[2-(3,4-Epoxycyclohexyl)ethyl]trimethoxysilane

sc-237858

Material Safety Data Sheet

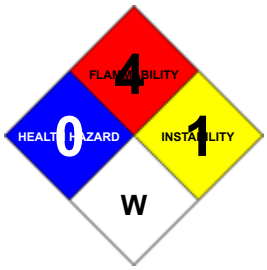
Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
[2-(3,4-Epoxycyclohexyl)ethyl]trimethoxysilane

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

PRODUCT USE
Used as a coupling agent and adhesion promoter in coatings.

SYNONYMS
C11-H22-O4-Si, CHOHC4H8-(CH2)2Si(OCH3)3, "silene, (3-4-epoxycyclohexyl)ethyltrimethoxy -", "silene, trimethyl(2-(7-oxabicyclo(4.1.0.)hept-3-yl)", "silane, trimethoxy[2-(7-oxabicyclo-[4.1.0.]hept-3-yl)ethyl]-", "2-(3, 4-epoxycyclohexyl)ethyltrimethoxysilane", trimethoxy[2-(7-oxabicyclo[4.1.0]hept-3-yl)ethyl]silane, "Silane A186 coupling agent", "UC A186", "KBM 303", "NUCA 186", "organosilane ester", "Organo Functional Silane A-186"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

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

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

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW

RISK

Contact with water liberates extremely flammable gases.
May cause CANCER.
May cause heritable genetic damage.
Harmful to aquatic organisms.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Accidental ingestion of the material may be damaging to the health of the individual.
■ Methanol may produce a burning or painful sensation in the mouth, throat, chest, and stomach.
This may be accompanied by nausea, vomiting, headache, dizziness, shortness of breath, weakness, fatigue, leg cramps, restlessness, confusion, drunken behavior, visual disturbance, drowsiness, coma and death.

EYE

■ There is some evidence to suggest that this material can causeeye irritation and damage in some persons.

SKIN

■ The material is not thought to produce adverse health effects or skin irritation following contact (as classified using animal models).
Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.
■ 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 is not thought to produce respiratory irritation (as classified using animal models).
Nevertheless inhalation of vapors, fumes or aerosols, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.
■ Inhalation of vapours may cause drowsiness and dizziness.
This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo.
■ Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.
■ Minor but regular methanol exposures may effect the central nervous system, optic nerves and retinae.
Symptoms may be delayed, with headache, fatigue, nausea, blurring of vision and double vision.

CHRONIC HEALTH EFFECTS

■ There is ample evidence that this material can be regarded as being able to cause cancer in humans based on experiments and other information.
Based on experiments and other information, there is ample evidence to presume that exposure to this material can cause genetic defects that can be inherited.
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.
Long-term exposure to methanol vapor, at concentrations exceeding 3000 ppm, may produce cumulative effects characterized by gastrointestinal disturbances (nausea, vomiting), headache, ringing in the ears, insomnia, trembling, unsteady gait, vertigo, conjunctivitis and clouded or double vision. Liver and/or kidney injury may also result.
The epoxide group is an alkylating agent and thus destroysnucleotides within the cell. This may cause cancer.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane	3388-04-3	>98
impurities as		
toluene	108-88-3	<0.001 ^
methanol	67-56-1	< 0.1 ^

Section 4 - FIRST AID MEASURES

SWALLOWED

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

EYE

If this product comes in contact with the eyes

- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.

SKIN

If skin contact occurs

- Immediately remove all contaminated clothing, including footwear
- Flush skin and hair with running water (and soap if available).

INHALED

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

NOTES TO PHYSICIAN

■ For acute and short term repeated exposures to methanol

- Toxicity results from accumulation of formaldehyde/formic acid.
- Clinical signs are usually limited to CNS, eyes and GI tract Severe metabolic acidosis may produce dyspnea and profound systemic effects which may become intractable. All symptomatic patients should have arterial pH measured. Evaluate airway, breathing and circulation.

If ingested treat as for acute methanol poisoning.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG)	Not Available
Upper Explosive Limit (%)	Not available.
Specific Gravity (water=1)	1.065 @ 25C
Lower Explosive Limit (%)	Not available.

EXTINGUISHING MEDIA

- Alcohol stable 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.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- Combustible.
- Slight fire hazard when exposed to heat or flame.

Combustion products include carbon dioxide (CO2), silicon dioxide (SiO2), other pyrolysis products typical of burning organic material.
May emit poisonous fumes.
May emit corrosive fumes.

