Safety Data Sheet

THIO-SUL®

Section 1: Identification

1a. Product Name ........................................... THIO-SUL®

1b. Other Identification:
   Chemical Family: Inorganic salt solution
   Synonyms: Ammonium thiosulphate; ATS; Thiosulfuric acid,
   (H₂S₂O₃), diammonium salt; Ammonium hypo sulfite;
   Ammonium hypo solution, Ammonium hiposulphite
   Formula: (NH₄)₂S₂O₃
   EC Pre-Registration No. 05-2118047540-50-0000

1c. Recommended Use of Chemical: Agricultural Industry – Fertilizer use
   Photographic – photochemical use

1d. Manufacturer
   Tessenderlo Kerley Inc.
   2255 N. 44th Street, Suite 300
   Phoenix, Arizona 85008-3279
   Information: (602) 889-8300

1e. Emergency Contact
   (800) 877-1737 (Tessenderlo Kerley, Inc.)
   (800) 424-9300 (CHEMTREC)

Section 2: Hazard(s) Identification

2a. Hazard Classification:
   Health: None
   Physical: None

2b. Signal Word
   Not Applicable

Hazard Statement(s):
   Not Applicable

Symbol(s):
   Not Applicable

Precautionary Statement(s):
   Avoid contact with eyes.
   Use/store in cool, well ventilated areas.
   Avoid prolonged/repeated breathing of vapors.
   Avoid prolonged/repeated contact with the skin.
   Keep away from any sources of heat or flames.
   Store totes or small containers out of direct sunlight.
   Wear protective apron, gloves and eye and face protection.
   Do not allow release to aquatic waterways.

2c. Unclassified Hazard(S):
   None

2d. Unknown Toxicity Ingredient:
   None
Section 3: COMPOSITION/ INFORMATION ON INGREDIENTS

3.1 Chemical Ingredients (See Section 8 for exposure guidelines)

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS #</th>
<th>EINECS #</th>
<th>% by Wt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium thiosulfate</td>
<td>7783-18-8</td>
<td>231-9820</td>
<td>50 - 60%</td>
</tr>
<tr>
<td>Ammonium sulfate</td>
<td>7783-20-2</td>
<td>231-984-1</td>
<td>0 - 6%</td>
</tr>
<tr>
<td>Ammonium sulfite (s)</td>
<td>10196-04-0</td>
<td>233-484-9</td>
<td>0.5 - 5%</td>
</tr>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>231-791-2</td>
<td>29 - 49.5%</td>
</tr>
</tbody>
</table>

Section 4: FIRST AID MEASURES

4.1 EYES: Immediately flush with large quantities of water for 15 minutes. Hold eyelids apart during irrigation to insure thorough flushing of the entire area of the eye and lids. Obtain medical attention if irritation occurs.

4.2 SKIN: Immediately flush with large quantities of water. Remove contaminated clothing under a safety shower. Obtain medical attention if irritation occurs.

4.3 INGESTION: If victim is conscious, give 2 to 4 glasses of water and induce vomiting by touching finger to back of throat. Obtain medical attention.

4.4 INHALATION: Remove victim from contaminated atmosphere. If breathing is labored, administer oxygen. If breathing has ceased, clear airway and start mouth to mouth resuscitation. If heart has stopped beating, external heart massage should be applied. Obtain medical attention.

Section 5: FIRE FIGHTING MEASURES

5.1 FLAMMABLE PROPERTIES: (See Section 9, for additional flammable properties)

Heating this product will evolve ammonia. Strong oxidizers such as nitrates, nitrites or chlorates can cause explosive mixtures if heated to dryness.

NFPA: Health - 1  Flammability - 0  Reactivity - 0

5.2 EXTINGUISHING MEDIA:

5.2.1 Suitable Extinguishing Media: Not flammable, use media suitable for combustibles involved in fire.

5.2.2 Unsuitable Extinguishing Media: None known

5.3 PROTECTION OF FIREFIGHTERS:

5.3.1 Specific hazards arising from the chemical:

Physical hazards Heating (flames) of closed or sealed containers may cause violent rupture of container due to thermal expansion of compressed gases.
**Chemical hazards** Heating causes release of ammonia vapors. Vapors are irritating to eyes, skin and respiratory tract. Heating to dryness may cause the release of ammonia, ammonium sulfate, sulfur and oxides of sulfur.

5.3.2: **Protective equipment and precautions for firefighters:** Firefighters should wear self-contained breathing apparatus and full fire-fighting turnout gear. Keep containers/storage vessels in fire area cooled with water spray.

---

**Section 6: ACCIDENTAL RELEASE MEASURES**

6.1 **PERSONAL PRECAUTIONS**

Use personal protective equipment specified in Section 8. Isolate the hazard area and deny entry to unnecessary and unprotected personnel.

