Sulfur trioxide trimethylamine complex

sc-229350

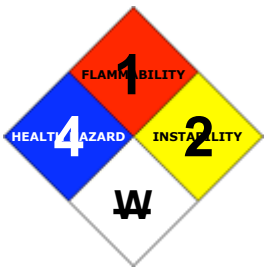
Material Safety Data Sheet

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Sulfur trioxide trimethylamine complex

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
C3-H9-N-O3-S, (CH3)3N.SO3

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

		Min	Max
Flammability:	1		
Toxicity:	4		
Body Contact:	4		
Reactivity:	2		
Chronic:	3		

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

CANADIAN WHMIS SYMBOLS


EMERGENCY OVERVIEW

RISK

Harmful if swallowed.
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.
■ 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.
■ Ingestion of acidic corrosives may produce burns around and in the mouth. the throat and esophagus.
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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.
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SKIN

■ The material can produce severe chemical burns following direct contactwith 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 produce harmful health effects (as classified using animal models). Systemic harm, however, has been identified following exposure of animals by at least one other route and the material may still produce health damage following entry through wounds, lesions or abrasions.
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■ 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.
■ Solution of material in moisture on the skin, or perspiration, may markedly increase skin corrosion and accelerate tissue destruction.

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 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.
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■ Acute poisoning from inhalation of high concentrations of sulfur trioxide is characterised by intense irritation of eyes and upper respiratory tract mucosae followed by consciousness disorders. Death may ensue as a result of suffocation due to
reflex spasm of the larynx, circulatory arrest in lungs or of shock.
■ 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

■ 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.
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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.
There is limited evidence that, skin contact with this product is more likely to cause a sensitization reaction in some persons compared to the general population.
Sulfur trioxide vapour/fumes can enter the body through the respiratory tract and act both as a local irritant and general toxic agent. Chronic exposure may produce respiratory tract damage and may degrade alkaline body reserves, carbohydrate, protein metabolism and tooth enamel.
Strong inorganic acid mists containing sulfuric acid can cause cancer.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
sulfur trioxide trimethylamine complex	3162-58-1	>98
may decompose in aqueous solutions to produce		
sulfur trioxide	7446-11-9	
trimethylamine	75-50-3	
sulfuric acid	7664-93-9	

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. <\p>.

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.

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.
· May be violently or explosively reactive.
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.
· Slight fire hazard when exposed to heat or flame.
Combustion products include: carbon monoxide (CO), carbon dioxide (CO_2), nitrogen oxides (NOx), sulfur oxides (SOx), other pyrolysis products typical of burning organic material.

FIRE INCOMPATIBILITY
■ Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids,chlorine bleaches, pool chlorine etc. as ignition may result.
· Keep dry.
· NOTE: May develop pressure in containers; open carefully. Vent periodically.

PERSONAL PROTECTION
Glasses:
Safety Glasses.
Full face- shield.
Gloves:
Respirator:
Type BEGKAX-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.
· 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.
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

■ 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/m³	STEL ppm	STEL mg/m³	Notes
Canada - British Columbia Occupational Exposure Limits	trimethylamine (Trimethylamine)	5		15		
Canada - Ontario Occupational Exposure Limits	trimethylamine (Trimethylamine)	5		15		
US NIOSH Recommended Exposure Limits (RELs)	trimethylamine (Trimethylamine)	10	24	15	36	
Canada - Alberta Occupational Exposure Limits	trimethylamine (Trimethylamine)	5	12	15	36	
US - Minnesota Permissible Exposure Limits (PELs)	trimethylamine (Trimethylamine)	10	24	15	36	
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	trimethylamine (Trimethylamine)	24	15	36		
US - California Permissible Exposure Limits for Chemical Contaminants	trimethylamine (Trimethylamine)	5	12	15	36	
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	trimethylamine (Trimethylamine)	10	24	15	36	
US AIHA Workplace Environmental Exposure Levels (WEELs)	trimethylamine (Trimethylamine)	1				
US - Hawaii Air Contaminant Limits	trimethylamine (Trimethylamine)	10	24	15	36	