FIRE INCOMPATIBILITY

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

EXTINGUISHING MEDIA

- Alcohol stable foam.
- Dry chemical powder.

FIRE FIGHTING

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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

- Remove all ignition sources.
- Clean up all spills immediately.

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

- DO NOT allow clothing wet with material to stay in contact with skin
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.

RECOMMENDED STORAGE METHODS

- Metal can or drum
- Packing as recommended by manufacturer.

STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- No smoking, naked lights or ignition sources.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC	Notes
Canada - Alberta Occupational Exposure Limits	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methanol (Methyl alcohol))	200	262	250	328				
Canada - British Columbia Occupational Exposure Limits	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methanol)	200		250					Skin
US - Minnesota Permissible Exposure Limits (PELs)	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol)	200	260	250	325				
US NIOSH Recommended Exposure Limits (RELs)	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol)	200	260	250	325				[skin]
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol)	200	260	250	325				
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol)	200	260						
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol)	200	260	250	310				
US - California Permissible Exposure Limits for Chemical Contaminants	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol; methanol)	200	260	250	325	1000			

US - Idaho - Limits for Air Contaminants	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol)	200	260			
US - Hawaii Air Contaminant Limits	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol (methanol))	200	260	250	325	
US - Alaska Limits for Air Contaminants	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol (Methanol))	200	260	250	310	
US - Michigan Exposure Limits for Air Contaminants	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol)	200	260	250	325	
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol (methanol) - Skin)	200	260	250	310	
US - Washington Permissible exposure limits of air contaminants	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methanol (Methyl alcohol))	200		250		
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol (methanol))	200		250		Skin
US - Oregon Permissible Exposure Limits (Z-1)	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol (methanol))	200	260			
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol)	200	260			
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol)	200	262	250	328	

US OSHA Permissible Exposure Levels (PELs) - Table Z1	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol)	200	260				
Canada - Northwest Territories Occupational Exposure Limits (English)	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methyl alcohol (Methanol) - Skin)	200	262	250	328		
Canada - Nova Scotia Occupational Exposure Limits	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methanol)	200		250			TLV Basis headache; eye damage. BEI
Canada - Prince Edward Island Occupational Exposure Limits	beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (Methanol)	200		250			TLV Basis headache; eye damage. BEI
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	toluene ()	1					
US - Minnesota Permissible Exposure Limits (PELs)	toluene (Toluene)	100	375	150	560		
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	toluene ()	0.08					
US NIOSH Recommended Exposure Limits (RELs)	toluene (Toluene)	100	375	150	560		
Canada - British Columbia Occupational Exposure Limits	toluene (Toluene Revised 2007; 2008)	20					R
Canada - Alberta Occupational Exposure	toluene (Toluene (Toluol))	50	188				

Limits						
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	toluene (Toluene)	100	375	150	580	
US - Idaho - Acceptable Maximum Peak Concentrations	toluene (Toluene (Z37.12-1967))	200				300
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	toluene (Toluene*)	100	375	150	560	300
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	toluene (Toluene)		See Table Z-2			
US - Idaho - Limits for Air Contaminants	toluene (Toluene)		[2]			
US - California Permissible Exposure Limits for Chemical Contaminants	toluene (Toluene; toluol)	50	188	150	560	500
US - Michigan Exposure Limits for Air Contaminants	toluene (Toluene)	100	375	150	560	
US - Alaska Limits for Air Contaminants	toluene (Toluene)	100	375	150	560	
Canada - Northwest Territories Occupational Exposure Limits (English)	toluene (Toluene (Toluol) - Skin)	100	375	150	560	

US - Washington Permissible exposure limits of air contaminants	toluene (Toluene)	100		150				
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	toluene (Toluene (toluol) - Skin)	100	375	150	560			
US - Hawaii Air Contaminant Limits	toluene (Toluene (Toluol))	100	375	150	560			
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	toluene (Toluene (toluol))	50		60				Skin
US - Oregon Permissible Exposure Limits (Z-2)	toluene (Toluene (Z37.12-1967))	100					300	Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal limits.
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	toluene (Toluene)	50	188					
US OSHA Permissible Exposure Levels (PELs) - Table Z2	toluene (Toluene (Z37.12–1967))					300		
Canada - Prince Edward Island Occupational Exposure	toluene (Toluene)	20						TLV Basis Visual impairment; female reproductive

Limits				system; pregnancy loss. The BEI is based on previous TLV-TWA
Canada - Nova Scotia Occupational Exposure Limits	toluene (Toluene)	20		TLV Basis Visual impairment; female reproductive system; pregnancy loss. The BEI is based on previous TLV-TWA
US - Wyoming Toxic and Hazardous Substances Table Z-2 Acceptable ceiling concentration, Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift	toluene (Toluene (Z37.12-1967))	200	300	

PERSONAL PROTECTION




RESPIRATOR

•Type AX Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 1432000 & 1492001, ANSI Z88 or national equivalent)

EYE

- Safety glasses with side shields.
- Chemical goggles.

