2,2'-Dithiodipyridine

sc-238250

Material Safety Data Sheet

Hazard Alert Code Key: EXTREME HIGH MODERATE LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
2,2'-Dithiodipyridine

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
C10-H8-N2-S2, "2, 2' -dithiopyridine", Aldrithiol-2

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>1</td>
<td></td>
</tr>
<tr>
<td>Toxicity</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Body Contact</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Reactivity</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Chronic</td>
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</table>

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW
RISK
Harmful by inhalation and if swallowed. Imitating to eyes, respiratory system and skin.

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
• 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, aerosols (mists, fumes) or dusts, generated by the material during the course of normal handling, may be harmful.
• The material can cause respiratory irritation in some persons.
• 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
• Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
• 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.
• Chronic exposure to mercaptans may result in damage to the lungs, kidneys and liver.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS RN</th>
<th>%</th>
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</thead>
<tbody>
<tr>
<td>2,2'-dipyridyl disulfide</td>
<td>2127-03-9</td>
<td>&gt;98</td>
</tr>
</tbody>
</table>

Section 4 - FIRST AID MEASURES

SWALLOWED
• IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY. • Where Medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:

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 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.
• Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Vapour Pressure (mmHG)</td>
<td>Negligible</td>
</tr>
<tr>
<td>Upper Explosive Limit (%)</td>
<td>Not available.</td>
</tr>
<tr>
<td>Specific Gravity (water=1):</td>
<td>Not available</td>
</tr>
<tr>
<td>Lower Explosive Limit (%)</td>
<td>Not available</td>
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</tbody>
</table>
Sodium hypochlorite solution (3-10%) destroys the odor by converting the mercaptan predominantly to tare commonly used. Frequently, a low flow of inert gas, e.g., nitrogen, is used to maintain a steady caustic in the event of reverse flow. Gas bubblers fitted with sintered-glass dip tubes and charged with aqueous sodium hydroxide (5 to 20%) with hydrogen sulfide or lower molecular weight mercaptans, e.g., C1-C4 mercaptans, the reactions can escape, the charcoal bed can absorb the mercaptans and prevent the escape of odor to the outside atmosphere. However, in reactions with hydrogen sulfide or lower molecular weight mercaptans, e.g., C1-C4 mercaptans, the quantity of effluent gases is directed to an outside gas burner and stack for destruction of the odor by combustion. A hood, equipped with a charcoal filter in the exhaust line, and a high linear air velocity (100 ft/min., minimum) is necessary for mercaptan reactions to carry out in glass and certain small-scale reactions with stainless-steel. In reactions where relatively small amounts of mercaptans can escape, the charcoal bed can absorb the mercaptans and prevent the escape of odor to the outside atmosphere. However, in reactions with hydrogen sulfide or lower molecular weight mercaptans, e.g., C1-C4 mercaptans, the quantity of effluent gases is directed to an outside gas burner to convert the odorous compounds to acceptable combustion products, including CO2 and SO2.

A very familiar and successful method for containing the odors of mercaptan (primarily C1 and C6) in the laboratory includes a continuous flow of volatile C1 to C4 mercaptans. In this case, the vented gases can be fed to an outside gas burner to convert the odor to acceptable combustion products, including C1-C4 mercaptans, the quantity of effluent gases is directed to an outside gas burner to convert the odor to acceptable combustion products, including CO2 and SO2.

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(sodium salt). A wash bottle with hypochlorite solution is very convenient for quickly eliminating or controlling the odor from small spills or when cleaning up glass equipment. A bath of this solution is also very useful. WARNING! Do not add this solution to a large quantity of concentrated mercaptan, since a violent reaction may occur.

A 30-40% aqueous solution of lead acetate trihydrate serves as a detector for methyl and ethyl mercaptan as well as hydrogen sulfide. A wash bottle of lead acetate solution is used to moisten a piece of filter paper or paper towel which is then held close to (no contact) the suspected leak. With hydrogen sulfide the paper turns black and with the two mercaptans a yellow color is obtained (high sensitivity). A large plastic bag should be kept in the hood, to store any odorous waste materials. The plastic bags can then be sealed in fiber drums for disposal. Glass bottles containing mercaptans and other odorous compounds can also be packed in fiber drums for odor-containment and properly marked for disposal.

A box of disposable gloves should be available, and the gloves should be discarded (in plastic bag in hood) after each use. Disposable aprons or lab coats are recommended, since clothing contacted with mercaptan is often difficult to deodorise.

Types of tubing found useful with mercaptans include: Teflon, TFE, FEP, and PFA, Bev-a-line (IV or V), and 316 stainless steel. Bev-a-line tubing has a polyethylene liner cross-linked to an ethylene vinyl acetate shell, a useful temperature range of -60 C to +250 C, and is heat bondable. It is less expensive than TFE tubing and is convenient for flexible connections between glass and metal tubing lines. It is available from most laboratory supply houses. Copper and brass are unacceptable materials for handling mercaptans, because mercaptans are H2S highly corrosive to copper and brass. Care should be taken not to use valves and gauges with brass components.

RECOMMENDED STORAGE METHODS
- Lined metal can, Lined metal pail/drum
- Plastic pail

For low viscosity materials
- Drums and jerricans must be of the non-removable head type.
- Where a can is to be used as an inner package, the can must have a screwed enclosure.

