**Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

**PRODUCT NAME**  
Triethoxysilane

**STATEMENT OF HAZARDOUS NATURE**  

**NFPA**

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

**EMERGENCY**  
ChemWatch  
Within the US & Canada: 877-715-9305  
Outside the US & Canada: +800 2436 2255  
(1-800-CHEMCALL) or call +613 9573 3112

**SYNONYMS**  
C6-H16-O3-Si, (C2H5O)3SiH, "silane, triethoxy-", "silylating agent"

**Section 2 - HAZARDS IDENTIFICATION**

**CHEMWATCH HAZARD RATINGS**

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Toxicty</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Body Contact</td>
<td>2</td>
<td></td>
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<tr>
<td>Reactivity</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Chronic</td>
<td>2</td>
<td></td>
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</table>

**CANADIAN WHMIS SYMBOLS**

...
EMERGENCY OVERVIEW

RISK
Very toxic by inhalation.
Harmful in contact with skin and if swallowed.
Irritating to eyes, respiratory system and skin.
Flammable.
Harmful to aquatic organisms.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED
- 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.

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

SKIN
- Skin contact with the material may be harmful; systemic effects may result following absorption.
- This material can cause inflammation of the skin on contact in some persons.
- The material may accentuate any pre-existing dermatitis condition.
- 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 vapors or aerosols (mists, fumes), 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.

CHRONIC HEALTH EFFECTS
- Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.
Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.
Prolonged exposure to ethanol may cause damage to the liver and cause scarring. It may also worsen damage caused by other agents. Large amounts of ethanol taken in pregnancy may result in “foetal alcohol syndrome”, characterised by delay in mental and physical development, learning difficulties, behavioural problems and small head size. A small number of people develop allergic reactions to ethanol, which include eye infections, skin swelling, shortness of breath, and itchy rashes with blisters.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS RN</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>triethoxysilane</td>
<td>998-30-1</td>
<td>&gt;98</td>
</tr>
<tr>
<td>hydrolysis produces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ethanol</td>
<td>64-17-5</td>
<td></td>
</tr>
</tbody>
</table>

Section 4 - FIRST AID MEASURES
SWALLOWED
• IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.
• For advice, contact a Poisons Information Centre or a doctor.
• Urgent hospital treatment is likely to be needed.
• In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient’s condition.

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.
• Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
• Transport to hospital or doctor without delay.

SKIN
If skin contact occurs
• Immediately remove all contaminated clothing, including footwear.
• Flush skin and hair with running water (and soap if available).
• Seek medical attention in event of irritation.

INHALED
• If fumes or combustion products are inhaled remove from contaminated area.
• Lay patient down. Keep warm and rested.
• Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
• Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.

NOTES TO PHYSICIAN
■ for poisons (where specific treatment regime is absent)

BASIC TREATMENT
• Establish a patent airway with suction where necessary.
• Watch for signs of respiratory insufficiency and assist ventilation as necessary.
• Administer oxygen by non-rebreather mask at 10 to 15 L/min.
• Monitor and treat, where necessary, for pulmonary oedema.
  Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vapor Pressure (mmHG)</td>
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<tr>
<td>Upper Explosive Limit (%)</td>
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</tr>
<tr>
<td>Specific Gravity (water=1)</td>
<td>0.890</td>
</tr>
<tr>
<td>Lower Explosive Limit (%)</td>
<td>Not available</td>
</tr>
</tbody>
</table>

EXTINGUISHING MEDIA
• DO NOT use water.

FIRE FIGHTING
• Alert Fire Brigade and tell them location and nature of hazard.
• Wear breathing apparatus plus protective gloves for fire only.
• Prevent, by any means available, spillage from entering drains or water courses.
• Use fire fighting procedures suitable for surrounding area.
When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 500 metres in all directions.
GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS
- Liquid and vapor are flammable.
- Moderate fire hazard when exposed to heat or flame.
- Vapor forms an explosive mixture with air.
- Moderate explosion hazard when exposed to heat or flame.
Combustion products include carbon monoxide (CO), carbon dioxide (CO2), silicon dioxide (SiO2), other pyrolysis products typical of burning organic material. May emit poisonous fumes.

FIRE INCOMPATIBILITY
- Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result
- Avoid reaction with water or moist air.

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid breathing vapors and contact with skin and eyes.
- Control personal contact by using protective equipment.

MAJOR SPILLS
- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear full body protective clothing with breathing apparatus.

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.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- Containers, even those that have been emptied, may contain explosive vapors.
- Do NOT cut, drill, grind, weld or perform similar operations on or near containers.

RECOMMENDED STORAGE METHODS
- Lined metal can, lined metal pail/ can.
- Plastic pail.
- Polyliner drum.
- Packing as recommended by manufacturer.

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.
- All inner and sole packagings for substances that have been assigned to Packaging Groups I or II on the basis of inhalation toxicity criteria, must be hermetically sealed.

