Material Safety Data Sheet

Methyl trifluoromethanesulfonate
sc-253036

Hazard Alert Code Key:

EXTREME HIGH MODERATE LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Methyl trifluoromethanesulfonate

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
C2-H3-F3-O3-S, F3CSO3CH3, "methyl triflate"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

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

CANADIAN WHMIS SYMBOLS

1 of 7
EMERGENCY OVERVIEW

RISK
Causes severe burns.
Risk of serious damage to eyes.
Flammable.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED
- The material can produce severe chemical burns within the oral cavity and gastrointestinal tract following ingestion.
- Ingestion of acidic corrosives may produce burns around and in the mouth, the throat and esophagus.
- The material has NOT been classified as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence.

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.
- Irritation of the eyes may produce a heavy secretion of tears (lachrymation).

SKIN
- The material can produce severe chemical burns following direct contact with 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 with the material may damage the health of the individual; systemic effects may result following absorption.
- 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 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.
- Inhalation hazard is increased at higher temperatures.
- Inhalation of quantities of liquid mist may be extremely hazardous, even lethal due to spasm, extreme irritation of larynx and bronchi, chemical pneumonitis and pulmonary edema.

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.
- Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.
- There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment.
- Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
- There is some evidence that inhaling this product is more likely to cause a sensitization reaction in some persons compared to the general population.
- Alkyl-substituted sulfonates are thought to induce genetic mutations in cells.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS RN</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>methyl trifluoromethanesulfonate</td>
<td>333-27-7</td>
<td>&gt;98</td>
</tr>
</tbody>
</table>

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 eye: · 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 (mist, fumes) may cause lung edema.
- Corrosive substances may cause lung damage (e.g.
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

<table>
<thead>
<tr>
<th>Vapour Pressure (mmHG)</th>
<th>Not available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Explosive Limit (%)</td>
<td>Not available</td>
</tr>
<tr>
<td>Specific Gravity (water=1)</td>
<td>1.450</td>
</tr>
<tr>
<td>Lower Explosive Limit (%)</td>
<td>Not available</td>
</tr>
</tbody>
</table>

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 1000 metres in all directions.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- Combustion products include: carbon dioxide (CO2), carbon monoxide (CO), hydrogen fluoride, sulfur oxides (SOx), other pyrolysis products typical of burning organic material.
- May emit corrosive fumes.
- Flammable.
- Moderate fire and explosion hazard when exposed to heat or flame.

FIRE INCOMPATIBILITY

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

PERSONAL PROTECTION

Glasses:
- Full face-shield.
Gloves:
Respirator:
- Type A Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

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

- Chemical Class: sulfates and sulfites

For release onto land: recommended sorbents listed in order of priority.

<table>
<thead>
<tr>
<th>SORBENT TYPE</th>
<th>RANK</th>
<th>APPLICATION</th>
<th>COLLECTION</th>
<th>LIMITATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAND SPILL - SMALL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cross-linked polymer -</td>
<td>1</td>
<td>shovel</td>
<td>shovel</td>
<td>R, W, SS</td>
</tr>
<tr>
<td>particulate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>wood-fiber - pillow</td>
<td>1</td>
<td>throw</td>
<td>pitchfork</td>
<td>R, P, DGC, RT</td>
</tr>
<tr>
<td>treated wood fiber -</td>
<td>1</td>
<td>throw</td>
<td>pitchfork</td>
<td>DGC, RT</td>
</tr>
<tr>
<td>pillow</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cross-linked polymer -</td>
<td>1</td>
<td>throw</td>
<td>pitchfork</td>
<td>R, DGC, RT</td>
</tr>
<tr>
<td>particulate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sorbent clay - particulate</td>
<td>2</td>
<td>shovel</td>
<td>shovel</td>
<td>R, I, P</td>
</tr>
<tr>
<td>foamed glass - pillow</td>
<td>2</td>
<td>throw</td>
<td>pitchfork</td>
<td>R, P, DGC, RT</td>
</tr>
<tr>
<td>LAND SPILL - MEDIUM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>expanded mineral -</td>
<td>3</td>
<td>throw</td>
<td>skiploader</td>
<td>R, I, W, P, DGC</td>
</tr>
<tr>
<td>particulate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sorbent clay - particulate</td>
<td>2</td>
<td>throw</td>
<td>skiploader</td>
<td>R, I, P</td>
</tr>
<tr>
<td>polypropylene - particulate</td>
<td>2</td>
<td>throw</td>
<td>skiploader</td>
<td>R, S, DGC</td>
</tr>
<tr>
<td>expanded mineral -</td>
<td>3</td>
<td>throw</td>
<td>skiploader</td>
<td>R, I, W, P, DGC</td>
</tr>
<tr>
<td>particulate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>wood fiber - particulate</td>
<td>3</td>
<td>throw</td>
<td>skiploader</td>
<td>R, W, P, DGC</td>
</tr>
<tr>
<td>polypropylene - mat</td>
<td>3</td>
<td>throw</td>
<td>skiploader</td>
<td>DGC, RT</td>
</tr>
</tbody>
</table>

