

# Bromoxynil

sc-252523



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

Bromoxynil

### 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

C7-H3-Br2-N-O, Br2C6H3(OH)CN, "3, 5-dibromo-4-hydroxybenzonitrile", "2, 6-dibromo-4-cyanophenol", "3, 5-dibromo-4-hydroxyphenylcyanide", "4-hydroxy-3, 5-dibromobenzonitrile", Brittox, Brominal, Brominex, Brominil, Bromoxynil, Broxynil, Bucril, Bucril, Butichlorofos, "Chipco Bucril", "Chipco Crab-Kleen", "MB 10064", "M&B 10064", "M&B 10731", "ME4 Bromanil", "Nu-Lawn Weeder", "Oxytril M", "ENT 20852", "pesticide herbicide"

## Section 2 - HAZARDS IDENTIFICATION

### CHEMWATCH HAZARD RATINGS

	Min	Max	
Flammability	1		
Toxicity	4		Min/Nil=0 Low=1 Moderate=2 High=3 Extreme=4
Body Contact	3		
Reactivity	1		



**CANADIAN WHMIS SYMBOLS****EMERGENCY OVERVIEW****RISK**

Very toxic by inhalation.

Danger of cumulative effects.

May cause SENSITISATION by skin contact.

Possible risk of harm to the unborn child.

Toxic in contact with skin and if swallowed.

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

**POTENTIAL HEALTH EFFECTS****ACUTE HEALTH EFFECTS****SWALLOWED**

■ Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.

■ The biochemical action of this class of material (including bromoxynil, ioxynil) is the same as that of dinitrophenol and dinitro-o-cresol. Exposure may cause disturbance of cellular oxidative phosphorylation process, giving rise to pathological sweating followed by thirst, emaciation and functional renal insufficiency. [CISDOC] Hyperaemia of all organs and oedema of the lungs and brains were seen at autopsy in a man who ingested approximately 43 mg/kg of the congener, ioxynil, in combination with alcohol. Signs of poisoning include raised temperature, increased respiration rate, disorientation and excitability.

■ Symptoms of dinitrophenol poisoning include a rapid increase in body temperature, breathing rate and heart rate. Oxygen demand is raised even faster, causing oxygen deficiency and acid-base imbalance (acidosis) to occur.

■ Aromatic nitriles, unlike aliphatic nitriles, do not appear to liberate cyanide within the body.

**EYE**

■ Although the material is not thought to be an irritant, direct contact with the eye may cause transient discomfort characterized by tearing or conjunctival redness (as with windburn). Slight abrasive damage may also result.

**SKIN**

■ Skin contact with the material may produce toxic effects; systemic effects may result following absorption.

■ The material is not thought to be a skin irritant (as classified using animal models). Abrasive damage however, may result from prolonged exposures.

■ 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**

■ Inhalation of dusts, generated by the material, during the course of normal handling, may produce severely toxic effects; these may be fatal.

■ The material is not thought to produce respiratory irritation (as classified using animal models). Nevertheless inhalation of dusts, or fume, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.

■ 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.

**CHRONIC HEALTH EFFECTS**

■ Results in experiments suggest that this material may cause disorders in the development of the embryo or fetus, even when no signs of poisoning show in the mother.

■ Repeated or long-term occupational exposure is likely to produce cumulative health effects involving organs or biochemical systems.

Skin contact with the material is more likely to cause a sensitization reaction in some persons compared to the general population.

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.

Subchronic bromoxynil feeding studies with rats and dogs produced lower body weights. Increased foetal weights, increased uterine deaths and an increased number of foetuses with an extra 14th rib were noted in a study using pregnant rats fed at 35 mg/kg/day. Repeated doses of 60 mg/kg/day in pregnant rabbits produced hydrocephalus, microphthalmia, anophthalmia and severe defects in ossification of the skull. A increased incidence of adenomas and carcinomas of the liver were noted in male mice.

