non-removable head type.
- Where a can is to be used as an inner package, the can must have a screwed enclosure.

STORAGE REQUIREMENTS

■ In addition, Goods of Class 5.1, packing group II should be:

- stored in piles so that
- the height of the pile does not exceed 1 metre
- the maximum quantity in a pile or building does not exceed 1000 tonnes unless the area is provided with automatic fire extinguishers
- the maximum height of a pile does not exceed 3 metres where the room is provided with automatic fire extinguishers or 2 meters if not.
- the minimum distance between piles is not less than 2 metres where the room is provided with automatic fire extinguishers or 3 meters if not.
- the minimum distance to walls is not less than 1 metre.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	STEL mg/m ³	Peak ppm	Peak mg/m ³	TWA F/CC	Notes
US - Minnesota Permissible Exposure Limits (PELs)	copper nitrate trihydrate (Copper - Dusts and mists (as Cu))		1						
US - Minnesota Permissible Exposure Limits (PELs)	copper nitrate trihydrate (Copper - Fume (as Cu))		0.1						
US ACGIH Threshold Limit Values (TLV)	copper nitrate trihydrate (Copper - Fume (as Cu))		0.2						TLV Basis: irritation; GI; metal fume fever
US ACGIH Threshold Limit Values (TLV)	copper nitrate trihydrate (Copper - Dusts and/or mists (as Cu))		1						TLV Basis: irritation; GI; metal fume fever
US - Idaho - Limits for Air Contaminants	copper nitrate trihydrate (Copper - Fume (as Cu))		0.1						
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	copper nitrate trihydrate (Copper - Fume (as Cu))		0.1						

US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	copper nitrate trihydrate (Copper - Dusts and mists (as Cu))	1		
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	copper nitrate trihydrate (Copper - Dusts and mists (as Cu))	1		
US - Idaho - Limits for Air Contaminants	copper nitrate trihydrate (Copper - Dusts and Mists (as Cu))	1		
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	copper nitrate trihydrate (Copper - Fume (as Cu))	0.1		
US OSHA Permissible Exposure Levels (PELs) - Table Z1	copper nitrate trihydrate (Copper - Dusts and mists (as Cu))	1		
US - Hawaii Air Contaminant Limits	copper nitrate trihydrate (Copper - Dusts and mists (as Cu))	1	2	
US - Oregon Permissible Exposure Limits (Z-1)	copper nitrate trihydrate (Copper fume)	0.1		
US - Hawaii Air Contaminant Limits	copper nitrate trihydrate (Copper - Fume (as Cu))	0.1		
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	copper nitrate trihydrate (Copper - Fume)	-	0.2	- 0.2
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	copper nitrate trihydrate (Copper - Dusts and mists (as Cu))	-	1	- 2
US - Oregon Permissible Exposure Limits (Z-1)	copper nitrate trihydrate (Copper fume Dusts and Mists)	1		
Canada - Prince Edward Island Occupational Exposure Limits	copper nitrate trihydrate (Copper - Dusts and/or mists (as Cu))	1		TLV Basis: irritation; GI; metal fume fever

US OSHA Permissible Exposure Levels (PELs) - Table Z1	copper nitrate trihydrate (Copper - Fume (as Cu))	0.1	
Canada - Prince Edward Island Occupational Exposure Limits	copper nitrate trihydrate (Copper - Fume (as Cu))	0.2	TLV Basis: irritation; GI; metal fume fever
Canada - Nova Scotia Occupational Exposure Limits	copper nitrate trihydrate (Copper - Fume (as Cu))	0.2	TLV Basis: irritation; GI; metal fume fever
Canada - Nova Scotia Occupational Exposure Limits	copper nitrate trihydrate (Copper - Dusts and/or mists (as Cu))	1	TLV Basis: irritation; GI; metal fume fever
US - California Permissible Exposure Limits for Chemical Contaminants	copper nitrate trihydrate (Copper salts, dusts and mists, as Cu)	1	

ENDOELTABLE

PERSONAL PROTECTION



RESPIRATOR

Consult your EHS staff for recommendations

EYE

- Chemical goggles.
- Full face shield.