US - Alaska Limits for Air Contaminants	trimethylamine (Trimethylamine)	10	24	15	36	
US - Washington Permissible exposure limits of air contaminants	trimethylamine (Trimethylamine)	10		15		
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	trimethylamine (Trimethylamine)	5		15		
US - Michigan Exposure Limits for Air Contaminants	trimethylamine (Trimethylamine)	10	24	15	36	
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	trimethylamine (Trimethylamine)	5	12	15	36	
US ACGIH Threshold Limit Values (TLV)	trimethylamine (Trimethylamine)	5		15		TLV Basis: upper respiratory tract irritation
Canada - Nova Scotia Occupational Exposure Limits	trimethylamine (Trimethylamine)	5		15		TLV Basis: upper respiratory tract irritation
Canada - Prince Edward Island Occupational Exposure Limits	trimethylamine (Trimethylamine)	5		15		TLV Basis: upper respiratory tract irritation
US - Minnesota Permissible Exposure Limits (PELs)	sulfuric acid (Sulfuric acid)		1			
Canada - Ontario Occupational Exposure Limits	sulfuric acid (Sulfuric acid, thoracic)		0.2			
US NIOSH Recommended Exposure Limits (RELs)	sulfuric acid (Sulfuric acid)		1			
Canada - Alberta Occupational Exposure Limits	sulfuric acid (Sulphuric acid)		1		3	
Canada - British Columbia Occupational Exposure Limits	sulfuric acid (Sulfuric acid, Thoracic Revised 2004)		0.2 (M)			A2, 1
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	sulfuric acid (Sulfuric acid)		1			
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	sulfuric acid (Sulfuric acid)		1			
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	sulfuric acid (Sulfuric acid)		1			
US - Idaho - Limits for Air Contaminants	sulfuric acid (Sulfuric acid)		1			
US - California Permissible Exposure Limits for Chemical Contaminants	sulfuric acid (Sulfuric acid)		1		3	
US ACGIH Threshold Limit Values (TLV)	sulfuric acid (Sulfuric acid)		0.2			TLV Basis: pulmonary function. A2 = as contained in strong inorganic

						acid mists
US - Hawaii Air Contaminant Limits	sulfuric acid (Sulfuric acid)		1		3	
US - Alaska Limits for Air Contaminants	sulfuric acid (Sulfuric acid)		1			
US - Michigan Exposure Limits for Air Contaminants	sulfuric acid (Sulfuric acid)		1			
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	sulfuric acid (Sulphuric acid)	-	1	-	1	
US - Washington Permissible exposure limits of air contaminants	sulfuric acid (Sulfuric acid)		1		3	
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	sulfuric acid (Sulphuric acid, (thoracic fraction++))		0.2		0.6	T20, strong acid mists only
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	sulfuric acid (Sulfuric acid)		1			
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	sulfuric acid (Sulfuric acid)		1		3	
US OSHA Permissible Exposure Levels (PELs) - Table Z1	sulfuric acid (Sulfuric acid)		1			
Canada - Prince Edward Island Occupational Exposure Limits	sulfuric acid (Sulfuric acid)		0.2			TLV Basis: pulmonary function. A2 = as contained in strong inorganic acid mists
US - Oregon Permissible Exposure Limits (Z-1)	sulfuric acid (Sulfuric acid)		1			
Canada - Northwest Territories Occupational Exposure Limits (English)	sulfuric acid (Sulphuric acid)		1		3	
Canada - Nova Scotia Occupational Exposure Limits	sulfuric acid (Sulfuric acid)		0.2			TLV Basis: pulmonary function. A2 = as contained in strong inorganic acid mists

ENDOELTABLE
The following materials had no OELs on our records

• sulfur trioxide trimethylamine complex: CAS:3162-58-1

PERSONAL PROTECTION

RESPIRATOR

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

EYE
· Chemical goggles.
· Full face shield.

HANDS/FEET
■ Elbow length PVC gloves.
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: 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 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.
Corrosive.
Acid.

State	Divided solid	Molecular Weight	139.17
Melting Range (°F)	449.6 (decomposes)	Viscosity	Not Applicable
Boiling Range (°F)	Not applicable	Solubility in water (g/L)	Reacts
Flash Point (°F)	Not available	pH (1% solution)	Not available
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)	>1
Volatile Component (%vol)	Negligible	Evaporation Rate	Not applicable

APPEARANCE
White to off-white crystalline powder; hydrolyses in water.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY
· Contact with alkaline material liberates heat.