Occupational chronic exposure to both ioxynil and bromoxynil produce inordinate sweating and thirst, fever, headache, dizziness, vomiting, asthenia, weight loss, and myalgia of the legs. The onset of these effects is insidious. Removal of effected workers from exposure resulted in prompt recovery. Pathology showed a transitory elevation of creatinine phosphokinase, LDH aldolase and SGOT.

2,4-dinitrophenol can cause skin eruption, peripheral nerve damage, liver and kidney damage, and rarely cataracts. Repeated or prolonged contact may produce an allergic or irritant inflammation of the skin.

Chronic intoxication with ionic bromides, historically, has resulted from medical use of bromides but not from environmental or occupational exposure; depression, hallucinosis, and schizophreniform psychosis can be seen in the absence of other signs of intoxication. Bromides may also induce sedation, irritability, agitation, delirium, memory loss, confusion, disorientation, forgetfulness (aphasias), dysarthria, weakness, fatigue, vertigo, stupor, coma, decreased appetite, nausea and vomiting, diarrhoea, hallucinations, an acne like rash on the face, legs and trunk, known as bronchoderma (seen in 25-30% of case involving bromide ion), and a profuse discharge from the nostrils (coryza). Ataxia and generalised hyperreflexia have also been observed. Correlation of neurologic symptoms with blood levels of bromide is inexact. The use of substances such as brompheniramine, as antihistamines, largely reflect current day usage of bromides; ionic bromides have been largely withdrawn from therapeutic use due to their toxicity. Several cases of foetal abnormalities have been described in mothers who took large doses of bromides during pregnancy.

### Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
bromoxynil (3,5-dibromo-4-hydroxybenzonitrile)	1689-84-5	100

### Section 4 - FIRST AID MEASURES

#### SWALLOWED

- Give a slurry of activated charcoal in water to drink. NEVER GIVE AN UNCONSCIOUS PATIENT WATER TO DRINK.
- At least 3 tablespoons in a glass of water should be given.

#### 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

- Quickly but gently, wipe material off skin with a dry, clean cloth.
- Immediately 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

- Treat symptomatically.

Marked fatigue, tremendous thirst, profuse sweating, flushing of the face are all characteristics of intoxication by

dinitrophenol derivatives. These may be followed by restlessness, anxiety, excitement which may occasionally lead to convulsions.  
Uncouples oxidative phosphorylation.

## 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 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

- 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 (CO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), other pyrolysis products typical of burning organic material.

May emit poisonous fumes.

### FIRE INCOMPATIBILITY

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

## Section 6 - ACCIDENTAL RELEASE MEASURES

### MINOR SPILLS

- Clean up waste regularly and abnormal spills immediately.
- Avoid breathing dust and contact with skin and eyes.
- Wear protective clothing, gloves, safety glasses and dust respirator.
- Use dry clean up procedures and avoid generating dust.
- Vacuum up or sweep up. NOTE Vacuum cleaner must be fitted with an exhaust micro filter (HEPA type) (consider explosion-proof machines designed to be grounded during storage and use).
- Dampen with water to prevent dusting before sweeping.
- Place in suitable containers for 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.

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**

Glass container.

- 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 - Ontario Occupational Exposure Limits	bromoxynil (Particles (Insoluble or Poorly Soluble) Not Otherwise)		10 (I)						
Canada - British Columbia Occupational Exposure Limits	bromoxynil (Particles (Insoluble or Poorly Soluble) Not Otherwise Classified (PNOC))		10 (N)						
Canada - Ontario Occupational Exposure Limits	bromoxynil (Specified (PNOS) / Particules (insolubles ou peu solubles) non précisées par ailleurs)		3 (R)						
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	bromoxynil (Particulates not otherwise regulated Respirable fraction)		5						
US - California Permissible Exposure Limits for Chemical Contaminants	bromoxynil (Particulates not otherwise regulated Respirable fraction)		5						(n)

