

NOC-12

sc-202246

Material Safety Data Sheet



The Power is Question

Hazard Alert Code Key:

EXTREME

HIGH

MODERATE

LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

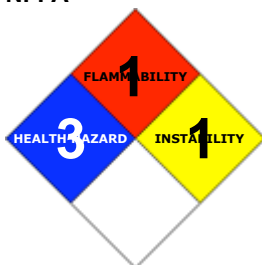
PRODUCT NAME

NOC-12

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800

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

C6-H16-N4-O2, NOC-12, "nitric oxide release agent"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

	Min	Max
Flammability:	1	
Toxicity:	2	
Body Contact:	2	
Reactivity:	1	
Chronic:	2	

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



CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

RISK

Irritating to eyes, respiratory system and skin.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Accidental ingestion of the material may be damaging to the health of the individual.

■ "Nitric oxide (NO) donors" produce relaxation of vascular smooth muscle. This may produce lowered blood pressure (orthostatic hypotension), reflex tachycardia, circulatory inadequacy and cardiovascular collapse. Large doses produce intravascular haemolysis. NO donors also inhibit the aggregation of platelets following metabolic conversion of nitrogen oxide which, in turn, activates reactions. As a consequence, following even minor injury, blood leaks from the capillaries (to produce purpura) and small blue-purple skin blemishes (petechiae) appear. Bleeding times are prolonged and clot retraction may be impaired.

EYE

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

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 is not thought to have harmful health effects, however the material may still produce health damage following entry through wounds, lesions or abrasions.

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

■ 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

■ The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.

■ 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.

■ A single acute exposure to nitric oxide (NO) may be fatal. No symptoms may occur at the time of exposure, with the exception of slight fatigue, cough or nausea. Only very high vapour concentrations induce prompt or immediate symptoms except perhaps for a slight transient cough, mild fatigue and brief nausea. Slowly evolving but progressive inflammation of the lungs may arise 5-72 hours following exposure; this results in profuse exudation in alveolar spaces. Fluid loss from the blood may produce massive pulmonary oedema. Because of impaired gas exchange, breathing becomes rapid and cyanosis becomes intense. Death may result from asphyxia. The typical reaction to nitrous fume is delayed and insidious because the oxides are largely absorbed by, and react with, alveolar structures and terminal respiratory bronchi. The upper respiratory tract is largely spared because the gas has relatively low solubility in mucous fluids. Warning properties, as a result, are largely absent. NO reacts with haemoglobin to produce nitrosylhaemoglobin (NO-Hb). The affinity for the haem group is 1400 times greater than that of carbon monoxide. Blood levels of NO-Hb are below predictions based on affinity binding experiments in vitro. This may be due to rapid metabolism of NO or may reflect its inability to reach the haem group in vivo or the NO-Hb-complex itself being rapidly metabolised. Either nitric oxide or the NO-Hb complex are likely to produce nitrite after metabolism, giving rise to methaemoglobinaemia. The conversion of NO-Hb to methaemoglobin has been demonstrated in vitro in the presence of molecular oxygen. Following exposure of mice to an atmosphere of 80 ppm NO, blood methaemoglobin exceeded 15%; several other reports indicate that NO can produce significant methaemoglobinaemia. Symptoms of methaemoglobinaemia include cyanosis (a bluish discolouration of skin and mucous membranes) and breathing difficulties. Symptoms may not be evident until several hours after exposure. At about 15% concentration of blood methaemoglobin there is observable cyanosis of the lips, nose and earlobes. Symptoms may be absent although euphoria, flushed face and headache are commonly experienced. At 25-40%, cyanosis is marked but little disability occurs other than that produced on physical exertion. At 40-60%, symptoms include weakness, dizziness, lightheadedness, increasingly severe headache, ataxia, rapid shallow respiration, drowsiness, nausea, vomiting, confusion, lethargy and stupor. Above 60% symptoms include dyspnea, respiratory depression, tachycardia or bradycardia, and convulsions. Levels exceeding 70% may be fatal. NO is a highly unorthodox messenger molecule which can readily diffuse through cell membranes to exert its biological action in a variety of mammalian cells. NO plays a significant role in neurotransmission, regulation of cerebral blood flow, vasodilation, inhibition of platelet aggregation and antiproliferative action of cytokines. NO is also reported to play an important role in neuromorphogenesis and synaptic plasticity.

CHRONIC HEALTH EFFECTS

■ Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems. 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.