HANDS/FEET

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.

- When handling liquid-grade epoxy resins wear chemically protective gloves (e.g nitrile or nitrile-butatoluene rubber), boots and aprons.
- DO NOT use cotton or leather (which absorb and concentrate the resin), polyvinyl chloride, rubber or polyethylene gloves (which absorb the resin).
- DO NOT use barrier creams containing emulsified fats and oils as these may absorb the resin; silicone-based barrier creams should be reviewed prior to use.

OTHER

- Employees working with confirmed human carcinogens should be provided with, and be required to wear, clean, full body protective clothing (smocks, coveralls, or long-sleeved shirt and pants), shoe covers and gloves prior to entering the regulated area. [AS/NZS ISO 65292006 or national equivalent]
- Employees engaged in handling operations involving carcinogens should be provided with, and required to wear and use half-face filter-type respirators with filters for dusts, mists and fumes, or air purifying canisters or cartridges. A respirator affording higher levels of protection may be substituted. [AS/NZS 1715 or national equivalent]
- Emergency deluge showers and eyewash fountains, supplied with potable water, should be located near, within sight of, and on the same level with locations where direct exposure is likely.
- Prior to each exit from an area containing confirmed human carcinogens, employees should be required to remove and leave protective clothing and equipment at the point of exit and at the last exit of the day, to place used clothing and equipment in impervious containers at the point of exit for purposes of decontamination or disposal. The contents of such impervious containers must be identified with suitable labels. For maintenance and decontamination activities, authorized employees entering the area should be provided with and required to wear clean, impervious garments, including gloves, boots and continuous-air supplied hood.
- Prior to removing protective garments the employee should undergo decontamination and be required to shower upon removal of the garments and hood.
- Protective overalls, closely fitted at neck and wrist.
- Eye-wash unit.

IN CONFINED SPACES

- Non-sparking protective boots
- Static-free clothing.
- Ensure availability of lifeline.

Staff should be trained in all aspects of rescue work.

Rescue gear Two sets of SCUBA breathing apparatus Rescue Harness, lines etc.

ENGINEERING CONTROLS

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.

The basic types of engineering controls are

Process controls which involve changing the way a job activity or process is done to reduce the risk.

Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.

Employers may need to use multiple types of controls to prevent employee overexposure.

- Employees exposed to confirmed human carcinogens should be authorized to do so by the employer, and work in a regulated area.

- Work should be undertaken in an isolated system such as a "glove-box" . Employees should wash their hands and arms upon completion of the assigned task and before engaging in other activities not associated with the isolated system.
- Within regulated areas, the carcinogen should be stored in sealed containers, or enclosed in a closed system, including piping systems, with any sample ports or openings closed while the carcinogens are contained within.
- Open-vessel systems are prohibited.
- Each operation should be provided with continuous local exhaust ventilation so that air movement is always from ordinary work areas to the operation.
- Exhaust air should not be discharged to regulated areas, non-regulated areas or the external environment unless decontaminated. Clean make-up air should be introduced in sufficient volume to maintain correct operation of the local exhaust system.
- For maintenance and decontamination activities, authorized employees entering the area should be provided with and required to wear clean, impervious garments, including gloves, boots and continuous-air supplied hood. Prior to removing protective garments the employee should undergo decontamination and be required to shower upon removal of the garments and hood.
- Except for outdoor systems, regulated areas should be maintained under negative pressure (with respect to non-regulated areas).
- Local exhaust ventilation requires make-up air be supplied in equal volumes to replaced air.
- Laboratory hoods must be designed and maintained so as to draw air inward at an average linear face velocity of 0.76 m/sec with a minimum of 0.64 m/sec. Design and construction of the fume hood requires that insertion of any portion of the employees body, other than hands and arms, be disallowed.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Liquid.

