L-CYSTEINE

MATERIAL SAFETY DATA SHEET

INTEGRA Chemical Company
1216 6th Ave N
Kent WA 98032
Phone: 253-479-7000

24 Hour Emergency Response: CHEMTREC 800-424-9300 (Outside USA 703-527-3887)

Product Identification

Product Name: L-CYSTEINE
Synonyms: Cysteine; L-beta-Mercaptoalanine
Chemical Formula: C\textsubscript{3}H\textsubscript{7}NO\textsubscript{2}S
Formula Weight: 121.16
Chemical Family: Amino acid
Integra Product Numbers: C974.30

Hazard Overview

HMIS Rating: 1-1-0-B
NFPA Rating: NE
Warning Label: Caution.

Use safe chemical handling practices. Avoid contact with skin, eyes and clothing. Wash thoroughly after handling.

Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS #</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-Cysteine</td>
<td>00052-90-4</td>
<td>100</td>
</tr>
</tbody>
</table>

Physical Data

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling Point</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Melting Point</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Vapor Density</td>
<td>NA</td>
<td>Air = 1</td>
</tr>
</tbody>
</table>

Solubility:
Appreciably soluble (>10%) in water.

Appearance and Odor:
Fine white powder or crystals.

Fire and Explosion Data

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Test Method</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash Point</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto-ignition Temperature</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammable Limits (% by volume in air)</td>
<td>Upper: NA</td>
<td>Lower: NA</td>
<td></td>
</tr>
</tbody>
</table>

Fire Extinguishing Media:
Material is not flammable. Use extinguishing media suitable to surrounding materials.

Special Firefighting Procedures:
Use water to cool nearby containers and structures. Wear full protective equipment, including suitable respiratory protection.

Unusual Fire and Explosion Hazards:
None identified

Health Hazard Information

Effects of Overexposure

Skin Contact: None Identified

Eye Contact:
Health Hazard Information

Eye Contact:  None Identified
Ingestion:  None Identified
Inhalation:  None Identified

Chronic Effects of Overexposure:  None Identified

Exposure Limits:

<table>
<thead>
<tr>
<th>Component</th>
<th>TWA</th>
<th>STEL</th>
<th>Ceiling</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-Cysteine</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
</tr>
</tbody>
</table>

ACGIH TLV

<table>
<thead>
<tr>
<th>Component</th>
<th>TWA</th>
<th>STEL</th>
<th>Ceiling</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-Cysteine</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
</tr>
</tbody>
</table>

Toxicity Data:

<table>
<thead>
<tr>
<th>Component</th>
<th>LD50 (oral, mouse)</th>
<th>LD50 (oral, rat)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-Cysteine</td>
<td>660 mg/kg</td>
<td>5580 mg/kg</td>
</tr>
</tbody>
</table>

Medical Conditions Generally Aggravated by Exposure:

Target Organs:  None Identified
Reproductive Effects:  None Identified
Carcinogenicity:  None Identified

Component | NTP Listing | IARC Listing | OSHA Regulated
----------|-------------|--------------|----------------|
L-Cysteine | No listing  | No listing   | No              |

Emergency First Aid Procedures

Skin Contact:  Wash with soap and water.
Eye Contact:  Flush with water for at least 15 minutes. Seek immediate medical attention.
Inhalation:  Remove to fresh air.
Ingestion:  Give victim large amounts of water and induce vomiting. Never give anything by mouth to an unconscious or convulsing person. Seek immediate medical attention.

Additional First Aid and Treatment Notes:

No information available

Reactivity Data

Stability:  Stable
L-CYSTEINE
MATERIAL SAFETY DATA SHEET

INTEGRA Chemical Company
1216 6th Ave N
Kent WA 98032
Phone: 253-479-7000
24 Hour Emergency Response: CHEMTREC 800-424-9300 (Outside USA 703-527-3887)

MSDS Number: C974
Revision Date: 16-Apr-08
Revision No.: 004

Reactivity Data

Stability: Stable
Hazardous Polymerization: Will Not Occur
Incompatibles:
   Incompatible with strong oxidizers.
Decomposition Products:
Conditions to Avoid:
   None identified

Spill and Disposal Procedures

Spill and Leak Procedures:
   Remove all ignition sources. Sweep or scoop into disposal container in a manner that minimizes dust dispersion.
   Wear suitable protective equipment.
Disposal Procedures:
   Dispose in accordance with all Local, State and Federal regulations.

Protective Equipment

Ventilation:
   Use adequate general or local exhaust ventilation to keep fume and/or dust levels as low as possible.
Respiratory Protection:
   None needed unless use generates annoying or irritating dusts, mists or vapors. Use a dust/mist respirator mask if necessary.
Skin and Eye Protective Equipment:
   Safety glasses. Use good chemical handling practices.

Storage and Handling Precautions

Storage Area: GENERAL
   Store in a cool, dry area. Keep away from incompatible substances. Protect from direct light and minimize contact with air. Protect containers from physical damage.

Transportation Information

☐ Regulated Material domestic ground transportation
   (reference: CFR Title 49, Transportation)
      Proper Shipping Name:
      UN or NA Identification number: Hazard Class and Label:
      Packing Group: Subsidiary Risk and Label:

☐ Regulated Material via Air Transportation
   (reference: ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air)
      Proper Shipping Name:
      UN Identification Number: Hazard Class and Label:
      Packing Group: Subsidiary Risk and Label:
L-CYSTEINE
MATERIAL SAFETY DATA SHEET

INTEGRA Chemical Company
1216 6th Ave N
Kent WA 98032
Phone: 253-479-7000
24 Hour Emergency Response: CHEMTREC 800-424-9300 (Outside USA 703-527-3887)

Transportation Information

<table>
<thead>
<tr>
<th>Packing Instruction</th>
<th>Max net qty per package</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger Aircraft:</td>
<td></td>
</tr>
<tr>
<td>Cargo Aircraft:</td>
<td></td>
</tr>
</tbody>
</table>

Regulatory Information

<table>
<thead>
<tr>
<th>Component</th>
<th>TSCA</th>
<th>CERCLA</th>
<th>SARA EHS</th>
<th>SARA 313 Toxic Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-Cysteine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SARA Hazard Categories:</td>
<td>Acute</td>
<td>Chronic</td>
<td>Flammability</td>
<td>Pressure</td>
</tr>
<tr>
<td>L-Cysteine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean Air Act Categories:</td>
<td>SOCMi</td>
<td>HAP</td>
<td>Volatile HAP</td>
<td>Organic HAP</td>
</tr>
<tr>
<td>L-Cysteine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MSDS Revision History:
002 - Changed header phone number
003 - Format revisions; updated header phone number
004 - Updated Header Information

NE = Not established, NA = Not applicable or Not available
The information presented above is offered for informational purposes only. This MSDS, and the associated product, is intended for use only by technically qualified persons, and at their own discretion and risk. Since conditions and manner of use are outside the control of Integra Chemical Company, we make no warranties, either expressed or implied, and assume no liability in connection with any use of this information.

***** END OF MSDS *****