STORAGE REQUIREMENTS
- Store in approved flammable liquid storage area.
- No smoking, naked lights/ignition sources.
- Keep containers securely sealed.
- Store away from incompatible materials in a cool, dry, well-ventilated area.
## EXPOSURE CONTROLS

<table>
<thead>
<tr>
<th>Source</th>
<th>Material</th>
<th>TWA ppm</th>
<th>TWA mg/m³</th>
<th>STEL ppm</th>
<th>STEL mg/m³</th>
<th>Peak ppm</th>
<th>Peak mg/m³</th>
<th>TWA F/CC</th>
<th>Notes</th>
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<td>US AIHA Workplace Environmental Exposure Levels (WEELs)</td>
<td>triethoxysilane (Triethoxysilane)</td>
<td>0.05</td>
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<td>US NIOSH Recommended Exposure Limits (RELs)</td>
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<td>Canada - British Columbia Occupational Exposure Limits</td>
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<td>US OSHA Permissible Exposure Levels (PELs) - Table Z1</td>
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<tr>
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<td>TLV® Basis URT irr</td>
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<td>US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants</td>
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<td>Location</td>
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<tr>
<td>US - Hawaii Air Contaminant Limits</td>
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<td>1,000</td>
<td>1,900</td>
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</tr>
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<td>US - Alaska Limits for Air Contaminants</td>
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<td>Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances</td>
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<td>Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances</td>
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<tr>
<td>Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances</td>
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<td>1,000</td>
<td>1,900</td>
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<td>1,250</td>
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<td>Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits</td>
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<td>Canada - Prince Edward Island Occupational Exposure Limits</td>
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<td>1000</td>
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<tr>
<td>US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants</td>
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<tr>
<td>US - Oregon Permissible Exposure Limits (Z-1)</td>
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<td>1,000</td>
<td>1,900</td>
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<td>Canada - Northwest Territories Occupational Exposure Limits (English)</td>
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<td>1000</td>
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<td>Canada - Nova Scotia Occupational Exposure Limits</td>
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<td></td>
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</tr>
</tbody>
</table>

**PERSONAL PROTECTION**

- **RESPIRATOR**
  - Type A Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 1432000 & 1492001, ANSI Z88 or national equivalent)
EYE
- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

HANDS/FEET
- Wear chemical protective gloves, eg. PVC.
- Wear safety footwear or safety gumboots, eg. Rubber
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

OTHER
- Overalls.
- Eyewash unit.
- Barrier cream.
- Skin cleansing cream.
- Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.
- For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets), non sparking safety footwear.

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.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Physical Properties</th>
<th>Liquid</th>
<th>Molecular Weight</th>
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</thead>
<tbody>
<tr>
<td>State</td>
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<td>Viscosity</td>
</tr>
<tr>
<td></td>
<td>Boiling Range (°F)</td>
<td>273- 275</td>
<td>Solubility in water (g/L)</td>
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<td></td>
<td>Flash Point (°F)</td>
<td>80</td>
<td>pH (1% solution)</td>
</tr>
<tr>
<td></td>
<td>Decomposition Temp (°F)</td>
<td>Not Available</td>
<td>pH (as supplied)</td>
</tr>
<tr>
<td></td>
<td>Autoignition Temp (°F)</td>
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<td>Vapor Pressure (mmHG)</td>
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<td>Specific Gravity (water=1)</td>
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<tr>
<td></td>
<td>Lower Explosive Limit (%)</td>
<td>Not available</td>
<td>Relative Vapor Density (air=1)</td>
</tr>
<tr>
<td></td>
<td>Volatile Component (%vol)</td>
<td>100</td>
<td>Evaporation Rate</td>
</tr>
</tbody>
</table>
### Material Value

<table>
<thead>
<tr>
<th>Material</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETHANOL</td>
<td>log Kow (Sangster 1997) -0.3</td>
</tr>
</tbody>
</table>

#### APPEARANCE

Liquid; reacts with water.

---

### Section 10 - CHEMICAL STABILITY

#### CONDITIONS CONTRIBUTING TO INSTABILITY
- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

#### STORAGE INCOMPATIBILITY
- Segregate from alcohol, water.
- Avoid reaction with oxidising agents
- **NOTE** May develop pressure in containers; open carefully. Vent periodically.
- Avoid strong acids, bases.

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

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### Section 11 - TOXICOLOGICAL INFORMATION

