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TESSENDERLO GROUP

Safety Data Sheet

Ammonium Sulfide Solution

SDS Number: 30 **Revision:** February 24, 2023

Section 1: IDENTIFICATION

1.1 Product Name: **Ammonium Sulfide Solution**

1.2 Other Identification:

Chemical Family: Inorganic salt solution
Formula: $(NH_4)_2S$

1.3 Recommended Use of Chemical: Mining reagent

1.4 Manufacturer: Tessenderlo Kerley, Inc.
2910 N. 44th Street, Suite 100
Phoenix, Arizona 85018
Information: (602) 889-8300

1.5 Emergency Contact:

Tessenderlo Kerley, Inc.	(800) 877-1737
CHEMTREC	(800) 424-9300 (Domestic)
	(703) 527-3887 (International)

Section 2: HAZARD(S) IDENTIFICATION

2.1 Hazard Classification:

Health	Acute Toxicity-Oral	Category 3
	Acute Toxicity-Inhalation	Category 3
	Skin Corrosion/Irritation	Category 1B
	Eye Damage/Irritation	Category 1
Physical	Flammable liquids	Category 2

2.2 Signal Word: **DANGER**

2.3 Hazard Statement(s):
Toxic if swallowed
Toxic if inhaled
Causes severe skin burns and eye damage
Causes serious eye damage
Highly flammable liquid and vapor

2.4 Symbol(s):

2.5 Precautionary Statement(s):

If swallowed: Rinse mouth. Do NOT induce vomiting. Immediately call a poison center/doctor/regional medical center.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse.
If inhaled: Remove person to fresh air and keep comfortable for breathing. Immediately call a poison center, doctor or regional medical center.
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor/regional medical center.
Wash hands and face thoroughly after handling. Do not eat, drink or smoke when using this product.
Do NOT breathe fumes/gas/mist/vapors.
Wear neoprene rubber gloves, boots, chemical suit and chemical goggles and full-face shield.
Store locked up. Store in well-ventilated place. Keep cool. Keep container tightly closed. Use only outdoors or in well-ventilated area.
Keep away from heat/sparks/open flames/hot surfaces/electrical ignition sources. No smoking.
Ground/Bond container and receiving equipment.
Use explosion-proof electrical/ventilation/lighting/process equipment.
Use only non-sparking tools. Take precautionary measures against static discharge.
In case of fire: Use dry chemical, carbon dioxide or alcohol foam to extinguish.
Dispose of contents/container to chemical waste facility in accordance with local/state/federal regulations.
Do not allow release to aquatic waterways.

2.6 Unclassified Hazard(s): Aquatic toxicity

2.7 Unknown Toxicity Ingredient: None

Section 3: COMPOSITION/INFORMATION on INGREDIENTS

3.1 Chemical Ingredients: (See Section 8 for exposure guidelines)

Chemical	Synonym Common Name	CAS No.	EINECS No.	% by Wt.
Ammonium sulfide solution	Ammonium sulfide solution	12135-76-1	235-223-4	40 – 55 (Typical)
Water and inerts	Water	7732-18-5	231-791-2	Remaining %

Section 4: FIRST AID MEASURES

4.1 Symptoms/Effects:

Acute: **Severe inhalation hazard.** Product is alkaline and corrosive to skin and eyes.

Chronic: No known chronic effects.

4.2 Eyes: Immediately flush with large quantities of water for 15 minutes. Hold eyelids apart during irrigation to ensure thorough flushing of the entire area of the eye and lids. Obtain immediate medical attention.

4.3 Skin: Immediately flush skin with large quantities of water. Remove contaminated clothing under a safety shower. Continue rinsing. Obtain immediate medical attention.

4.4 Ingestion: DO NOT INDUCE VOMITING. If victim is conscious, immediately give large quantities of water. If vomiting does occur, continue to give fluids. Obtain immediate medical attention.

4.5 Inhalation: Remove victim from contaminated atmosphere. If breathing is labored, administer Oxygen. If breathing has ceased, clear airway and start CPR. Obtain immediate medical attention.

Section 5: FIRE FIGHTING MEASURES

5.1 Flammable Properties:

NFPA: Health - 4 Flammability - 3 Reactivity - 1

5.2 Extinguishing Media:

5.2.1 Suitable Extinguishing Media: Water, dry chemical or alcohol foam.

5.2.2 Unsuitable Extinguishing Media: For small fires, large quantities of water are suitable. For larger fires involving large quantities of this product, water will lower the pH of the product causing more flammable/toxic vapors to evolve.

5.3 Protection of Firefighters:

5.3.1 Specific Hazards Arising from the Chemical:

Physical Hazards: Liquid is corrosive to skin and eyes. Toxic vapors of Ammonia and Hydrogen sulfide exist in vapor space over the liquid. Heating (flames) of closed or sealed containers may cause violent rupture of container due to thermal expansion of compressed gases.

Chemical Hazards: Dilution of product with water will increase the evolution of Hydrogen sulfide vapors.

5.3.2 Protective Equipment and Precautions for Firefighters:

Firefighters should wear self-contained breathing apparatus (SCBA) and full fire-fighting turnout gear. Keep containers/storage vessels in fire area cooled with water spray.