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Repeated or prolonged inhalation of nitric oxide may produce bronchitis or emphysema.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
3-ethyl-3-(ethylaminoethyl)-1-hydroxy-2-oxo-1-triazene	146724-89-2	>98
slowly releases		
nitric oxide	10102-43-9	

Section 4 - FIRST AID MEASURES

SWALLOWED

· If swallowed do NOT induce vomiting. · If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

EYE

■ If this product comes in contact with the eyes: · Wash out immediately with fresh 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 contact occurs: · Immediately remove all contaminated clothing, including footwear · Flush skin and hair with running water (and soap if available).

INHALED

· If fumes or combustion products are inhaled remove from contaminated area. · Lay patient down. Keep warm and rested.

NOTES TO PHYSICIAN

■ Treat symptomatically.

For intoxication due to nitrogen oxides:

· If patient encountered shortly after exposure, instruct the patient to breathe deeply.
· Enforce complete rest for 24-48 hours even when the patient is not symptomatic.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Negligible
Upper Explosive Limit (%):	Not available.
Specific Gravity (water=1):	Not available
Lower Explosive Limit (%):	Not available

EXTINGUISHING MEDIA

· Foam.
· Dry chemical powder.

FIRE FIGHTING

· Alert Emergency Responders and tell them location and nature of hazard.
· Wear breathing apparatus plus protective gloves.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

· Combustible solid which burns but propagates flame with difficulty.
· Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.

Combustion products include: carbon monoxide (CO), carbon dioxide (CO₂), nitrogen oxides (NO_x), other pyrolysis products typical of burning organic material.

May emit poisonous fumes.

May emit corrosive fumes.

FIRE INCOMPATIBILITY

■ Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

PERSONAL PROTECTION

Glasses:

Chemical goggles.

Gloves:

Respirator:

Type BE-P Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

· Remove all ignition sources.
· Clean up all spills immediately.
· Avoid contact with skin and eyes.
· Control personal contact by using protective equipment.
· Use dry clean up procedures and avoid generating dust.
· Place in a suitable, labelled container for waste disposal.

MAJOR SPILLS

■ Moderate hazard.

· CAUTION: Advise personnel in area.
· Alert Emergency Responders and tell them location and nature of hazard.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.

- Do NOT cut, drill, grind or weld such containers.
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

RECOMMENDED STORAGE METHODS

- Polyethylene or polypropylene container.
- Check all containers are clearly labelled and free from leaks.

STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC	Notes
US - Oregon Permissible Exposure Limits (Z-3)	3-ethyl- 3-(ethylaminoethyl)-1- hydroxy-2-oxo- 1-triazene (Inert or Nuisance Dust: Total dust)		10						(d)
US OSHA Permissible Exposure Levels (PELs) - Table Z3	3-ethyl- 3-(ethylaminoethyl)-1- hydroxy-2-oxo- 1-triazene (Inert or Nuisance Dust: (d) Respirable fraction)		5						
US OSHA Permissible Exposure Levels (PELs) - Table Z3	3-ethyl- 3-(ethylaminoethyl)-1- hydroxy-2-oxo- 1-triazene (Inert or Nuisance Dust: (d) Total dust)		15						
US - Hawaii Air Contaminant Limits	3-ethyl- 3-(ethylaminoethyl)-1- hydroxy-2-oxo- 1-triazene (Particulates not other wise regulated - Total dust)		10						
US - Hawaii Air Contaminant Limits	3-ethyl- 3-(ethylaminoethyl)-1- hydroxy-2-oxo- 1-triazene (Particulates not other wise regulated - Respirable fraction)		5						
US - Oregon Permissible Exposure Limits (Z-3)	3-ethyl- 3-(ethylaminoethyl)-1- hydroxy-2-oxo- 1-triazene (Inert or Nuisance Dust: Respirable fraction)		5						(d)
US - California Permissible Exposure Limits for Chemical Contaminants	3-ethyl- 3-(ethylaminoethyl)-1- hydroxy-2-oxo- 1-triazene (Particulates not otherwise regulated Respirable fraction)		5						(n)

US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	3-ethyl-3-(ethylaminoethyl)-1-hydroxy-2-oxo-1-triazene (Particulates not otherwise regulated Respirable fraction)		5	
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	3-ethyl-3-(ethylaminoethyl)-1-hydroxy-2-oxo-1-triazene (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction)		5	
US - Michigan Exposure Limits for Air Contaminants	3-ethyl-3-(ethylaminoethyl)-1-hydroxy-2-oxo-1-triazene (Particulates not otherwise regulated, Respirable dust)		5	
Canada - Prince Edward Island Occupational Exposure Limits	3-ethyl-3-(ethylaminoethyl)-1-hydroxy-2-oxo-1-triazene (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)		10	See Appendix B current TLV/BEI Book
Canada - Alberta Occupational Exposure Limits	nitric oxide (Nitric oxide)	25	31	
Canada - British Columbia Occupational Exposure Limits	nitric oxide (Nitric oxide)	25		
US NIOSH Recommended Exposure Limits (RELs)	nitric oxide (Nitric oxide)	25	30	
US OSHA Permissible Exposure Levels (PELs) - Table Z1	nitric oxide (Nitric oxide)	25	30	
US ACGIH Threshold Limit Values (TLV)	nitric oxide (Nitric oxide)	25		TLV Basis: hypoxia/cyanosis; nitrosylhemoglobin formation; upper respiratory tract irritation. BEI-M
US - Minnesota Permissible Exposure Limits (PELs)	nitric oxide (Nitric oxide)	25	30	
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	nitric oxide (Nitric oxide)	25	30	
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	nitric oxide (Nitric oxide)	25	30	

