

# Tungsten(IV) chloride

sc-253812



The Power is Question

## Material Safety Data Sheet

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

## Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

### PRODUCT NAME

Tungsten(IV) chloride

### 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

Cl4-W, WCl4, "tungsten tetrachloride", "tungsten chloride"

## Section 2 - HAZARDS IDENTIFICATION

### CHEMWATCH HAZARD RATINGS

	Min	Max
Flammability:	0	Blue bar
Toxicity:	2	Blue to yellow bar
Body Contact:	4	Blue to red bar
Reactivity:	1	Blue to green bar
Chronic:	2	Blue to yellow bar

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



### CANADIAN WHMIS SYMBOLS



### EMERGENCY OVERVIEW

## RISK

Contact with water liberates toxic gas.  
Causes severe burns.  
Risk of serious damage to eyes.

## POTENTIAL HEALTH EFFECTS

### ACUTE HEALTH EFFECTS

#### SWALLOWED

- The material can produce severe chemical burns within the oral cavity and gastrointestinal tract following ingestion.
  - Ingestion of acidic corrosives may produce burns around and in the mouth.  
the throat and esophagus.
  - Accidental ingestion of the material may be damaging to the health of the individual.
  - If given orally, tungsten can accumulate in the spleen, kidney and liver.
- Symptoms of poisoning include diarrhea, stoppage of breathing and circulatory collapse leading to death.

#### EYE

- The material can produce severe chemical burns to the eye following direct contact. Vapors or mists may be extremely irritating.
  - If applied to the eyes, this material causes severe eye damage.
  - Direct eye contact with acid corrosives may produce pain, tears, sensitivity to light and burns.
- Mild burns of the epithelia generally recover rapidly and completely.

#### SKIN

- The material can produce severe chemical burns following direct contact with the skin.
  - Skin contact with acidic corrosives may result in pain and burns; these may be deep with distinct edges and may heal slowly with the formation of scar tissue.
  - 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.
- Corrosive acids can cause irritation of the respiratory tract, with coughing, choking and mucous membrane damage.  
There may be dizziness, headache, nausea and weakness.
- 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.
- Hydrogen chloride (HCl) vapour or fumes present a hazard from a single acute exposure.  
Exposures of 1300 to 2000 ppm have been lethal to humans in a few minutes.
- Tungsten is relatively inert and produces few respiratory effects.

## CHRONIC HEALTH EFFECTS

- Repeated or prolonged exposure to acids may result in the erosion of teeth, swelling and or ulceration of mouth lining. Irritation of airways to lung, with cough, and inflammation of lung tissue often occurs.  
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.  
Chronic minor exposure to hydrogen chloride (HCl) vapour or fume may cause discolouration or erosion of the teeth, bleeding of the nose and gums; and ulceration of the nasal mucous membranes.  
Repeated exposures of animals to concentrations of about 34 ppm HCl produced no immediate toxic effects.  
Workers exposed to hydrochloric acid suffered from gastritis and a number of cases of chronic bronchitis have also been reported.  
Repeated or prolonged exposure to dilute solutions of HCl may cause dermatitis.

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
tungsten(IV) chloride	13470-13-8	>98
reaction with water or moist air produces		
<a href="#">hydrogen chloride</a>	7647-01-0	

## 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.

#### **NOTES TO PHYSICIAN**

■ For acute or short term repeated exposures to strong acids:

· Airway problems may arise from laryngeal edema and inhalation exposure. Treat with 100% oxygen initially.  
· Respiratory distress may require cricothyroidotomy if endotracheal intubation is contraindicated by excessive swelling.

Both dimercaptol and calcium disodium edetate are said to be effective in acute experimental tungsten poisonings.

### **Section 5 - FIRE FIGHTING MEASURES**

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

#### **EXTINGUISHING MEDIA**

· Dry chemical powder.  
· BCF (where regulations permit).

#### **FIRE FIGHTING**

· Alert Emergency Responders and tell them location and nature of hazard.  
· Wear full body protective clothing with breathing apparatus.  
When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 800 metres in all directions.

#### **GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS**

· Non combustible.  
· Not considered to be a significant fire risk.  
Decomposition may produce toxic fumes of: hydrogen chloride, metal oxides, tungsten.

#### **FIRE INCOMPATIBILITY**

■ None known.

#### **PERSONAL PROTECTION**

Glasses:

Chemical goggles.

Full face- shield.

Gloves:

Respirator:

Type B-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**

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

#### **RECOMMENDED STORAGE METHODS**

■ DO NOT use aluminum or galvanized containers.

Check regularly for spills and leaks.

· Lined metal can, Lined metal pail/drum

· Plastic pail.