HANDS/FEET

■ Wear chemical protective gloves, eg. PVC.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

- DO NOT wear cotton or cotton-backed gloves.
- DO NOT wear leather gloves.
- Promptly hose all spills off leather shoes or boots or ensure that such footwear is protected with PVC over-shoes.

OTHER

- Overalls.
- PVC Apron.
- Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.
- For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets), non sparking safety footwear.

ENGINEERING CONTROLS

■ Local exhaust ventilation usually required. If risk of overexposure exists, wear an approved respirator.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Mixes with water.

Corrosive.

State	DIVIDED SOLID	Molecular Weight	241.62
Melting Range (°F)	238.1	Viscosity	Not Applicable
Boiling Range (°F)	338 (decomposes)	Solubility in water (g/L)	Miscible
Flash Point (°F)	Not applicable	pH (1% solution)	4.0; 0.2M aqueous
Decomposition Temp (°F)	Not Applicable	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available.	Vapour Pressure (mmHG)	Negligible.
Upper Explosive Limit (%)	Not applicable	Specific Gravity (water=1)	2.32 @ 25 C
Lower Explosive Limit (%)	Not applicable	Relative Vapor Density (air=1)	8.33
Volatile Component (%vol)	Not applicable.	Evaporation Rate	Not applicable

APPEARANCE

Hygroscopic, deep blue crystals. May have an irritating odour due to nitric acid. Soluble in alcohol, but practically insoluble in ethyl acetate. Readily soluble in water. Solubility in water @ 0 C : 137.8 g/100 cc; 100 C: 1270 g/100 cc.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable under normal handling conditions.

STORAGE INCOMPATIBILITY

■ for metal nitrates:

- Segregate from heavy metals, phosphides, sodium acetate, lead nitrate, tartrates, trichloroethylene,
- Avoid shock and heat.
- Mixtures of metal nitrates with alkyl esters may explode due to the formation of unstable alkyl nitrates.
- Mixtures of a nitrate with phosphorous, tin(II) chloride and other reducing agents may react explosively.
- Mixtures containing nitrates and organic materials are potentially dangerous, especially if acidic materials or heavy metals are present.
- Fibrous organic material, jute, wood and similar cellulosic material can become highly combustible by nitrate impregnation
- Metal nitrates are incompatible with cyanides, thiocyanates, isothiocyanates and hypophosphites. Avoid reaction with the following which can cause an explosion: barium thiocyanate, boron phosphide, cyanides, sodium hypophosphite, sulfur and charcoal, powdered aluminium or aluminium oxide, sodium thiosulfate.
- Mixtures of metal nitrates and phosphinates may explode on heating
- A mixture of aluminium powder, water and metal nitrate may explode due to a self accelerating reaction.
- Mixtures containing nitrates, nitrites and organic materials are potentially dangerous, especially in the presence of acidic materials and heavy metals.
- Inorganic oxidising agents can react with reducing agents to generate heat and products that may be gaseous (causing pressurization of closed containers). The products may themselves be capable of further reactions (such as combustion in the air).
- Organic compounds in general have some reducing power and can in principle react with compounds in this class. Actual reactivity varies greatly with the identity of the organic compound.
- Inorganic oxidising agents can react violently with active metals, cyanides, esters, and thiocyanates.
- Inorganic reducing agents react with oxidizing agents to generate heat and products that may be flammable, combustible, or otherwise reactive. Their reactions with oxidizing agents may be violent.
- Incidents involving interaction of active oxidants and reducing agents, either by design or accident, are usually very energetic and examples of so-called redox reactions.
- Contact with acids produces toxic fumes.
- WARNING: Avoid or control reaction with peroxides. All transition metal peroxides should be considered as potentially explosive. For example transition metal complexes of alkyl hydroperoxides may decompose explosively.
- The pi-complexes formed between chromium(0), vanadium(0) and other transition metals (haloarene-metal complexes) and mono-or poly-fluorobenzene show extreme sensitivity to heat and are explosive.
- Avoid reaction with borohydrides or cyanoborohydrides.
- Metals and their oxides or salts may react violently with chlorine trifluoride and bromine trifluoride.
- These trifluorides are hypergolic oxidisers. They ignites on contact (without external source of heat or ignition) with recognised fuels - contact with these materials, following an ambient or slightly elevated temperature, is often violent and may produce ignition.
- The state of subdivision may affect the results.
- Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous.

