5-Aminotetrazole

sc-233246

Material Safety Data Sheet

Hazard Alert Code Key: EXTREME HIGH MODERATE LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
5-Aminotetrazole

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
C-H3-N5, "1H-tetrazole, 5-amino-", aminotetrazole, 5-amino-1H-tetrazole, 1H-tetrazol-5-amine, "airbag gas generator"

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>Toxicity</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Body Contact</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Reactivity</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Chronic</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW
RISK
Forms very sensitive explosive metallic compounds.
Heating may cause an explosion.
Harmful if swallowed.
Risk of serious damage to eyes.
Irritating to respiratory system and skin.
Highly flammable.

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
■ If applied to the eyes, this material causes severe eye damage.

SKIN
■ This material can cause inflammation of the skin on contact in some persons.
■ The material may accentuate any pre-existing dermatitis condition.
■ 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.
■ 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.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS RN</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-aminotetrazole monohydrate</td>
<td>4418-61-5</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: ・ 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 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>
</tr>
</thead>
<tbody>
<tr>
<td>Vapour Pressure (mmHG)</td>
<td>Not available</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>
</tbody>
</table>
EXTINGUISHING MEDIA

- For SMALL FIRES:
  Dry chemical, CO2, water spray or foam.
- For LARGE FIRES:
  Water-spray, fog or foam.

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

- WARNING: May EXPLODE on heating!!!.
- Flammable solid which burns and propagates flame easily, even when partly wetted with water.
- Any source of ignition, i.e. friction, heat, sparks or flame, may cause fire or explosion.

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 dust filter.

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

- Remove all ignition sources.
- DO NOT touch or walk through spilled material.

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

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of overexposure 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

- For low viscosity materials and solids: 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

- FOR MINOR QUANTITIES:
  - Store in an indoor fireproof cabinet or in a room of noncombustible construction
  - Provide adequate portable fire-extinguishers in or near the storage area.

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>
</tr>
</thead>
<tbody>
<tr>
<td>US - California Permissible Exposure Limits for Chemical Contaminants</td>
<td>5-aminotetrazole monohydrate (Particulates not otherwise regulated Respirable fraction)</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(n)</td>
</tr>
</tbody>
</table>
### Occupational Exposure Limits

**US - Tennessee**

<table>
<thead>
<tr>
<th>Contaminants</th>
<th>Limit for Air Particulates otherwise regulated Respirable fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-aminotetrazole monohydrate</td>
<td>5</td>
</tr>
</tbody>
</table>

**US - Wyoming**

<table>
<thead>
<tr>
<th>Contaminants</th>
<th>Limit for Air Particulates otherwise regulated Respirable fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-aminotetrazole monohydrate</td>
<td>5</td>
</tr>
</tbody>
</table>

**US - Michigan**

<table>
<thead>
<tr>
<th>Contaminants</th>
<th>Limit for Air Particulates otherwise regulated Respirable dust</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-aminotetrazole monohydrate</td>
<td>5</td>
</tr>
</tbody>
</table>

**Canada - Prince Edward Island**

<table>
<thead>
<tr>
<th>Contaminants</th>
<th>Limit for Air Particulates not otherwise regulated Inhalable particles</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-aminotetrazole monohydrate</td>
<td>10</td>
</tr>
</tbody>
</table>

*See Appendix B current TLV/BEI Book*

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### PERSONAL PROTECTION

**RESPIRATOR**

BR2

Consult your EHS staff for recommendations

**EYE**

- Safety glasses with side shields.
- Chemical goggles.

**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.
- Wear physical protective gloves, eg. leather.

**OTHER**

- Overalls.
- Eyewash unit.
- 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**

- For large scale or continuous use:
  - Spark-free, earthed ventilation system, venting directly to the outside and separate from usual ventilation systems
  - Provide dust collectors with explosion vents.
  - 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

Mixes with water.