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**

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

**Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION**

**EXPOSURE CONTROLS**

Source	Material	TWA ppm	TWA mg/m <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Peak ppm	Peak mg/m <sup>3</sup>	TWA F/CC	Notes
Canada - Alberta Occupational Exposure Limits	tungsten(IV) chloride (Hydrogen chloride)					2	3		
Canada - British Columbia Occupational Exposure Limits	tungsten(IV) chloride (Hydrogen chloride Revised 2003)					2			
US - Minnesota Permissible Exposure Limits (PELs)	tungsten(IV) chloride (Hydrogen chloride)					5	7		
US ACGIH Threshold Limit Values (TLV)	tungsten(IV) chloride (Hydrogen chloride)					2			TLV Basis: upper respiratory tract irritation
US NIOSH Recommended Exposure Limits (RELs)	tungsten(IV) chloride (Hydrogen chloride)					5	7		
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	tungsten(IV) chloride (Hydrogen chloride)					5	7		
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	tungsten(IV) chloride (Hydrogen chloride)	(C)5	(C)7						
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	tungsten(IV) chloride (Hydrogen chloride)					5	7		
US - California Permissible Exposure Limits for Chemical Contaminants	tungsten(IV) chloride (Hydrogen chloride; muriatic acid)	5	7			C			
US - Idaho - Limits for Air Contaminants	tungsten(IV) chloride (Hydrogen chloride)					5	7		
US - Hawaii Air Contaminant Limits	tungsten(IV) chloride (Hydrogen chloride)					5	7		

US - Alaska Limits for Air Contaminants	tungsten(IV) chloride (Hydrogen chloride)					5	7	
US - Michigan Exposure Limits for Air Contaminants	tungsten(IV) chloride (Hydrogen chloride)					5	7	
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	tungsten(IV) chloride (Hydrogen chloride)	5	7	-	-			
US - Washington Permissible exposure limits of air contaminants	tungsten(IV) chloride (Hydrogen chloride)					5.0		
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	tungsten(IV) chloride (Hydrogen chloride)					2		
US - Oregon Permissible Exposure Limits (Z-1)	tungsten(IV) chloride (Hydrogen chloride)					5	7	
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	tungsten(IV) chloride (Hydrogen chloride)					5	7	
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	tungsten(IV) chloride (Hydrogen chloride)					5	7,5	
US OSHA Permissible Exposure Levels (PELs) - Table Z1	tungsten(IV) chloride (Hydrogen chloride)					5	7	
Canada - Northwest Territories Occupational Exposure Limits (English)	tungsten(IV) chloride (Hydrogen chloride)					5	7.5	
Canada - Nova Scotia Occupational Exposure Limits	tungsten(IV) chloride (Hydrogen chloride)					2		TLV Basis: upper respiratory tract irritation
Canada - Prince Edward Island Occupational Exposure Limits	tungsten(IV) chloride (Hydrogen chloride)					2		TLV Basis: upper respiratory tract irritation

ENDOELTABLE

## PERSONAL PROTECTION



### RESPIRATOR

- type b-p filter of sufficient capacity.
- Consult your EHS staff for recommendations

### EYE

- Chemical goggles.
- Full face shield.

### HANDS/FEET

- Elbow length PVC gloves.

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.

### OTHER

- Overalls.
- PVC Apron.

### ENGINEERING CONTROLS

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

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

### PHYSICAL PROPERTIES

Corrosive.

Acid.

Contact with water liberates toxic gas.

State	DIVIDED SOLID	Molecular Weight	325.66
Melting Range (°F)	Decomposes	Viscosity	Not Applicable
Boiling Range (°F)	Not available	Solubility in water (g/L)	Reacts
Flash Point (°F)	Not Applicable	pH (1% solution)	Not available
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not applicable	Vapour Pressure (mmHG)	Not available
Upper Explosive Limit (%)	Not applicable	Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not applicable	Relative Vapor Density (air=1)	>1
Volatile Component (%vol)	Not available	Evaporation Rate	Not available

### APPEARANCE

Grey to black powder; hydrolyses in water. Diamagnetic.

## Section 10 - CHEMICAL STABILITY

### CONDITIONS CONTRIBUTING TO INSTABILITY

- Contact with alkaline material liberates heat.
- Presence of incompatible materials.
- Product is considered stable.

### STORAGE INCOMPATIBILITY

- 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.
- Reacts with water or steam to produce toxic and corrosive fumes.
- Inorganic acids are generally soluble in water with the release of hydrogen ions. The resulting solutions have pH's of less than 7.0.
- Inorganic acids neutralize chemical bases (for example: amines and inorganic hydroxides) to form salts.
- Avoid strong bases.
- NOTE: May develop pressure in containers; open carefully. Vent periodically.
- Segregate from alcohol, water.
- 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.

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

## Section 11 - TOXICOLOGICAL INFORMATION

tungsten(IV) chloride

### 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.

TUNGSTEN(IV) CHLORIDE:

■ The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

The material may produce respiratory tract irritation, and result in damage to the lung including reduced lung function.

The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

Tungsten can cause a reduction in body temperature, and enlargement of the adrenal glands and kidneys if injected. Death may occur if it is given directly into the abdominal cavity.

No significant acute toxicological data identified in literature search.