Avoid storage with reducing agents.

This material can fuse and melt, under these conditions, application of water can result in intensive scattering of molten material. Can explode when finely mixed with potassium ferrocyanide. [SAX]

Avoid reaction with paper, wood, sulphur, aluminium, phosphorus, tin, acetic anhydride, esters, tin (II) chloride and phosphinates

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

copper nitrate trihydrate

TOXICITY AND IRRITATION

COPPER NITRATE TRIHYDRATE:

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
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Oral (rat) LD50: 940 mg/kg Nil Reported

■ Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

Section 12 - ECOLOGICAL INFORMATION

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

This material and its container must be disposed of as hazardous waste.

Avoid release to the environment.

Refer to special instructions/ safety data sheets.

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

A. General Product Information

Ignitability characteristic: use EPA hazardous waste number D001 (waste code I)

Corrosivity characteristic: use EPA hazardous waste number D002 (waste code C)

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

‡ Puncture containers to prevent re-use and bury at an authorized landfill.

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

For small quantities of oxidizing agent:

- Cautiously acidify a 3% solution to pH 2 with sulfuric acid.
- Gradually add a 50% excess of sodium bisulfite solution with stirring.
- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.

Section 14 - TRANSPORTATION INFORMATION



DOT:

Symbols: None Hazard class or Division: 5.1

Identification Numbers: UN3085 PG: II

Label Codes: 5.1, 8 Special provisions: 62, IB6,

IP2, T3,

TP33

Packaging: Exceptions: None Packaging: Non- bulk: 212

Packaging: Exceptions: None Quantity limitations: 5 kg

Passenger aircraft/rail:

Quantity Limitations: Cargo 25 kg Vessel stowage: Location: B

aircraft only:

Vessel stowage: Other: 13, 34,

56, 58,

106, 138

Hazardous materials descriptions and proper shipping names:

Oxidizing solid, corrosive, n.o.s.

Air Transport IATA:

ICAO/IATA Class: 5.1 ICAO/IATA Subrisk: 8

UN/ID Number: 3085 Packing Group: II

Special provisions: A3

Cargo Only

Packing Instructions: 511 Maximum Qty/Pack: 25 kg

Passenger and Cargo Passenger and Cargo

Packing Instructions: 508 Maximum Qty/Pack: 5 kg

Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity

Packing Instructions: Y508 Maximum Qty/Pack: 2.5 kg

Shipping Name: OXIDIZING SOLID, CORROSIVE, N.O.S.

*(CONTAINS COPPER NITRATE TRIHYDRATE)

Maritime Transport IMDG:

IMDG Class: 5.1 IMDG Subrisk: 8

UN Number: 3085 Packing Group: II

EMS Number: F-A , S-Q Special provisions: 274

Limited Quantities: 1 kg Marine Pollutant: Yes

Shipping Name: OXIDIZING SOLID, CORROSIVE, N.O.S.

Section 15 - REGULATORY INFORMATION

copper nitrate trihydrate (CAS: 10031-43-3,3251-23-8) is found on the following regulatory lists;

"Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)"

Section 16 - OTHER INFORMATION

Ingredients with multiple CAS Nos

Ingredient Name CAS copper nitrate trihydrate 10031-43-3, 3251-23-8

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■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:

www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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