6.2 **ENVIRONMENTAL PRECAUTIONS**

This product is not a water pollutant, but should be kept out of “waters of the US” because of potential aquatic toxicity (See Section 12). This product is a non-hazardous liquid fertilizer solution designed to supply nitrogen and sulfur to various crops.

6.3 **METHODS OF CONTAINMENT**

- **Small releases:** Confine and absorb small releases on sand, earth or other inert absorbent.
- **Large releases:** Shut off release if safe to do so. Dike spill area with earth, sand or other inert absorbent to prevent runoff into surface waterways (potential aquatic toxicity). Recover as much of the solution as possible. Treat remaining material as a small release (above)

6.4 **METHODS FOR CLEANUP**

- **Small release:** For small areas use water spray to dilute to a weak fertilizer solution, taking care not to let water runoff out of containment area.
- **Large release:** Recover as much of the spilled product using portable pump and hoses. Treat remaining material as a small release (above). Spread fertilizer material over a wide area to avoid over fertilizing effects.

6.5 **OTHER INFORMATION** NA

---

**Section 7: HANDLING and STORAGE**

7.1 **Handling:** Avoid contact with eyes. Use only in a well ventilated area. Wash thoroughly after handling. Avoid prolonged or repeated breathing of vapors. Avoid prolonged or repeated contact with the skin.

7.2 **Storage:** Store in well ventilated areas. Do not store combustibles in the area of storage vessels. Keep away from any sources of heat or flame. Store tote and smaller containers out of direct sunlight at moderate temperatures. (See Section 10.3 for materials of construction)
Section 8: EXPOSURE CONTROLS/ PERSONAL PROTECTION

8.1 EXPOSURE GUIDELINES: OSHA ACGIH

<table>
<thead>
<tr>
<th></th>
<th>TWA</th>
<th>STEL</th>
<th>TLV</th>
<th>STEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEL</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

8.2 ENGINEERING CONTROLS: Use adequate exhaust ventilation to prevent inhalation of product vapors.

8.3 PERSONAL PROTECTIVE EQUIPMENT (PPE)

8.3.1 Eye/Face Protection: Chemical goggles and a full face shield.

8.3.2 Skin Protection: Neoprene rubber gloves and apron should be worn to prevent repeated or prolonged contact with the liquid. Wash contaminated clothing prior to reuse.

8.3.3 Respiratory Protection: None generally required. If conditions exist where mist may be generated, a NIOSH/MSHA approved mist respirator should be worn.

8.3.4 General Hygiene Considerations: There are no known hazards associated with this product. When use as recommended, however common good industrial hygiene practices should be followed, such as, washing thoroughly after handling and before eating or drinking.

Section 9: PHYSICAL and CHEMICAL PROPERTIES

9.1 APPEARANCE/STATE/ODOR: Colorless to yellow to tan liquid which may have a slight ammonia and/or organic odor

9.2 pH: 6.5 to 8.5

9.3 FREEZING POINT: 30°F – 60°F (-1.1°C – 15.6°C) typical

9.4 BOILING POINT: 210°F (98.9°C) - 220°F (104.4°C)

9.5 FLASH POINT: Not applicable

9.6 EVAPORATION RATE: Not applicable

9.7 FLAMMABILITY: Not applicable

9.8 FLAMMABILITY LIMITS: Not applicable

9.9 VAPOR PRESSURE: 18 mm @ 70°F (21.1°C)

9.10 VAPOR DENSITY: Not applicable

9.11 SPECIFIC GRAVITY: 1.32 - 1.35 (11.0 - 11.2 lbs/gal)

9.12 SOLUBILITY: Complete

Section 10: STABILITY and REACTIVITY

10.1 CHEMICAL STABILITY: This is a stable material under normal [60 120°F (15-49°C)] temperatures and pressure [14.7 psig (760mm Hg)]

10.2 CONDITIONS TO AVOID: Temperatures above 120°F (49°C) and below 60°F (15°C).

10.3 INCOMPATIBLE MATERIALS: Acids will cause the release of sulfur dioxide, a severe respiratory hazard. Alkalis will accelerate the evolution of ammonia. Ammonium thiosulfate solution is not compatible with copper, zinc or their alloys (i.e. bronze, brass, galvanized metals, etc.). These materials of construction should not be used in handling systems or storage containers for this product. (SEE Section 7.2, Storage)
10.4 HAZARDOUS DECOMPOSITION PRODUCTS: Heating this product will evolve ammonia. Heating to dryness will cause the production of ammonia, ammonium sulfate, sulfur and oxides of sulfur. Ammonia (16-25%) may form flammable mixtures with air.

10.5 POSSIBILITY OF HAZARDOUS REACTIONS: Strong oxidizers such as nitrates, nitrites or chlorates can cause explosive mixtures if heated to dryness.