Legend

DGC: Not effective where ground cover is dense
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.
- Do NOT cut, drill, grind, weld or perform similar operations on or near containers.

RECOMMENDED STORAGE METHODS
- Lined metal can. Lined metal drum. Lined metal safety cans.
- Packing as supplied and/or recommended by manufacturer.
- Plastic lining or containers may only be used if approved for flammable liquid (non-polar type).
- Check that containers are clearly labelled and free from leaks.
DO NOT use aluminum or galvanized containers.

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.
- Protect containers against physical damage and check regularly for leaks.
- Storage areas should be clearly identified, well illuminated, clear of obstruction and accessible only to trained and authorised personnel - adequate security must be provided so that unauthorised personnel do not have access.
- Store in grounded, properly designed and approved vessels and away from incompatible materials.
- Store according to applicable regulations for flammable materials for storage tanks, containers, piping, buildings, rooms, cabinets, allowable quantities and minimum storage distances.
- Use non-sparking ventilation systems, approved explosion proof equipment and intrinsically safe electrical systems.
- Have appropriate extinguishing capability in storage area (e.g. portable fire extinguishers - dry chemical, foam or carbon dioxide) and flammable gas detectors.
- Keep adsorbents for leaks and spills readily available
- For bulk storages, consider use of floating roof or nitrogen blanketed vessels; where venting to atmosphere is possible, equip storage tank vents with flame arrestors; inspect tank vents during winter conditions for vapour/ ice build-up; storage tanks should be above ground and diked to hold entire contents
- Observe manufacturer's storing and handling recommendations.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS
The following materials had no OELs on our records
- methyl trifluoromethanesulfonate: CAS:333-27-7

PERSONAL PROTECTION

RESPIRATOR
Type A Filter of sufficient capacity

EYE
- Chemical goggles.
- Full face shield.

HANDS/FEET
- Elbow length PVC gloves.
- When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots.

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.
- 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
- Local exhaust ventilation usually required. If risk of overexposure exists, wear an approved respirator.

### Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

**PHYSICAL PROPERTIES**

Does not mix with water.
Sinks in water.
Corrosive.

<table>
<thead>
<tr>
<th>State</th>
<th>LiQUID</th>
<th>Molecular Weight</th>
<th>164.10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting Range (°F)</td>
<td>Not available</td>
<td>Viscosity</td>
<td>Not Available</td>
</tr>
<tr>
<td>Boiling Range (°F)</td>
<td>201-210</td>
<td>Solubility in water (g/L)</td>
<td>Partly miscible</td>
</tr>
<tr>
<td>Flash Point (°F)</td>
<td>101</td>
<td>pH (1% solution)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Decomposition Temp (°F)</td>
<td>Not Available</td>
<td>pH (as supplied)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Autoignition Temp (°F)</td>
<td>Not available</td>
<td>Vapour Pressure (mmHG)</td>
<td>Not available</td>
</tr>
<tr>
<td>Upper Explosive Limit (%)</td>
<td>Not available</td>
<td>Specific Gravity (water=1)</td>
<td>1.450</td>
</tr>
<tr>
<td>Lower Explosive Limit (%)</td>
<td>Not available</td>
<td>Relative Vapor Density (air=1)</td>
<td>&gt;1</td>
</tr>
<tr>
<td>Volatile Component (%vol)</td>
<td>Not available</td>
<td>Evaporation Rate</td>
<td>Not available</td>
</tr>
</tbody>
</table>