Heating this product will increase Ammonia and Hydrogen sulfide vapors. Dilution with water will increase the evolution of Hydrogen sulfide vapors. Both of these gases may form flammable mixtures with air (See Section 9.10). Keep containers/storage vessels in fire area cooled with water spray. If the vapors venting from a container or vessel are burning, they should be permitted to burn until the source of ignition has been eliminated.

Ammonium sulfide solutions do not support a continuous pooling liquid fire. The released vapors will flash off and then have to build again in concentration for an outside ignition source to re-ignite the vapors.

Section 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal Precautions: Use personal protective equipment specified in Section 8. Isolate the release area and deny entry to unnecessary, unprotected and untrained personnel. If safe to do so, remove any potential sources of heat/ignition.

6.2 Environmental Precautions: Keep out of "waters of the United States" because of aquatic toxicity (See Section 12).

6.3 Methods of Containment:

Small Release: Confine and absorb small releases with sand, earth or other inert absorbents.

Large Release: Shut off release if safe to do so. Dike spill area with earth, sand or other inert absorbents to prevent runoff into surface waterways (aquatic toxicity), storm drains or sewers.

6.4 Method for Cleanup:

Small Release: Treat area with a spray of a weak solution (3-5%) of Hydrogen peroxide to stop release of toxic Hydrogen sulfide and to help neutralize the spill area. Once reaction stops, soak up remaining liquids with absorbent. Shovel up absorbed material and put in suitable waste container for proper waste disposal. Use non-sparking tools.

Large Release: Recover spilled product with air-operated diaphragm pump, hose and non-sparking tools. Treat remaining material as a small release (above). If water spray is used to reduce vapors, do not

apply directly to the spill but utilize the spray on the vapors just downwind of the spill area.

Section 7: HANDLING and STORAGE

7.1 Handling: Avoid contact with skin or eyes. Use only in a well-ventilated area. Wash thoroughly after handling. Avoid breathing product vapors.

7.2 Storage: Store in cool, dry well-ventilated areas. Do not store combustibles or incompatible materials in product storage areas or loading/unloading areas. Keep away from heat or flames. Storage in drums or totes is not recommended due to possible product degradation if containers are not properly handled and are allowed to overheat or come in contact with incompatible materials. Product degradation can cause toxic gas release. (See Section 10.5, for materials of construction)

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Exposure Guidelines:

Chemical	OSHA PELs		ACGIH TLVs	
	TWA	STEL	TWA	STEL
Ammonia	50 ppm	None	25 ppm	35 ppm
Ammonium sulfide solution	None	None	None	None
Hydrogen Sulfide	None	20 ppm (Ceiling)	1 ppm	5 ppm
Water	None	None	None	None

8.2 Engineering Controls: Use adequate exhaust ventilation to prevent inhalation of product vapors. Keep eye wash/safety showers in areas where product is commonly handled.

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, chemical suit and boots should be worn to prevent contact with the liquid. Wash contaminated clothing prior to reuse.

8.3.3 Respiratory Protection: Wear self-contained breathing apparatus (SCBA), pressure demand, MSHA/NIOSH approved or equivalent or supplied air respirator with full face mask.

8.3.4 Hygiene Considerations: 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:	Green to yellow to reddish-yellow liquid.
9.2 Odor:	Rotten egg odor.
9.3 Odor Threshold:	4.7 ppb (Hydrogen sulfide). 37 ppb (Ammonia).
9.4 pH:	9.5 to 10.5 (Typical).
9.5 Melting Point/Freezing Point:	0° to 10°F (-17.8° - to -12.2°C).
9.6 Boiling Point:	104°F (40°C)
9.7 Flash Point:	71.6°F (22°C)
9.8 Evaporation Rate:	Not determined
9.9 Flammability:	See Section 5.1
9.10 Upper/Lower Flammability Limits:	4.3 to 46% in air (Hydrogen sulfide). 15 to 28% in air (Ammonia).
9.11 Vapor Pressure:	450 mm Hg @ 68°F (20°C).
9.12 Vapor Density:	Not determined
9.13 Relative Density:	0.975 to 1.05 (8.12 to 8.75 lbs/gal).
9.14 Solubility:	Complete
9.15 Partition Coefficient:	No data available.
9.16 Auto-ignition Temperature:	Not applicable
9.17 Decomposition Temperature:	Not determined
9.18 Viscosity:	Not determined

Section 10: STABILITY and REACTIVITY

10.1 Reactivity:	Ammonium sulfide solution is a strong base/reducing agent.
10.2 Chemical Stability:	This is a stable product under normal (ambient) temperature and pressure.
10.3 Possibility of Hazardous Reactions:	Contact with acids or acidic materials or dilution with water will increase Hydrogen sulfide vapors.
10.4 Conditions to Avoid:	Contact with strong oxidizers, acids/acidic materials, dilution with water or heating of the solution.
10.5 Incompatible Materials:	Strong oxidizers such as nitrates, nitrites or chlorates can cause explosive mixtures if heated to dryness. Acids will cause the release of Hydrogen sulfide, a highly toxic gas. Alkalies will accelerate the evolution of Ammonia. **Ammonium sulfide 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.
10.6 Hazardous Decomposition Products:	Heating this product will increase ammonia and Hydrogen sulfide vapors. Continued heating will also cause Oxides of Nitrogen and Sulfur to be released.