State	Liquid	Molecular Weight	246.38
Melting Range (°F)	<32	Viscosity	Not Applicable
Boiling Range (°F)	590	Solubility in water (g/L)	Miscible(reacts)
Flash Point (°F)	235	pH (1% solution)	Not applicable.
Decomposition Temp (°F)	Not available.	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available.	Vapour Pressure (mmHG)	Not Available
Upper Explosive Limit (%)	Not available.	Specific Gravity (water=1)	1.065 @ 25C
Lower Explosive Limit (%)	Not available.	Relative Vapor Density (air=1)	>2
Volatile Component (%vol)	Not Available	Evaporation Rate	Not Available

APPEARANCE

Liquid. Moisture sensitive. Reacts slowly with water with production of toxic and flammable methanol.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

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

STORAGE INCOMPATIBILITY

- Contact with water liberates highly flammable gases
- Epoxides are highly reactive with acids, bases, and oxidizing and reducing agents.
- Epoxides react, possibly with anhydrous metal chlorides, ammonia, amines and group 1 metals.

Avoid reaction with oxidizing agents.

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

Section 11 - TOXICOLOGICAL INFORMATION

beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane

TOXICITY AND IRRITATION

BETA-(3,4-EPOXYCYCLOHEXYL)ETHYLTRIMETHOXYSILANE

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

TOXICITY	IRRITATION
Inhalation (Mouse) LC >290 mg/m³/4h	Skin (rabbit) 500 mg Mild
Oral (Rat) LD50 8 ml/kg	
Intraperitoneal (Rat) LD50 1 ml/kg	
Inhalation (Mouse) LC50 >290 mg/m³/4h	
Dermal (Rabbit) LD50 6.3 ml/kg	

For alkoxysilanes

Low molecular weight alkoxysilanes (including alkyl orthosilicates) are a known concern for lung toxicity, due to inhalation of vapours or aerosols causing irreversible lung damage at low doses.

Alkoxysilane groups that rapidly hydrolyse when in contact with water, result in metabolites that may only cause mild skin irritation. Although there appears to be signs of irritation under different test conditions, based on the available information, the alkoxysilanes cannot be readily classified as a skin irritant.

The trimethoxysilane group of chemicals have previously been associated with occupational eye irritation in exposed workers who experienced severe inflammation of the cornea . Based on the collective information, these substances are likely to be severe irritants to the eyes.

Methoxysilanes are generally reported to possess higher reactivity and toxicity compared to ethoxysilanes; some methoxysilanes appear to be carcinogenic .In the US, alkoxysilanes with alkoxy groups greater than C2 are classified as moderate concern.

Based on available information on methoxysilanes, the possibility that this family causes skin sensitisation cannot be ruled out. Amine-functional methoxysilanes have previously been implicated as a cause of occupational contact dermatitis, often as a result of repeated skin exposure with workers involved in the manufacture or use of the resins containing the chemical during fibreglass production.

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.

The intraperitoneal LD50 of, beta-(3,4-epoxycyclohexyl)ethylyltrimethoxysilane (EEMS) has been reported to be 8- to 12.3-fold lower than that its oral LD50.

EEMS hasbeen shown to be non-toxic in an acute inhalation study, with a lethal concentration of >290 mg/m³/4 hours. In another study, no signs of toxicity were observed in rats exposed to an EEMS vapour saturated atmosphere for 8 hours.

The developmental toxicity has been studied for EEMS. Pregnant rats and rabbits were dosed with EEMS in corn oil by oral gavage. While maternal toxicity was observed at the highest dose levels (1.0 and 2.5 mL/kg bw/day in rats, and 0.25 and 0.75 mL/kg bw/day in rabbits), no embryotoxicity or teratogenicity was observed in either species at any dose. Only minimal foetal toxicity (dilated cerebral ventricles and reduced forelimb ossification) was observed in rat offspring at 2.5 mL/kg bw/day.

EEMS, as found to cause fibrosarcomas (2/40 animals tested) and arcinomas (4/40) at higher incidence than found in negative control animals (0/40) .

Section 12 - ECOLOGICAL INFORMATION

Harmful to aquatic organisms.

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

B. Component Waste Numbers

When toluene is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number U220 (waste code T).

When methanol is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number U154 (waste code I).

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. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. 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 or consult manufacturer for recycling options.
- Consult Waste Management Authority for disposal.

Section 14 - TRANSPORTATION INFORMATION

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

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

Section 15 - REGULATORY INFORMATION

beta-(3,4-epoxycyclohexyl)ethyltrimethoxysilane (CAS: 3388-04-3) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)","US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

■ Inhalation and/or ingestion may produce health damage*.
■ Cumulative effects may result following exposure*.
■ May produce discomfort of the eyes*.
■ Possible skin sensitiser*.
■ Vapours potentially cause drowsiness and dizziness*.
* (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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