US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	nitric oxide (Nitric oxide)	25	30		
US - California Permissible Exposure Limits for Chemical Contaminants	nitric oxide (Nitric oxide; NO)	25	30		
US - Idaho - Limits for Air Contaminants	nitric oxide (Nitric oxide)	25	30		
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	nitric oxide (Nitrogen monoxide)	25	31		
US - Hawaii Air Contaminant Limits	nitric oxide (Nitric oxide)	25	30	35	45
US - Alaska Limits for Air Contaminants	nitric oxide (Nitric oxide)	25	30		
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	nitric oxide (Nitric oxide)	25		38	
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	nitric oxide (Nitric oxide)	25	30	35	45
US - Washington Permissible exposure limits of air contaminants	nitric oxide (Nitric oxide)	25		38	
US - Michigan Exposure Limits for Air Contaminants	nitric oxide (Nitric oxide)	25	30		
Canada - Prince Edward Island Occupational Exposure Limits	nitric oxide (Nitric oxide)	25			TLV Basis: hypoxia/cyanosis; nitrosylhemoglobin formation; upper respiratory tract irritation. BEI-M
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	nitric oxide (Nitric oxide)	25	30		
Canada - Nova Scotia Occupational Exposure Limits	nitric oxide (Nitric oxide)	25			TLV Basis: hypoxia/cyanosis; nitrosylhemoglobin formation; upper

US - Oregon Permissible Exposure Limits (Z-1)	nitric oxide (Nitric oxide)	25	30			
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Canada - Northwest Territories Occupational Exposure Limits (English)	nitric oxide (Nitric oxide)	25	31	35	43	
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ENDOELTABLE

PERSONAL PROTECTION



RESPIRATOR

Type BE-P Filter of sufficient capacity
Consult your EHS staff for recommendations

EYE

- Safety glasses with side shields.
- Chemical goggles.

HANDS/FEET

■ 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.

Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.

- polychloroprene
- nitrile rubber
- butyl rubber
- fluorocautchouc
- polyvinyl chloride

Gloves should be examined for wear and/ or degradation constantly.

OTHER

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

ENGINEERING CONTROLS

- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.

· Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.

Prior to use, systems that contain nitrogen oxide must first be purged with inert gas.

CAUTION: On contact with air, nitric oxide is converted to highly poisonous nitrogen dioxide, dinitrogen tetroxide or both. Gas masks plus adequate ventilation are mandatory when handling even small amounts in the laboratory.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Solid.

State	Divided solid	Molecular Weight	176.2
Melting Range (°F)	Not available	Viscosity	Not Applicable
Boiling Range (°F)	Not available	Solubility in water (g/L)	Reacts
Flash Point (°F)	Not available	pH (1% solution)	Not applicable
Decomposition Temp (°F)	Not available.	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available	Vapour Pressure (mmHG)	Negligible
Upper Explosive Limit (%)	Not available.	Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not available	Relative Vapor Density (air=1)	Not Applicable
Volatile Component (%vol)	Negligible	Evaporation Rate	Not Applicable

APPEARANCE

Solid; does not mix well with water.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.

STORAGE INCOMPATIBILITY

■ Nitric oxide:

- is reactive with alkalis, flammable and combustible materials, organic compounds and solvents, reducing agents, copper and aluminium.
 - forms nitric / nitrous acid in contact with water and is therefore very corrosive to metals when wet.
 - explosions may occur on contact with ammonia, boron trichloride, carbon disulfide, cyclohexane, fluorine, formaldehyde, nitrobenzene, toluene, incompletely halogenated hydrocarbons, propylene, alcohols, and ozone.
- High nitrogen compounds are often unstable or explosive; the tendency is exaggerated by attachment of azide or diazonium groups, or a high-nitrogen heterocyclic nucleus.