triethoxysilane

#### 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.
- 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.

#### CARCINOGEN

<table>
<thead>
<tr>
<th>Ethanol</th>
<th>US ACGIH Threshold Limit Values (TLV) - Carcinogens</th>
<th>Carcinogen Category</th>
<th>Reference(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethanol</td>
<td>US - Rhode Island Hazardous Substance List</td>
<td>IARC</td>
<td></td>
</tr>
<tr>
<td>ETHANOL</td>
<td>US Environmental Defense Scorecard Suspected Carcinogens</td>
<td>Reference(s)</td>
<td>HAZMAP, NTP-C</td>
</tr>
<tr>
<td>ETHYL ALCOHOL IN ALCOHOLIC BEVERAGES</td>
<td>US Environmental Defense Scorecard Suspected Carcinogens</td>
<td>Reference(s)</td>
<td>IARC</td>
</tr>
<tr>
<td>TWA_MG_M3~</td>
<td>US - Maine Chemicals of High Concern List</td>
<td>Carcinogen Category</td>
<td>Reference(s)</td>
</tr>
<tr>
<td>VPVB_(VERY~</td>
<td>US - Maine Chemicals of High Concern List</td>
<td>Carcinogen</td>
<td>CA Prop 65; IARC; NTP 11th ROC</td>
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<tr>
<td>VPVB_(VERY~</td>
<td>US - Maine Chemicals of High Concern List</td>
<td>Carcinogen</td>
<td></td>
</tr>
<tr>
<td>TWA_MG_M3~</td>
<td>Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens</td>
<td>Notes</td>
<td>TLV® Basis URT irr</td>
</tr>
</tbody>
</table>
Harmful to aquatic organisms. This material and its container must be disposed of as hazardous waste.

**Section 13 - DISPOSAL CONSIDERATIONS**

**US EPA Waste Number & Descriptions**

A. General Product Information

Ignitability characteristic: use EPA hazardous waste number D001 (waste code I)

**Disposal Instructions**

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

- Containers may still present a chemical hazard/danger when empty.
- Return to supplier for reuse/recycling if possible.

Otherwise:

- If container cannot be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
- Where possible retain label warnings and MSDS and observe all notices pertaining to the product.

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 or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: burial in a land-fill specifically licenced to accept chemical and/or pharmaceutical wastes or incineration in a licenced apparatus (after admixture with suitable combustible material).
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

**Section 14 - TRANSPORTATION INFORMATION**

**DOT:**

<table>
<thead>
<tr>
<th>Symbols:</th>
<th>Hazard class or Division:</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>6.1</td>
</tr>
</tbody>
</table>
Identification Numbers: UN2929  
Label Codes: 6.1, 3  
Packaging: Exceptions: 153  
Quantity Limitations: Cargo only: 60 L  
Vessel stowage: Other: 40

Quantity Limitations: Cargo aircraft only: 60 L  
Vessel stowage: Location: B

Hazardous materials descriptions and proper shipping names:
Toxic liquids, flammable, organic, n.o.s.

**Air Transport IATA:**
- ICAO/IATA Class: 6.1  
- UN/ID Number: 2929  
- Special provisions: A4  
- Cargo Only
  - Packing Instructions: 662  
  - Maximum Qty/Pack: 60 L
- Passenger and Cargo
  - Packing Instructions: 654  
  - Maximum Qty/Pack: 5 L
- Limited Quantity
  - Packing Instructions: Y641  
  - Maximum Qty/Pack: 1 L

**Maritime Transport IMDG:**
- IMDG Class: 6.1  
- UN Number: 2929  
- Special provisions: 274  
- Limited Quantities: 100 ml

Shipping name: TOXIC LIQUID, FLAMMABLE, ORGANIC, N.O.S. (contains triethoxysilane)

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**Section 15 - REGULATORY INFORMATION**

**triethoxysilane (CAS: 998-30-1)** is found on the following regulatory lists:

- "Canada Non-Domestic Substances List (NDSL)"
- "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)"
- "US - Delaware Pollutant Discharge Requirements - Reportable Quantities"
- "US - Massachusetts Oil & Hazardous Material List"
- "US - New Jersey Right to Know Hazardous Substances"
- "US - Pennsylvania - Hazardous Substance List"
- "US AIHA Workplace Environmental Exposure Levels (WEELs)"
- "US DOE Temporary Emergency Exposure Limits (TEELs)"
- "US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act"
- "US SARA Section 302 Extremely Hazardous Substances"
- "US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory"  

**Regulations for ingredients**

**ethanol (CAS: 64-17-5)** is found on the following regulatory lists:

- "Canada - Alberta Occupational Exposure Limits"
- "Canada - British Columbia Occupational Exposure Limits"
- "Canada - Northwest Territories Occupational Exposure Limits (English)"
- "Canada - Nova Scotia Occupational Exposure Limits"
- "Canada - Prince Edward Island Occupational Exposure Limits"
- "Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens"
- "Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)"
- "Canada - Saskatchewan Industrial Hazardous Substances"
- "Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits"
- "Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances"
- "Canada ARET (Accelerated Reduction / Elimination of Toxics) Substance List"
- "Canada CEPA Environmental Registry Substance Lists - List of substances on the DSL"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

■ Cumulative effects may result following exposure*.
* (limited evidence).

Denmark Advisory list for selfclassification of dangerous substances

<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS</th>
<th>Suggested codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>triethoxysilane</td>
<td>998-30-1</td>
<td>Xn; R22</td>
</tr>
<tr>
<td>ethanol</td>
<td>64-17-5</td>
<td>Xn; R22</td>
</tr>
</tbody>
</table>

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:
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.