**APPEARANCE**

Colourless liquid; does not mix with water.

### Section 10 - CHEMICAL STABILITY

**CONDITIONS CONTRIBUTING TO INSTABILITY**

- Contact with alkaline material liberates heat.

**STORAGE INCOMPATIBILITY**

- Reacts with mild steel, galvanized steel / zinc producing hydrogen gas which may form an explosive mixture with air.
- Avoid reaction with oxidizing agents, bases and strong reducing agents.
- Segregate from alkalis, oxidizing agents and chemicals readily decomposed by acids, i.e. cyanides, sulfides, carbonates.
- Avoid strong acids.

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

### Section 11 - TOXICOLOGICAL INFORMATION

methyl trifluoromethanesulfonate

**TOXICITY AND IRRITATION**
METHYL TRIFLUOROMETHANESULFONATE:

- 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 compound 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. No significant acute toxicological data identified in literature search.

Section 12 - ECOLOGICAL INFORMATION

This material and its container must be disposed of as hazardous waste.

Ecotoxicity

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Persistence: Water/Soil</th>
<th>Persistence: Air</th>
<th>Bioaccumulation</th>
<th>Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>methyl trifluoromethanesulfonate</td>
<td>HIGH</td>
<td>LOW</td>
<td></td>
<td>HIGH</td>
</tr>
</tbody>
</table>

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

A. General Product Information
- Ignitability characteristic: use EPA hazardous waste number D001 (waste code I)
- 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.
- 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.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.

Section 14 - TRANSPORTATION INFORMATION

DOT:
- Symbols: None
- Hazard class or Division: 8
- Identification Numbers: UN2920 PG: II
- Label Codes: 8, 3 Special provisions: B2, IB2, T11, TP2, TP27
- Packaging: Exceptions: None
- Non- bulk: 202
- Special provisions: B2, IB2, T11, TP27
- Packaging: Exceptions: None Quantity limitations: 1 L
- Passenger aircraft: Quantity Limitations: Cargo 30 L Vessel stowage: Location: C
- Aircraft only:
- Vessel stowage: Other: 25, 40
- Hazardous materials descriptions and proper shipping names:
- Corrosive liquids, flammable, n.o.s.

Air Transport IATA:
- ICAO/IATA Class: 8 (3) ICAO/IATA Subrisk: None
- UN/ID Number: 2920 Packing Group: II
- Special provisions: None
- Cargo Only
- Packing Instructions: 30 L Maximum Qty/Pack: 1 L
- Passenger and Cargo Passenger and Cargo
Section 15 - REGULATORY INFORMATION

methyl trifluoromethanesulfonate (CAS: 333-27-7) is found on the following regulatory lists;
"Canada Non-Domestic Substances List (NDSL)","US DOE Temporary Emergency Exposure Limits (TEELs)","US Toxic Substances Control Act (TSCA) - Inventory"

Section 16 - OTHER INFORMATION

Reasonable care has been taken in the preparation of this information, but the author makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The author makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use. For additional technical information please call our toxicology department on +800 CHEMCALL.

- Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references. A list of reference resources used to assist the committee may be found at: www.chemwatch.net/references.

- 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.

This document is copyright. Apart from any fair dealing for the purposes of private study, research, review or criticism, as permitted under the Copyright Act, no part may be reproduced by any process without written permission from CHEMWATCH. TEL (+61 3) 9572 4700.

Issue Date: Feb-15-2009
Print Date: Apr-2-2011