High-nitrogen chemical families include

- azides
- diazoazoles
- diazonium salts
- hydrazinium salts
- N-nitro compounds
- tetrazoles
- triazenes
- triazoles.

Segregate from alcohol, water.

Avoid reaction with oxidizing agents.

- NOTE: May develop pressure in containers; open carefully. Vent periodically.

A number of triazene derivatives bearing hydrogen, cyano, hydroxy or nitroso groups on the terminal nitrogen of the chain are unstable, mainly to heat. Purification of triazenes by vacuum sublimation carries a risk explosion.

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

Section 11 - TOXICOLOGICAL INFORMATION

3-ETHYL-3-(ETHYLAMINOETHYL)-1-HYDROXY-2-OXO-1-TRIAZENE

TOXICITY AND IRRITATION

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

■ 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.

3-ETHYL-3-(ETHYLAMINOETHYL)-1-HYDROXY-2-OXO-1-TRIAZENE:

■ No significant acute toxicological data identified in literature search.

NITRIC OXIDE:

TOXICITY

IRRITATION

Inhalation (rat) LC50: 1068 mg/m³/4h Nil Reported

Rat cell mutagen.

SKIN

nitric oxide Canada - Alberta Occupational Exposure Limits - Skin Substance Interaction

1

Section 12 - ECOLOGICAL INFORMATION

No data

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
3-ethyl-3-(ethylaminoethyl)-1-hydroxy-2-oxo-1-triazene	HIGH		LOW	MED
nitric oxide			LOW	

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

B. Component Waste Numbers

When nitric oxide is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number P076 (waste code T).

Disposal Instructions

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

! 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.

- 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

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: DOT, IATA, IMDG

Section 15 - REGULATORY INFORMATION

3-ethyl-3-(ethylaminoethyl)-1-hydroxy-2-oxo-1-triazene (CAS: 146724-89-2) is found on the following regulatory lists;

"US - Hawaii Air Contaminant Limits", "US - Oregon Permissible Exposure Limits (Z-3)", "US OSHA Permissible Exposure Levels (PELs) - Table Z3"

Regulations for ingredients

nitric oxide (CAS: 10102-43-9) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits", "Canada - British Columbia Occupational Exposure Limits", "Canada - Northwest Territories Occupational Exposure Limits (English)", "Canada - Nova Scotia Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits", "Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits", "Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada Domestic Substances List (DSL)", "Canada Environmental Protection Act (CEPA) 1999 - Schedule 1 Toxic Substances List", "Canada Ingredient Disclosure List (SOR/88-64)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "OECD Representative List of High Production Volume (HPV) Chemicals", "US - Alaska Limits for Air Contaminants", "US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List", "US - California Permissible Exposure Limits for Chemical Contaminants", "US - Connecticut Hazardous Air Pollutants", "US - Hawaii Air Contaminant Limits", "US - Idaho - Limits for Air Contaminants", "US - Massachusetts Oil & Hazardous Material List", "US - Michigan Exposure Limits for Air Contaminants", "US - Minnesota Hazardous Substance List", "US - Minnesota Permissible Exposure Limits (PELs)", "US - New Jersey Right to Know Hazardous Substances", "US - Oregon Hazardous Materials", "US - Oregon Permissible Exposure Limits (Z-1)", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "US - Vermont Hazardous Constituents", "US - Vermont Hazardous Waste - Acutely Hazardous Wastes", "US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US - Vermont Permissible Exposure Limits Table

Z-1-A Transitional Limits for Air Contaminants", "US - Washington Dangerous waste constituents list", "US - Washington Discarded Chemical Products List - ""P"" Chemical Products", "US - Washington Permissible exposure limits of air contaminants", "US - Wyoming List of Highly Hazardous Chemicals, Toxics and Reactives", "US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US ACGIH Threshold Limit Values (TLV)", "US Department of Homeland Security Chemical Facility Anti-Terrorism Standards - Chemicals of Interest", "US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA Acute Exposure Guideline Levels (AELs) - Interim", "US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act", "US NFPA 45 Fire Protection for Laboratories Using Chemicals - Flammability Characteristics of Common Compressed and Liquefied Gases", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA List of Highly Hazardous Chemicals, Toxics and Reactives", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261", "US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Wastes", "US SARA Section 302 Extremely Hazardous Substances", "US Toxic Substances Control Act (TSCA) - Inventory", "USA: Chemical Facility Anti-Terrorism Standards - List Appendix A - 6CFR 27"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- Inhalation and/or ingestion may produce health damage*.
- Cumulative effects may result following exposure*.

* (limited evidence).

Reasonable care has been taken in the preparation of this information, but the author makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The author makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use. For additional technical information please call our toxicology department on +800 CHEMCALL.

- 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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