Section 11: TOXICOLOGICAL INFORMATION

11.1 ORAL: Oral-Rat LD50: 1,950 - 2,890 mg/kg (ammonium thiosulfate)
Oral-Mouse LD50: 2,100 - >3,000 mg/kg (ammonium thiosulfate)
Oral-Rat LD50: 2,000 – 4,250 mg/kg (ammonium sulfate)

11.2 DERMAL: Data not available. Skin Irritation/corrosion test on Rabbit & Rat: Non-Irritating
Rat > 2,000 mg/kg (ammonium sulfate)

11.3 INHALATION: Inhalation-Rat LC50: > 2,260 mg/m3 (4 hrs - ammonium thiosulfate)
Inhalation-Mouse LC50: > 1,800 mg/m3 (4 hrs - ammonium thiosulfate)
Inhalation-Rabbit LD50: > 2,200 ug/m3 (1 Hr - ammonium sulfate)

11.4 CHRONIC/CARCINOGENICITY: No evidence available

11.5 TERATOLOGY: Data not available

11.6 REPRODUCTION: Data not available

11.7 MUTAGENICITY: Data not available

Additional product testing data is available from “TFI Product testing Program”, The Fertilizer Institute, April 2003.

Section 12: ECOLOGICAL INFORMATION

Static acute 96 hour-LC50 for bluegills is 1,000 mg/L.
Static acute 96 hour-LC50 for rainbow trout is 770 mg/L.
Static acute 96 hour-LC50 for sheepshead minnow is > 1,000 mg/L.
Static acute 96 hour-LC50 for mysid shrimp is 77 mg/L.

Section 13: DISPOSAL CONSIDERATIONS

If this product as supplied becomes a waste, it does not meet the criteria of a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Consult state and local regulations for different or more restrictive disposal regulations.

Section 14: TRANSPORT INFORMATION

14.1 BASIC SHIPPING DESCRIPTION

14.1.1 Proper Shipping Name: Ammonium thiosulfate solution (Non-hazardous)
14.2 ADDITIONAL INFORMATION

14.2.1 Other DOT Requirements

14.2.1.1 Reportable Quantity: No
14.2.1.2 Placard(s): NA
14.2.1.3 Label(s) NA

14.2.2 USCG Classification: Class 43, Misc. water solutions Chris Code – ATV

14.2.3 International Transportation

14.2.3.1 IMO: Pollution Category (C) See USCG, Section 14.2.2
14.2.3.2 IATA: Non-hazardous under IATA regulations.
14.2.3.3 TDG (Canada): Proper Shipping Description – See US DOT Section 14.1.1.

14.2.4 Emergency Response Guide: Not applicable

14.2.5 Emergency Response Assistance Plan: Not applicable

14.2.6 Special Precautions: Not applicable

Section 15: REGULATORY INFORMATION

15.1 US FEDERAL REGULATIONS

15.1.2 TSCA: Product is contained in USEPA Toxic Substance Control Act Inventory
15.1.3 CERLA: Reportable Quantity – Not applicable
15.1.4 SARA Title III:

15.1.4.1 Extremely Hazardous Substance (EHS): Not Listed
15.1.4.2 Section 312 (Tier II) ratings: Immediate (acute) Yes
Fire No
Sudden release No
Reactivity No
Delayed (chronic) No

15.1.4.3 Section 313 (FORM R): Ammonia (CAS # 7664-41-7) – 14.6%
15.1.5 RCRA (Resource Conservation and Recovery Act) Status: Not Applicable
15.1.6 CAA Hazardous Air Pollutant (HAP): Not Applicable

15.2 INTERNATIONAL REGULATIONS

15.2.1 Canada

15.2.1.1 WHIMIS: Not Applicable
15.2.1.2 DSL/NDSL: Listed in DSL, Record # 8479

Thio-Sul
Section 16: OTHER INFORMATION

REVISIONS: The entire SDS was reformatted to comply to ANSI Standard Z400.1-1993, by Technical Services-Tessenderlo Kerley, Inc.

Address updated, 4/30/99
Section 8.3, Eye Protection revised and logo revised, 4/29/02
Section 2.1, ingredient adjusted, Section 11 toxicity data added, Section 14.1 clarified, and Section 9 adjusted 6/15/04
Entire MSDS revised to conform to ANSI Z400.1-2004, and GHS. 1/31/2011

THE INFORMATION PUBLISHED IN THIS SAFETY DATA SHEET HAS BEEN COMPILED FROM OUR EXPERIENCE AND OSHA, ANSI, NFPA, DOT, ERG, AND CHRIS. IT IS THE USER'S RESPONSIBILITY TO DETERMINE THE SUITABILITY OF THIS INFORMATION FOR THE ADOPTION OF NECESSARY SAFETY PRECAUTIONS. WE RESERVE THE RIGHT TO REVISE SAFETY DATA SHEETS PERIODICALLY AS NEW INFORMATION BECOMES AVAILABLE.