STORAGE INCOMPATIBILITY
■ Sulfur trioxide
· reacts with many chemicals producing fire and explosion
· enhances the combustion of other substances
· attracts water from many organic substances, creating heat with possible ignition or explosion
· produces sulfuric acid fume in moist air
· reacts violently with water or steam producing sulfuric acid (never add water directly to the material)
· is a strong oxidiser
· reacts violently with reducing acids, organic substances, acetonitrile, dimethyl sulfoxide, dioxane, diphenyl mercury, dioxygen difluoride, formamide, iodine, lead oxide, metal oxides, nitryl chloride, perchloric acid, red phosphorus, pyridine, sulfuric acid, tetrafluoroethylene
· is incompatible with strong acids, caustics, ammonia, amines, organic anhydrides, metallic powders, acrylates, aldehydes, alcohols, substituted allyls, alkylene oxides, capralactam solution, cresols, dimethyl sulfoxide, isocyanates, ketones, glycols, phenols, vinyl acetate, nitrates, chlorates, carbides and cyanides

· must be stabilised with inhibitor to prevent a potentially explosive change in the vapour pressure
· attacks metal in the presence of moisture producing flammable hydrogen
NOTE:
The vapour pressure of sulfur trioxide rises rapidly with increasing temperature when the alpha form melts (62.3 degrees C), the pressure rise is dramatic. Vessels must be capable of standing pressures of 15 atmospheres.
Reacts with mild steel, galvanized steel / zinc producing hydrogen gas which may form an explosive mixture with air.
· Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous.
Sulfuric acid :
· is a strong oxidiser
· reacts with water or steam
· reacts violently with many substances including reducing agents, combustible materials, organic substances, alkalis, ammonium tetraperoxochromate, aniline, 1,2-ethanediamine, ethanolamine, isoprene, mesityl oxide, endo--norbanecarboxylic acid ethyl ester, perchlorates, sodium carbonate, zinc chlorate
· reacts, possibly causing ignition or explosion, with many substances, including non-oxidising mineral acids, organic acids, bases, reducing agents, acetic anhydride, acetone cyanohydrin, acetonitrile, acrolein, acrylates, acrylonitrile, alcohols, aldehydes, alkylene oxides, allyl alcohol, allyl chloride, substituted allyls, 2-aminoethanol, ammonium hydroxide, bromine pentafluoride, n-butyraldehyde, caprolactam solution, carbides, caesium acetylene carbide, chlorine trifluoride, chlorates, chlorosulfonic acid, cresols, cuprous nitride, diisobutylene, ethylene cyanohydrin, ethylene diamine, ethylene glycol, ethyleneimine, fulminates, glycols, hydrochloric acid, iodine heptafluoride, iron, isocyanates, ketones, lithium silicide, mercuric nitride, 2-methyllactonitrile, powdered metals, nitric acid, p-nitrotoluene, pentasilver trihydroxydiaminophosphate, perchloric acid, phenols, phosphorus, picrates, potassium chlorate, potassium permanganate, beta-propiolactone, propylene oxide, pyridine, rubidium acetylene, silver permanganate, sodium, sodium chlorate, sodium hydroxide, styrene monomer, zinc phosphide
· increases the explosive sensitivity of nitromethane
· incompatible with 2-amino-5-nitrothiazole, 2-aminothiazole, ammonia, aliphatic amines, alkanolamines, amides, organic anhydrides, isocyanate, vinyl acetate, alkylene oxides, epichlorohydrin
· attacks some plastics, rubber and coatings
· reacts with metals to produce flammable hydrogen gas.
Segregate from alcohol, water.
Avoid strong acids.
Segregate from alkalis, oxidizing agents and chemicals readily decomposed by acids, i.e. cyanides, sulfides, carbonates.
· NOTE: May develop pressure in containers; open carefully. Vent periodically.

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

Section 11 - TOXICOLOGICAL INFORMATION

SULFUR TRIOXIDE TRIMETHYLAMINE COMPLEX

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.
SULFUR TRIOXIDE:
SULFUR TRIOXIDE TRIMETHYLAMINE COMPLEX:
■ The material may cause severe 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. Repeated exposures may produce severe ulceration.
■ The material may produce respiratory tract irritation, and result in damage to the lung including reduced lung function.
■ The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.
SULFUR TRIOXIDE TRIMETHYLAMINE COMPLEX:
■ No significant acute toxicological data identified in literature search.

TOXICITY	IRRITATION
SULFUR TRIOXIDE:	
Inhalation (human) TCLO: None 30 mg/m³	Nil Reported
TRIMETHYLAMINE:	
Inhalation (rat) LCLo: 3500 ppm/4h	Nil Reported
Intravenous (mouse) LD50: 90 mg/kg	* [Sigma/Aldrich]
Inhalation (mouse) LC50: 19000 mg/m³	
Inhalation (rat) LC50: 2000 ppm/1h*	

Oral (rat) LD50: 5000 mg/kg *

Oral (Rat) LD50: 500 mg/kg

■ Acute Toxicity:

Oral LD50: 766 mg/kg (dosed as 45% aqueous solutions in rats); slightly toxic to animals.

