Material Safety Data Sheet

Tyrothricin

sc-358585

Hazard Alert Code Key: EXTREME HIGH MODERATE LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Tyrothricin

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

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>Max</th>
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</thead>
<tbody>
<tr>
<td>Flammability</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Toxicity</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Body Contact</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Reactivity</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Chronic</td>
<td>2</td>
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</tbody>
</table>

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW
RISK

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED
■ Accidental ingestion of the material may be damaging to the health of the individual.
■ At sufficiently high doses the material may be hepatotoxic(i.e., liver damaging).
■ At sufficiently high doses the material may be nephrotoxic(i.e., kidney damaging).

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

SKIN
■ 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 either adverse health effects or irritation of the respiratory tract following inhalation (as classified using animal models). Nevertheless, adverse effects have been produced following exposure of animals by at least one other route and good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.
■ 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
■ Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems. Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung. Prolonged or repeated use of antibiotics, at therapeutic doses, may produce bacterial resistance for some types of bacteria. Prolonged use may result in the overgrowth of non-susceptible organisms (i.e. systemic effects include liver and kidney damage.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS RN</th>
<th>%</th>
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<tbody>
<tr>
<td>tyrothricin</td>
<td>1404-88-2</td>
<td>&gt;98</td>
</tr>
<tr>
<td>mixture of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gramicidin</td>
<td>1405-97-6</td>
<td></td>
</tr>
<tr>
<td>tyrocidine</td>
<td>8011-61-8</td>
<td></td>
</tr>
</tbody>
</table>

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 or hair contact occurs: - Flush skin and hair with running water (and soap if available). - Seek medical attention in event of irritation.

INHALED
- If dust is inhaled, remove from contaminated area. - Encourage patient to blow nose to ensure clear passage of breathing. - If irritation or discomfort persists seek medical attention.

NOTES TO PHYSICIAN
- Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES
Vapour Pressure (mmHG): Negligible
Upper Explosive Limit (%): Not available
Specific Gravity (water=1): Not available
Lower Explosive Limit (%): Not available

**EXTINGUISHING MEDIA**
- Foam.
- Dry chemical powder.

**FIRE FIGHTING**
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.

**GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS**
- Combustible solid which burns but propagates flame with difficulty.
- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
- Combustion products include: carbon monoxide (CO), carbon dioxide (CO2), nitrogen oxides (NOx), other pyrolysis products typical of burning organic material. May emit poisonous fumes.

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

**PERSONAL PROTECTION**
- Glasses: Chemical goggles.
- Gloves:
- Respirator: Particulate

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**Section 6 - ACCIDENTAL RELEASE MEASURES**

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

**MAJOR SPILLS**
- Moderate hazard.
- CAUTION: Advise personnel in area.
- Alert Emergency Responders and tell them location and nature of hazard.

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**Section 7 - HANDLING AND STORAGE**

**PROCEDURE FOR HANDLING**
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.
- Do NOT cut, drill, grind or weld such containers.
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

**RECOMMENDED STORAGE METHODS**
- Glass container.
- Polyethylene or polypropylene container.
- Check all containers are clearly labelled and free from leaks.

**STORAGE REQUIREMENTS**
- Observe manufacturer's storing and handling recommendations.

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

**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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<tr>
<td>Location</td>
<td>Compound/Particle Description</td>
<td>Limit</td>
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<tr>
<td>US - Oregon Permissible Exposure Limits (Z-3)</td>
<td>tyrothricin (Inert or Nuisance Dust: Total dust)</td>
<td>10 (d)</td>
<td></td>
<td></td>
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<tr>
<td>US OSHA Permissible Exposure Levels (PELs) - Table Z3</td>
<td>tyrothricin (Inert or Nuisance Dust: (d) Respirable fraction)</td>
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<td></td>
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<td>US OSHA Permissible Exposure Levels (PELs) - Table Z3</td>
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<tr>
<td>US - Hawaii Air Contaminant Limits</td>
<td>tyrothricin (Particulates not otherwise regulated - Total dust)</td>
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<tr>
<td>US - Oregon Permissible Exposure Limits (Z-3)</td>
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<td>5     (d)</td>
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<td>US - California Permissible Exposure Limits for Chemical Contaminants</td>
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<td>US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants</td>
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<tr>
<td>US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants</td>
<td>tyrothricin (Particulates not otherwise regulated (PNOR)(f)-Respirable fraction)</td>
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<td></td>
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<tr>
<td>US - Michigan Exposure Limits for Air Contaminants</td>
<td>tyrothricin (Particulates not otherwise regulated, Respirable dust)</td>
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<td></td>
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<tr>
<td>Canada - Prince Edward Island Occupational Exposure Limits</td>
<td>tyrothricin (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)</td>
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</tbody>
</table>

See Appendix B current TLV/BEI Book

ENDOELTABLE

PERSONAL PROTECTION
RESPIRATOR
Particulate
Consult your EHS staff for recommendations

EYE
- When handling very small quantities of the material eye protection may not be required.
  For laboratory, larger scale or bulk handling or where regular exposure in an occupational setting occurs:
  - Chemical goggles
  - Face shield. Full face shield may be required for supplementary but never for primary protection of eyes
  - Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses 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].