<table>
<thead>
<tr>
<th>State</th>
<th>DIVIDED SOLID</th>
<th>Molecular Weight</th>
<th>85.07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting Range (°F)</td>
<td>392-399.2 (decomp)</td>
<td>Viscosity</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Boiling Range (°F)</td>
<td>Not applicable</td>
<td>Solubility in water (g/L)</td>
<td>Miscible</td>
</tr>
<tr>
<td>Flash Point (°F)</td>
<td>Not available</td>
<td>pH (1% solution)</td>
<td>3-5</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>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>Not available.</td>
<td>Evaporation Rate</td>
<td>Not available</td>
</tr>
</tbody>
</table>

APPEARANCE

Moist white crystalline solid; mixes with water.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

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

STORAGE INCOMPATIBILITY

- High nitrogen compounds are often unstable or explosive; the tendency is exaggerated by attachment of azide or diazonium groups, or a high-nitrogen heterocyclic nucleus.
- High-nitrogen chemical families include:
  - azides
  - diazaazoles
  - diazonium salts
  - hydrazinium salts
  - N-nitro compounds
  - tetrazoles
  - triazines
  - triazoles.
- Avoid oxidizing agents, acids, acid chlorides, acid anhydrides.

WARNING: Avoid contact with metals and metal salts - may form explosive compounds.

Diazoitated 5-aminotetrazole is unstable under the conditions recommended for its use in biochemical reactions; whilst the pH was being reduced by addition of 5% potassium hydroxide it exploded, possibly due to the formation of the internal salt, 5-diazotetrazolide. The diazonium chloride is very unstable in concentrated solutions at 0 deg. C. The importance of adequate dilution of the reaction media to prevent explosion during diazotisation must be stressed.

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

Section 11 - TOXICOLOGICAL INFORMATION

5-AMINOTETRAZOLE MONOHYDRATE

TOXICITY AND IRRITATION

5-AMINOTETRAZOLE MONOHYDRATE:

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

<table>
<thead>
<tr>
<th>Toxicity</th>
<th>IRRITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrapertitoneal (mouse) LD50: 2500 mg/kg</td>
<td>Nil Reported</td>
</tr>
</tbody>
</table>

- 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.

Section 12 - ECOLOGICAL INFORMATION

5 of 7
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.
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: G Hazard class or Division: 4.1
Identification Numbers: UN1325 PG: II
Label Codes: 4.1 Special provisions: A1, IB8, IP2, IP4, T3, TP33
Packaging: Exceptions: 151 Packaging: Non- bulk: 212
Packaging: Exceptions: 151 Quantity limitations: 15 kg
Passenger aircraft/rail:
   Quantity Limitations: Cargo 50 kg Vessel stowage: Location: B aircraft only:
   Vessel stowage: Other: None
Hazardous materials descriptions and proper shipping names:
   Flammable solids, organic, n.o.s.
Air Transport IATA:
   ICAO/IATA Class: 4.1 ICAO/IATA Subrisk: None
   UN/ID Number: 1325 Packing Group: II
   Special provisions: A3
   Cargo Only
   Packing Instructions: 417 Maximum Qty/Pack: 50 kg
   Passenger and Cargo Passenger and Cargo
   Packing Instructions: 415 Maximum Qty/Pack: 15 kg
   Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity
   Packing Instructions: Y415 Maximum Qty/Pack: 5 kg
   Shipping Name: FLAMMABLE SOLID, ORGANIC, N.O.S. *(CONTAINS 5-AMINOTETRAZOLE MONOHYDRATE)
Maritime Transport IMDG:
   IMDG Class: 4.1 IMDG Subrisk: None
   UN Number: 1325 Packing Group: II
   EMS Number: F-A , S-G Special provisions: 274 915
   Limited Quantities: 1 kg
   Shipping Name: FLAMMABLE SOLID, ORGANIC, N.O.S.

Section 15 - REGULATORY INFORMATION

5-aminotetrazole monohydrate (CAS: 4418-61-5,15454-54-3) is found on the following regulatory lists;
"Canada Non-Domestic Substances List (NDSL)","US Toxic Substances Control Act (TSCA) - Inventory"
Ingredients with multiple CAS Nos
Ingredient Name CAS 5-aminotetrazole monohydrate 4418-61-5, 15454-54-3

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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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