Inhalation LC50: > 5.9 mg/l (rats, 4 hrs.); slightly toxic to animals. Vapours/aerosols are severely irritating to the respiratory tract.

Skin: Corrosive to rabbit skin (dosed as 45% aqueous solution).

Dermal LD50 > 5000 mg/kg (dosed as 45% aqueous solution in rabbits); practically nontoxic to animals.

Eyes: Corrosive to rabbit eyes (dosed as 45% aqueous solution). Vapours/aerosols are expected to be severely irritating to eyes (based on analogy to other structurally related amines

Developmental toxicity: Only studies of limited quality conducted via routes (i.p.) not representative of workplace exposure routes were available.

Pregnant mice were treated intraperitoneally (i.p.) with 15, 60, 150 or 295 mg of Trimethylamine hydrochloride/kg/day during days 1-17 of gestation. No maternal or foetal effects were observed at doses of 15 or 60 mg/kg/day. At 150 mg/kg/day, foetotoxicity (decreased body weight) was observed, but no maternal effects were evident. At 295 mg/kg/day, foetotoxicity and maternal toxicity (including mortality) were observed. In another study, pregnant mice were treated intraperitoneally (i.p.) with 60, 150, 300 or 450 mg of trimethylamine/kg/day during days 6-15 of gestation. No maternal or foetal effects were observed at doses of 60 or 150 mg/kg/day. At 300 mg/kg/day, foetotoxicity was observed, but no maternal effects were evident. At 450 mg/kg/day, foetotoxicity and maternal toxicity were observed.

Repeat dose toxicity: Groups of 10 male rats were exposed via inhalation (vapor) to trimethylamine at concentrations of 75 ppm, 250 ppm or 750 ppm for 6 hours/day, 5 days/week for 2 weeks. Respiratory tract effects were observed at all dose levels.

At 75 ppm, nasal tissue effects were noted and at higher doses effects on the nose, trachea & lungs were observed. Although a NOEL (no-observed effect level) for trimethylamine was not determined on this study, only minimal nasal tissue effects were observed at 75 ppm and these were reversible following a 14-day recovery period.

Somnolence, excitement, muscle contraction, pulse rate decrease and

cardiac and blood changes recorded.

SULFURIC ACID:

Oral (rat) LD50: 2140 mg/kg	Eye (rabbit): 1.38 mg SEVERE
Inhalation (rat) LC50: 510 mg/m³/2h	Eye (rabbit): 5 mg/30sec SEVERE
Inhalation (human) TCLo: 3 mg/m³/24w	

■ WARNING: For inhalation exposure ONLY: This substance has been classified by the IARC as Group 1: CARCINOGENIC TO HUMANS

The International Agency for Research on Cancer (IARC) has classified occupational exposures to respirable (<5 um) crystalline silica as being carcinogenic to humans . This classification is based on what IARC considered sufficient evidence from epidemiological studies of humans for the carcinogenicity of inhaled silica in the forms of quartz and cristobalite. Crystalline silica is also known to cause silicosis, a non-cancerous lung disease.

Occupational exposures to strong inorganic acid mists of sulfuric acid:

CARCINOGEN

STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID	US Environmental Defense Scorecard Recognized Carcinogens	Reference(s)	P65
STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65

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
trimethylamine	HIGH		LOW	HIGH
sulfuric acid			LOW	

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

A. General Product Information

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.
· 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: + Hazard class or Division: 8
Identification Numbers: UN1829 PG: I
Label Codes: 8, 6.1 Special provisions: 2, B9,
B14, B32,
B49, B77,
N34, T20,
TP4, TP13,
TP25,
TP26,
TP38, TP45
Packaging: Exceptions: None Packaging: Non- bulk: 227
Packaging: Exceptions: None Quantity limitations: Forbidden
Passenger aircraft/rail:
Quantity Limitations: Cargo Forbidden Vessel stowage: Location: A
aircraft only:
Vessel stowage: Other: 40
Hazardous materials descriptions and proper shipping names:
Sulfur trioxide, stabilized

Air Transport IATA:

ICAO/IATA Class: 8 ICAO/IATA Subrisk: None
UN/ID Number: 1829 Packing Group: -
Special provisions: A2
Cargo Only
Packing Instructions: Forbidden Maximum Qty/Pack: Forbidden
Passenger and Cargo Passenger and Cargo
Packing Instructions: Forbidden Maximum Qty/Pack: Forbidden
Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity
Packing Instructions: - Maximum Qty/Pack: -
Shipping Name: SULPHUR TRIOXIDE, STABILIZED(CONTAINS SULFUR
TRIOXIDE TRIMETHYLAMINE COMPLEX)

Maritime Transport IMDG:

IMDG Class: 8 IMDG Subrisk: None
UN Number: 1829 Packing Group: I
EMS Number: F-A , S-B Special provisions: None
Limited Quantities: 0
Shipping Name: SULPHUR TRIOXIDE, STABILIZED(contains sulfur trioxide trimethylamine complex)

Section 15 - REGULATORY INFORMATION

Regulations for ingredients

sulfur trioxide (CAS: 7446-11-9) is found on the following regulatory lists;

"Canada - Saskatchewan Industrial Hazardous Substances","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","International Air Transport Association (IATA) Dangerous Goods Regulations","International Air Transport Association (IATA) Dangerous Goods Regulations - Prohibited List","International Council of Chemical Associations (ICCA) - High Production Volume List","OECD Representative List of High Production Volume (HPV) Chemicals","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 - Massachusetts Oil & Hazardous Material List","US - New Jersey Right to Know Hazardous Substances","US - Oregon Hazardous Materials","US - Pennsylvania - Hazardous Substance List","US - Wyoming List of Highly Hazardous Chemicals, Toxics and Reactives","US Department of Homeland Security Chemical Facility Anti-Terrorism Standards - Chemicals of Interest","US DOE Temporary Emergency Exposure Limits

(TEELs)","US EPA Acute Exposure Guideline Levels (AEGLs) - Interim","US EPA High Production Volume Chemicals Additional List","US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act","US OSHA List of Highly Hazardous Chemicals, Toxics and Reactives","US Postal Service (USPS) Hazardous Materials Table: Postal Service Mailability Guide","US Postal Service (USPS) Numerical Listing of Proper Shipping Names by Identification (ID) Number","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"

trimethylamine (CAS: 75-50-3) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Nova Scotia Occupational Exposure Limits","Canada - Ontario Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Industrial Hazardous Substances","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","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 Council of Chemical Associations (ICCA) - High Production Volume List","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 - Massachusetts Oil & Hazardous Material List","US - Michigan Exposure Limits for Air Contaminants","US - Minnesota Permissible Exposure Limits (PELs)","US - New Jersey Right to Know Hazardous Substances","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 ACGIH Threshold Limit Values (TLV)","US AIHA Workplace Environmental Exposure Levels (WEELs)","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 EPA Acute Exposure Guideline Levels (AEGLs) - Interim","US EPA High Production Volume Program 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 Toxic Substances Control Act (TSCA) - Inventory","USA: Chemical Facility Anti-Terrorism Standards - List Appendix A - 6CFR 27"

sulfuric acid (CAS: 7664-93-9) 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 - Ontario 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 - Saskatchewan Occupational Health and Safety Regulations - Designated Chemical Substances","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 Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","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 Air Transport Association (IATA) Dangerous Goods Regulations","International Air Transport Association (IATA) Dangerous Goods Regulations - Prohibited List","International Council of Chemical Associations (ICCA) - High Production Volume List","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 - 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 Proposition 65 - Priority List for the Development of NSRLs for Carcinogens","US - California Toxic Air Contaminant List Category II","US - Connecticut Hazardous Air Pollutants","US - Hawaii Air Contaminant Limits","US - Idaho - Limits for Air Contaminants","US - Maine Chemicals of High Concern List","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 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 Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants","US ACGIH Threshold Limit Values (TLV)","US ACGIH Threshold Limit Values (TLV) - Carcinogens","US CWA (Clean Water Act) - List of Hazardous Substances","US CWA (Clean Water Act) - Reportable Quantities of Designated Hazardous Substances","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 (AEGLs) - Interim","US EPA High Production Volume Chemicals Additional List","US EPCRA Section 313 Chemical List","US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives -

Adhesives","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 NIOSH Recommended Exposure Limits (RELs)","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 Toxic Substances Control Act (TSCA) - Inventory"

No data for sulfur trioxide trimethylamine complex (CAS: , 3162-58-1)

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

■ Inhalation may produce severe health damage*.
■ Cumulative effects may result following exposure*.
■ Possible skin sensitiser*.
■ Possible cancer-causing agent following repeated inhalation*.
* (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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