STORAGE REQUIREMENTS
- Store in original containers.
- Keep containers securely sealed.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

### EXPOSURE CONTROLS

<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>
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</tr>
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<tbody>
<tr>
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<td>2,2’-dipyridyl disulfide (Particles (Insoluble or Poorly Soluble) Not Otherwise)</td>
<td>10 (I)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Canada - British Columbia Occupational Exposure Limits</td>
<td>2,2’-dipyridyl disulfide (Particles (Insoluble or Poorly Soluble) Not Otherwise Classified (PNOC))</td>
<td>10 (N)</td>
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<td></td>
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<tr>
<td>US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants</td>
<td>2,2’-dipyridyl disulfide (Particulates not otherwise regulated Respirable)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
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</tr>
</tbody>
</table>

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.

Atofina Chemicals.
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<tr>
<td>Location</td>
<td>Chemical</td>
<td>Exposure Limits</td>
<td>Notes</td>
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</tr>
<tr>
<td>US - California</td>
<td>2,2'-dipyridyl disulfide</td>
<td>5 (n)</td>
<td>Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits. PNOR means “particles not otherwise regulated.”</td>
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<tr>
<td>US - Oregon</td>
<td>2,2'-dipyridyl disulfide</td>
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<td>US - Michigan</td>
<td>2,2'-dipyridyl disulfide</td>
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<td>Canada - Prince Edward Island</td>
<td>2,2'-dipyridyl disulfide</td>
<td>10</td>
<td>See Appendix B current TLV/BEI Book</td>
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ENDOELTABLE

PERSONAL PROTECTION
RESPIRATOR
- particulate.
Consult your EHS staff for recommendations

EYE
- Safety glasses with side shields.
- Chemical goggles.

HANDS/FEET
- Wear chemical protective gloves, eg. PVC.
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).
- 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.
- Eyewash unit.

ENGINEERING CONTROLS
- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES
Solid.
Does not mix with water.

<table>
<thead>
<tr>
<th>State</th>
<th>Divided solid</th>
<th>Molecular Weight</th>
<th>220.32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting Range (°F)</td>
<td>133- 136</td>
<td>Viscosity</td>
<td>Not available</td>
</tr>
<tr>
<td>Boiling Range (°F)</td>
<td>Not available</td>
<td>Solubility in water (g/L)</td>
<td>Partly miscible</td>
</tr>
<tr>
<td>Flash Point (°F)</td>
<td>Not available</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>Negligible</td>
</tr>
<tr>
<td>Upper Explosive Limit (%)</td>
<td>Not available.</td>
<td>Specific Gravity (water=1)</td>
<td>Not available</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>Negligible</td>
<td>Evaporation Rate</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

APPEARANCE
White crystalline powder; does not mix well with water.

Section 10 - CHEMICAL STABILITY

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

STORAGE INCOMPATIBILITY
- Avoid strong bases.
- Avoid reaction with oxidizing agents.
For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

2,2'-dipyridyl disulfide

TOXICITY AND IRRITATION
2,2'-DIPYRIDYL DISULFIDE:
- 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-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.

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>2,2'-dipyridyl disulfide</td>
<td>HIGH</td>
<td>No Data Available</td>
<td>LOW</td>
<td>MED</td>
</tr>
</tbody>
</table>

### Section 13 - DISPOSAL CONSIDERATIONS

**Disposal Instructions**

All waste must be handled in accordance with local, state and federal regulations. Puncture containers to prevent re-use and bury at an authorized landfill. Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:
- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.
- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.

### Section 14 - TRANSPORTATION INFORMATION

**DOT:**
- Symbols: None
- Hazard class or Division: 6.1
- Identification Numbers: UN2811 PG: III
- Label Codes: 6.1 Special provisions: IB8, IP3, T1, TP33
- Packaging: Exceptions: 153 Packaging: Non- bulk: 213
- Packaging: Exceptions: 153 Quantity limitations: 100 kg
- Passenger aircraft/rail:
- Quantity Limitations: Cargo 200 kg Vessel stowage: Location: A aircraft only:
- Vessel stowage: Other: None
- Hazardous materials descriptions and proper shipping names:
- Toxic solids, organic, n.o.s.

**Air Transport IATA:**
- ICAO/IATA Class: 6.1
- ICAO/IATA Subrisk: None
- UN/ID Number: 2811 Packing Group: III
- Special provisions: A3
- Cargo Only
- Packaging Instructions: 200 kg Maximum Qty/Pack: 677
- Passenger and Cargo Passenger and Cargo
- Packaging Instructions: 100 kg Maximum Qty/Pack: 670
- Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity
- Packaging Instructions: 10 kg Maximum Qty/Pack: Y645
- Shipping Name: TOXIC SOLID, ORGANIC, N.O.S. * (CONTAINS 2, 2'-DIPYRIDYL DISULFIDE)

**Maritime Transport IMDG:**
- IMDG Class: 6.1
- IMDG Subrisk: None
- UN Number: 2811 Packing Group: III
- EMS Number: F-A , S-A Special provisions: 223 274
Limited Quantities: 5 kg
Shipping Name: TOXIC SOLID, ORGANIC, N.O.S.(contains 2,2'-dipyridyl disulfide)

Section 15 - REGULATORY INFORMATION

2,2'-dipyridyl disulfide (CAS: 2127-03-9) is found on the following regulatory lists;
"US DOE Temporary Emergency Exposure Limits (TEELs)"

Section 16 - OTHER INFORMATION

ND
Substance CAS Suggested codes 2, 2' - dipyridyl disulfide 2127- 03- 9 Xn; R22

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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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