US - Oregon Permissible Exposure Limits (Z-1)	<b>bromoxynil</b> (Particulates not otherwise regulated (PNOR) (f) Total Dust)	-	10	Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits. PNOR means “particles not otherwise regulated.”
US - Michigan Exposure Limits for Air Contaminants	<b>bromoxynil</b> (Particulates not otherwise regulated, Respirable dust)		5	
US - Oregon Permissible Exposure Limits (Z-1)	<b>bromoxynil</b> (Particulates not otherwise regulated (PNOR) - (f) Respirable Fraction)	-	5	Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits. PNOR means “particles not otherwise regulated.”
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	<b>bromoxynil</b> (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction)		5	
Canada - Prince Edward Island Occupational Exposure Limits	<b>bromoxynil</b> (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)		10	See Appendix B current TLV/BEI Book

## PERSONAL PROTECTION



### RESPIRATOR

•Particulate. (AS/NZS 1716 & 1715, EN 1432000 & 1492001, ANSI Z88 or national equivalent)

### EYE

- Safety glasses with side shields.
- Chemical goggles.

### HANDS/FEET

Wear chemical protective gloves, eg. PVC.

NOTE The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.

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

- 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, AS/NZS 2161.1 or national equivalent).

- 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, AS/NZS 2161.10.1 or national equivalent) 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, AS/NZS 2161.10.1 or national equivalent) 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.
- Eyewash 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.

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

### PHYSICAL PROPERTIES

Solid.

Does not mix with water.

State	Divided solid	Molecular Weight	276.91
Melting Range (°F)	381- 383	Viscosity	Not Applicable
Boiling Range (°F)	Not available.	Solubility in water (g/L)	Immiscible
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

Odorless solid, practically insoluble in water 130 ppm). Soluble in methanol, acetone and tetrahydrofuran. Slightly volatile in steam. Sublimation point 135 C @ 0.15 mm Hg.

## Section 10 - CHEMICAL STABILITY

### CONDITIONS CONTRIBUTING TO INSTABILITY

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

### STORAGE INCOMPATIBILITY

- Phenols are incompatible with strong reducing substances such as hydrides, nitrides, alkali metals, and sulfides.
- Avoid use of aluminium, copper and brass alloys in storage and process equipment.

- Heat is generated by the acid-base reaction between phenols and bases.
- Phenols are sulfonated very readily (for example, by concentrated sulfuric acid at room temperature), these reactions generate heat.
- Phenols are nitrated very rapidly, even by dilute nitric acid.
- Nitrated phenols often explode when heated. Many of them form metal salts that tend toward detonation by rather mild shock.

Avoid reaction with oxidizing agents.

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

## Section 11 - TOXICOLOGICAL INFORMATION

bromoxynil

### TOXICITY AND IRRITATION

#### BROMOXYNIL

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

TOXICITY	IRRITATION
Oral (rat) LD50 190 mg/kg	Nil Reported
Dermal (rat) LD50 >2000 mg/kg	
Oral (mouse) LD50 110 mg/kg	
Intravenous (mouse) LD50 56 mg/kg	
Oral (dog) LD50 100 mg/kg	
Oral (rabbit) LD50 260 mg/kg	
Dermal (rabbit) LD50 3660 mg/kg	
Oral (g.pig) LD50 63 mg/kg	
Oral (chicken) LD50 240 mg/kg	

Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's edema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type.

ADI 0.003 mg/kg/day

NOEL 0.3 mg/kg/day

### CARCINOGEN

BROMOXYNIL	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s) OPP-CAN
BROMINE COMPOUNDS (ORGANIC OR INORGANIC)	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s) P65-MC
VPVB_(VERY~	US - Maine Chemicals of High Concern List	Carcinogen
VPVB_(VERY~	US - Maine Chemicals of High Concern List	Carcinogen CA Prop 65; IARC; NTP 11th ROC

### REPROTOXIN

bromoxynil	US - California Proposition 65 - Reproductive Toxicity	NSRL or MADL (µg/day)
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## 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.