HYDROGEN CHLORIDE:

TOXICITY	IRRITATION
Inhalation (human) LCLo: 1300 ppm/30m	Eye (rabbit): 5 mg/30s - Mild
Inhalation (human) LCLo: 3000 ppm/5m	
Inhalation (rat) LC50: 3124 ppm/60m	

■ The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

4701 ppm/30m

### CARCINOGEN

Hydrochloric acid	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	3
Acid mists, strong inorganic	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	1
Hydrogen chloride	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A4
hydrogen chloride	US - Rhode Island Hazardous Substance List	IARC	
TWAPPM~	US - Maine Chemicals of High Concern List	Carcinogen	A4

## Section 12 - ECOLOGICAL INFORMATION

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

### Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
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tungsten(IV) chloride	No Data Available	No Data Available		
hydrogen chloride	LOW	No Data Available	LOW	HIGH

## Section 13 - DISPOSAL CONSIDERATIONS

### US EPA Waste Number & Descriptions

A. General Product Information

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

Reactivity characteristic: use EPA hazardous waste number D003 (waste code R).

### 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:

- Dissolve the material (in water or acid solution as appropriate) or convert it to a water soluble state with appropriate oxidizing agent.
- Precipitate as the sulfide, adjusting the pH to neutral to complete the precipitation.
- 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: 8

Identification Numbers: UN3260 PG: II

Label Codes: 8 Special provisions: IB8, IP2,

IP4, T3,

TP33

Packaging: Exceptions: 154 Packaging: Non- bulk: 212

Packaging: Exceptions: 154 Quantity limitations: 15 kg

Passenger aircraft/rail:

Quantity Limitations: Cargo 50 kg Vessel stowage: Location: B aircraft only:

Vessel stowage: Other: None

Hazardous materials descriptions and proper shipping names:

Corrosive solid, acidic, inorganic, n.o.s.

### Air Transport IATA:

UN/ID Number: 3260 Packing Group: II

Special provisions: A3

Cargo Only

Packing Instructions: 50 kg Maximum Qty/Pack: 863

Passenger and Cargo Passenger and Cargo

Packing Instructions: 15 kg Maximum Qty/Pack: 859

Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity

Packing Instructions: 5 kg Maximum Qty/Pack: Y844

■ Air transport may be forbidden if this material is flammable, corrosive or toxic gases may be released under normal conditions of transport.

Shipping Name: CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S.

\*(CONTAINS TUNGSTEN(IV) CHLORIDE)

### Maritime Transport IMDG:

IMDG Class: 8 IMDG Subrisk: None

UN Number: 3260 Packing Group: II

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

Limited Quantities: 1 kg

Shipping Name: CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S.(contains tungsten(IV) chloride)

## Section 15 - REGULATORY INFORMATION

**tungsten(IV) chloride (CAS: 13470-13-8) is found on the following regulatory lists;**

"US DOE Temporary Emergency Exposure Limits (TEELs)"

### Regulations for ingredients



### hydrogen chloride (CAS: 7647-01-0) is found on the following regulatory lists;

"Canada - Alberta Ambient Air Quality Objectives","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 - Prince Edward Island Occupational Exposure Limits - Carcinogens","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Industrial Hazardous Substances","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada Controlled Drugs and Substances Act Schedule VI","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada National Pollutant Release Inventory (NPRI)","Canada Prohibited Toxic Substances, Schedule 2, Concentration Limits (English)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","CODEX General Standard for Food Additives (GSFA) - Additives Permitted for Use in Food in General, Unless Otherwise Specified, in Accordance with GMP","GESAMP/EHS Composite List - GESAMP Hazard Profiles","IMO IBC Code Chapter 17: Summary of minimum requirements","IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk","International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs","International Council of Chemical Associations (ICCA) - High Production Volume List","International Maritime Dangerous Goods Requirements (IMDG Code) - Goods Forbidden for Transport","OECD Representative List of High Production Volume (HPV) Chemicals","United Nations Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances - Table II","United Nations List of Precursors and Chemicals Frequently used in the Illicit Manufacture of Narcotic Drugs and Psychotropic Substances Under International Control (Red List) - Table II","US - Alaska Limits for Air Contaminants","US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which emissions must be quantified","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELS)","US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)","US - California Permissible Exposure Limits for Chemical Contaminants","US - California Toxic Air Contaminant List Category II","US - Connecticut Hazardous Air Pollutants","US - Florida Essential Chemicals","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 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 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 ACGIH Threshold Limit Values (TLV) - Carcinogens","US Clean Air Act - Hazardous Air Pollutants","US CWA (Clean Water Act) - List of Hazardous Substances","US CWA (Clean Water Act) - Reportable Quantities of Designated Hazardous Substances","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 Drug Enforcement Administration (DEA) List I and II Regulated Chemicals","US EPA Acute Exposure Guideline Levels (AEGs) - Final","US EPA High Production Volume Chemicals Additional List","US EPA Master Testing List - Index I Chemicals Listed","US EPCRA Section 313 Chemical List","US Food Additive Database","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 Postal Service (USPS) Hazardous Materials Table: Postal Service Mailability Guide","US SARA Section 302 Extremely Hazardous Substances","US Spacecraft Maximum Allowable Concentrations (SMACs) for Airborne Contaminants","US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory"

## Section 16 - OTHER INFORMATION

### LIMITED EVIDENCE

- 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](http://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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