HANDS/FEET
- 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.
- Rubber gloves (nitrile or low-protein, powder-free latex). Employees allergic to latex gloves should use nitrile gloves in preference.
- Double gloving should be considered.
- PVC gloves.
- Protective shoe covers.
- Head covering.
Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.
- polychloroprene
- nitrile rubber
- butyl rubber
- fluorocautchouc
- polyvinyl chloride
Gloves should be examined for wear and/or degradation constantly.

OTHER
- For quantities up to 500 grams a laboratory coat may be suitable.
- For quantities up to 1 kilogram a disposable laboratory coat or coverall of low permeability is recommended. Coveralls should be buttoned at collar and cuffs.
- For quantities over 1 kilogram and manufacturing operations, wear disposable coverall of low permeability and disposable shoe covers.
- For manufacturing operations, air-supplied full body suits may be required for the provision of advanced respiratory protection.
- Eye wash unit.
- Ensure there is ready access to an emergency shower.
- For Emergencies: Vinyl suit.

ENGINEERING CONTROLS
- Enclosed local exhaust ventilation is required at points of dust, fume or vapor generation.
HEPA terminated local exhaust ventilation should be considered at point of generation of dust, fumes or vapors.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>PHYSICAL PROPERTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid.</td>
</tr>
<tr>
<td>Does not mix with water.</td>
</tr>
<tr>
<td>State</td>
</tr>
<tr>
<td>Melting Range (°F)</td>
</tr>
</tbody>
</table>
Boiling Range (°F) | Not available | Solubility in water (g/L) | Partly miscible
---|---|---|---
Flash Point (°F) | Not available | pH (1% solution) | Not applicable
Decomposition Temp (°F) | Not available | pH (as supplied) | Not applicable
Autoignition Temp (°F) | Not available | Vapour Pressure (mmHg) | Negligible
Upper Explosive Limit (%) | Not available. | Specific Gravity (water=1) | Not available
Lower Explosive Limit (%) | Not available | Relative Vapor Density (air=1) | >1
Volatile Component (%vol) | Negligible | Evaporation Rate | Not applicable

**APPEARANCE**
Crystalline solid; does not mix well with water. Soluble in lower alcohols, acetic acid, pyridine, dry acetone and dioxane. Tends to form colloidal suspensions in water.

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**Section 10 - CHEMICAL STABILITY**

**CONDITIONS CONTRIBUTING TO INSTABILITY**
· Presence of incompatible materials.
· Product is considered stable.

**STORAGE INCOMPATIBILITY**
■ Avoid reaction with oxidizing agents.

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

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**Section 11 - TOXICOLOGICAL INFORMATION**

tyrothricin

**TOXICITY AND IRRITATION**
■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TYROCIDINE:
TYROTHRICIN:
■ No significant acute toxicological data identified in literature search.

TYROTHRICIN:

<table>
<thead>
<tr>
<th>TOXICITY</th>
<th>IRRITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral (mouse) LD50: &gt;3000 mg/kg</td>
<td>Nil Reported</td>
</tr>
<tr>
<td>Intraperitoneal (mouse) LD50: 100 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Subcutaneous (mouse) LD50: &gt;1500 mg/kg</td>
<td></td>
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</tbody>
</table>

Known hypersensitivity reactions are common, temporary loss of balance and nephrotoxic effects, i.e. Impairment of renal function. There are no long term studies about its effect on pregnancy and lactation

**TOXICITY**

**IRRITATION**

**GRAMICIDIN:**

| Intravenous (mouse) LD50: 20 mg/kg | Nil Reported |
| Intravenous (mouse) LD50: 1.5 mg/kg | |
| Parenteral (mouse) LD50: 0.017 mg/kg | |

■ Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergic 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.

**NOTE:** Substance has been shown to be mutagenic in at least one assay, or belongs to a family of chemicals producing damage or change to cellular DNA.

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**Section 12 - ECOLOGICAL INFORMATION**
**Section 13 - DISPOSAL CONSIDERATIONS**

**Disposal Instructions**

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

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.

- 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**

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

**Section 15 - REGULATORY INFORMATION**

tyrothricin (CAS: 1404-88-2) is found on the following regulatory lists;
"US - Hawaii Air Contaminant Limits","US - Oregon Permissible Exposure Limits (Z-3)","US OSHA Permissible Exposure Levels (PELs) - Table Z3"

**Regulations for ingredients**

Gramicidin (CAS: 1405-97-6,1393-88-0) is found on the following regulatory lists;
"Canada - Prince Edward Island Occupational Exposure Limits","Canada National Pollutant Release Inventory (NPRI)","US - California Permissible Exposure Limits for Chemical Contaminants","US - Michigan Exposure Limits for Air Contaminants","US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants"

tyrocidine (CAS: 8011-61-8) is found on the following regulatory lists;
"US - Hawaii Air Contaminant Limits","US - Oregon Permissible Exposure Limits (Z-3)","US OSHA Permissible Exposure Levels (PELs) - Table Z3"

**Section 16 - OTHER INFORMATION**

Ingredients with multiple CAS Nos

Ingredient Name CAS Gramicidin 1405-97-6, 1393-88-0

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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