Section 11: TOXICOLOGICAL INFORMATION

11.1 Oral: Oral-Mus LD_{LO}: 80 mg/kg (ammonium sulfide)
Oral-Rat, LD_{50}: 350 mg/kg (ammonia)

11.2 Dermal: Skin-Mus, LD_{50}: 132 mg/kg (ammonium sulfide)
Skin-Rabbit, LD_{LO}: 119 mg/kg (ammonium sulfide)

11.3 Inhalation: Inhalation-Rat, LC_{50}: 2,000 ppm, 4 hr. exposure (ammonia).
Inhalation-Rat, LC_{50}: 444 ppm, 1 hr. exposure (hydrogen sulfide)

11.4 Eyes: No data available. However, ingredients are known to cause severe eye damage on exposure to eyes.

11.5 Chronic/Carcinogenicity: Not listed in NTP, IARC or by OSHA.

11.6 Teratology: No data available.

11.7 Reproduction: No data available.

11.8 Mutagenicity: No data available.

Section 12: ECOLOGICAL INFORMATION

12.1 Ecotoxicity: 100 ppm, 72 hrs., goldfish killed, fresh water.
248 ppm, 48 hrs. mosquito fish, Tl_m, fresh water.
Ammonia ingredient is known to be very toxic to aquatic life.

12.2 Persistence & Degradability: No data available.

12.3 Bioaccumulative Potential: This product is not bioaccumulative.

12.4 Mobility in Soil: No data available.

12.5 Other Adverse Effects: None

Section 13: DISPOSAL CONSIDERATIONS

Consult federal, state and local regulations for disposal requirements.

Section 14: TRANSPORT INFORMATION

14.1 Basic Shipping Description:

14.1.1 Proper Shipping Name:	Ammonium sulfide solution
14.1.2 Hazard Classes:	8 (6.1, 3)
14.1.3 Identification Number:	UN2683
14.1.4 Packing Group:	II
14.1.5 Hazardous Substance:	Yes

14.1.6 Marine Pollutant: No

14.2 Additional Information:

14.2.1 Other DOT Requirements:

14.2.1.1 Reportable Quantity: 100 lbs (27 gallons of product @ 45% concentration).
14.2.1.2 Placard(s): Corrosive
14.2.1.3 Label(s): Corrosive, toxic, flammable.

14.2.2 USCG Classification: Class: Not listed CHRIS Code: ASF

14.2.3 International Transportation:

14.2.3.1 IMO: Ammonium sulphide solution.
14.2.3.2 IATA: Ammonium sulphide solution.
14.2.3.3 TDG (Canada): Ammonium sulphide solution.
14.2.3.4 ADR (Europe): Ammonium sulphide solution.
14.2.3.5 ADG (Australia): Ammonium sulphide solution.

14.2.4 Emergency Response Guide: 132

14.4.5 ERAP - Canada: Yes, for shipments greater than 246 gals.

14.2.6 Special Precautions: None

Section 15: REGULATORY INFORMATION

15.1 U.S. Federal Regulations:

15.1.1 OSHA: This product is considered hazardous under the criteria of the Federal OSHA Hazard Communication Standard (29 CFR 1910.1200).

15.1.2 TSCA: Product is contained in USEPA Toxic Substance Control Act Inventory.

15.1.3 CERCLA: Reportable Quantity – Yes, 100 lbs.

15.1.4 SARA Title III:

15.1.4.1 Extremely Hazardous Substance (EHS): No

15.1.4.2 Section 312 (Tier II) Ratings:

Immediate (acute)	Yes
Fire	Yes
Sudden Release	No
Reactivity	Yes
Delayed (chronic)	No

15.1.4.3 Section 313 (FORM R): Yes, ammonia solution.

15.1.5 RCRA: Yes, D001, D003 waste.

15.1.6 CAA (Hazardous Air Pollutant/HAP): Not applicable

15.2 International Regulations:

15.2.1 Canada:

15.2.1.1 WHMIS: E, D2A, B2

15.2.1.2 DSL/NDSL: DSL, Record No. 4701

15.3 State Regulations:

15.3.1 CA Proposition 65: ⚠**WARNING:** This product can expose you to chemicals including benzene, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65.Warnings.ca.gov.

Section 16: OTHER INFORMATION

REVISIONS: This SDS was reformatted to comply with the new Hazard Communication Standard dated March 26, 2012, by the Regulatory Affairs Department of Tessenderlo Kerley, Inc. 9/26/2014. Revised Section 2 Precautionary Statements. 6/4/2015.; Revised sections 2, 5, 6, 8-10 and 15. 6/10/2016.; Revised section 15. 8/6/2018.; Revised Section 1. 1/3/2020.; Revised logo. 10/4/2021; Revised Section 7.2. 2/24/2023

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