### GESAMP/EHS COMPOSITE LIST - GESAMP Hazard Profiles



Name / EHS Cas No / RTECS No	TRN	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3
Alcohol ic beverag es / CAS:168 9- 84- 5 /	293	85	0	0	R	0	0	0	0	0	0	1			D	1

Legend: EHS=EHS Number (EHS=GESAMP Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships) NRT=Net Register Tonnage, A1a=Bioaccumulation log Pow, A1b=Bioaccumulation BCF, A1=Bioaccumulation, A2=Biodegradation, B1=Acuteaquatic toxicity LC/ECIC50 (mg/l), B2=Chronic aquatic toxicity NOEC (mg/l), C1=Acute mammalian oral toxicity LD50 (mg/kg), C2=Acute mammalian dermal toxicity LD50 (mg/kg), C3=Acute mammalian inhalation toxicity LC50 (mg/kg), D1=Skin irritation & corrosion, D2=Eye irritation & corrosion, D3=Long-term health effects, E1=Tainting, E2=Physical effects on wildlife & benthic habitats, E3=Interference with coastal amenities, For column A2: R=Readily biodegradable, NR=Not readily biodegradable. For column D3: C=Carcinogen, M=Mutagenic, R=Reprotoxic, S=Sensitising, A=Aspiration hazard, T=Target organ systemic toxicity, L=Lunginjury, N=Neurotoxic, I=Immunotoxic. For column E1: NT=Not tainting (tested), T=Tainting test positive. For column E2: Fp=Persistent floater, F=Floater, S=Sinking substances. The numerical scales start from 0 (no hazard), while higher numbers reflect increasing hazard. (GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships)

### Section 13 - DISPOSAL CONSIDERATIONS

#### 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.

- 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:	6.1
Identification Numbers:	UN2588	PG:	III
Label Codes:	6.1	Special provisions:	IB8, IP3, T1, TP33
Packaging: Exceptions:	153	Packaging: Non-bulk:	213
Packaging: Exceptions:	153	Quantity limitations: Passenger aircraft/rail:	100 kg
Quantity Limitations: Cargo aircraft only:	200 kg	Vessel stowage: Location:	A
Vessel stowage: Other:	40	S.M.P.:	YES

Hazardous materials descriptions and proper shipping names:

Pesticides, solid, toxic, n.o.s.

**Air Transport IATA:**

ICAO/IATA Class:	6.1	ICAO/IATA Subrisk:	None
UN/ID Number:	2588	Packing Group:	III
Special provisions:	A3		
Cargo Only			
Packing Instructions:	677	Maximum Qty/Pack:	200 kg
Passenger and Cargo		Passenger and Cargo	
Packing Instructions:	670	Maximum Qty/Pack:	100 kg
Passenger and Cargo Limited Quantity		Passenger and Cargo Limited Quantity	
Packing Instructions:	Y645	Maximum Qty/Pack:	10 kg

Shipping Name: PESTICIDE, SOLID, TOXIC, N.O.S. \*(CONTAINS BROMOXYNIL)

**Maritime Transport IMDG:**

IMDG Class:	6.1	IMDG Subrisk:	None
UN Number:	2588	Packing Group:	III
EMS Number:	F-A,S-A	Special provisions:	61 223 274
Limited Quantities:	5 kg	Marine Pollutant:	Yes

Shipping Name: PESTICIDE, SOLID, TOXIC, N.O.S.(contains bromoxynil)

**Section 15 - REGULATORY INFORMATION**

**bromoxynil (CAS: 1689-84-5) is found on the following regulatory lists;**

"Canada Environmental Quality Guidelines (EQGs) Water: Aquatic life","Canada Environmental Quality Guidelines (EQGs) Water: Community","International Maritime Dangerous Goods Requirements (IMDG Code) - Marine Pollutants","International Maritime Dangerous Goods Requirements (IMDG Code) - Substance Index","US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which production, use or other presence must be reported","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - California Proposition 65 - Priority List for the Development of MADLs for Chemicals Causing Reproductive Toxicity","US - California Proposition 65 - Reproductive Toxicity","US - Maine Chemicals of High Concern List","US - Massachusetts Oil & Hazardous Material List","US Department of Transportation (DOT) Marine Pollutants - Appendix B","US EPCRA Section 313 Chemical List","US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act"

## Section 16 - OTHER INFORMATION

*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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