



# TSI-Ferrous Sulfide Activator

## SAFETY DATA SHEET

### SECTION 1: Identification

#### 1.1. Identification

Product form:	Mixture
Trade name:	TSI -FSA
CAS No:	1317-37-9
Formula:	FeS
Synonyms:	Ferrous sulfide / Iron sulfide / Iron sulphide / Iron(II) sulfide / Ferrous sulfide / Iron sulfide / Iron sulphide / Iron(II) sulfide

#### 1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture: Chemical used for the activation of persulfate.

#### 1.3. Details of the supplier of the safety data sheet

Terra Systems, Inc.  
130 Hickman Road, Suite 1  
Claymont, DE 19703

Company Contact: Michael D. Lee, Ph.D.  
Telephone Number: (302)798-9553

#### 1.4. Emergency telephone number

CHEMTREC: (800) 424-9300

### SECTION 2: Hazard(s) identification

#### 2.1. Classification of the substance or mixture

Classification of the substance or mixture	GHS-US classification
Skin corrosion/irritation Category 2	H315
Serious eye damage/eye irritation Category 2A	H319
Full text of H statements:	see section 16

#### 2.2. Label elements

##### GHS-US labeling



Hazard pictograms (GHS-US):

GHS07

Signal word (GHS-US):

Warning



Hazard statements (GHS-US):

H315 - Causes skin irritation

H319 - Causes serious eye irritation

Precautionary statements (GHS-US):

P264 - Wash hands thoroughly after handling

P280 - Wear eye protection, protective clothing, protective gloves

P302+P352 - If on skin: Wash with plenty of water

P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

P321 - Specific treatment (see Consult a doctor/medical service if you feel unwell on this label) P332+P313 - If skin irritation occurs: Get medical advice/attention

P337+P313 - If eye irritation persists: Get medical advice/attention

P362+P364 - Take off contaminated clothing and wash it before reuse

### 2.3. Other hazards

#### HMIS Classification:

Health hazard: 0

Flammability: 0

Physical hazards: 0

#### NFPA Rating:

Health hazard: 1

Fire: 0

Reactivity Hazard: 0

**Inhalation** May be harmful if inhaled. May cause respiratory tract irritation.

**Skin** May be harmful if absorbed through skin. May cause skin irritation.

**Eyes** May cause eye irritation.

**Ingestion** May be harmful if swallowed.

**Other Hazards not contributing to the classification:** Generates toxic gas in contact with acid.

### 2.4. Unknown acute toxicity (GHSUS)

Not applicable

## SECTION 3: Composition/Information on ingredients

### 3.1. Substance

Not applicable



### 3.2. Mixture

Name	Product Identifier	%	GHS-US classification
Iron sulfide (FeS)	(CAS No) 1317-37-9	7 -11	Not classified
Sodium Sulfide	(CAS No) 1313-82-2	0.1 - 1	Acute Tox. 3 (Oral), H301

Full text of hazard classes and H-statements : see section 16

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

First-aid measures general:	Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).
First-aid measures after inhalation:	Remove person to fresh air and keep comfortable for breathing. Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a poison center or doctor/physician.
First-aid measures after skin contact:	Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation occurs: Get medical advice/attention.
First-aid measures after eye contact:	Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a doctor/physician. If eye irritation persists: Get medical advice/attention.
First-aid measures after ingestion:	Rinse mouth. Do NOT induce vomiting. Immediately call a poison center or doctor/physician. Call a poison center/doctor/physician if you feel unwell.

### 4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries:	Causes skin and eye irritation.
Symptoms/injuries after skin contact :	Irritation.
Symptoms/injuries after eye contact:	Causes serious eye damage. Eye irritation.

### 4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

Suitable extinguishing media:	Foam. Dry powder. Carbon dioxide. Water spray. Sand.
Unsuitable extinguishing media:	Do not use a heavy water stream.

### 5.2. Special hazards arising from the substance or mixture



Reactivity: Corrosive vapors.

### 5.3. Advice for firefighters

Firefighting instructions:

Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment.

Protection during firefighting:

Do not enter fire area without proper protective equipment, including respiratory protection. Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing.

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

#### 6.1.1. For non-emergency personnel

Emergency procedures:

Ventilate spillage area. Evacuate unnecessary personnel. Avoid contact with skin and eyes.

#### 6.1.2. For emergency responders

Protective equipment:

Do not attempt to take action without suitable protective equipment. Equip cleanup crew with proper protection. For further information refer to section 8: "Exposure controls/personal protection".

Emergency procedures:

Ventilate area.

### 6.2. Environmental precautions

Avoid release to the environment. Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

### 6.3. Methods and materials for containment and cleaning up

Methods for cleaning up:

Take up liquid spill into absorbent material. Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect spillage. Store away from other materials.

Other information:

Dispose of materials or solid residues at an authorized site.

### 6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection. For further information refer to section 13.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Precautions for safe handling:

Ensure good ventilation of the work station. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Provide good ventilation in process area to prevent



formation of vapor. Do not breathe dust, fume, gas, mist, spray, vapors. Avoid contact during pregnancy/while nursing. Avoid contact with skin and eyes. Wear personal protective equipment.

Hygiene measures:

Wash hands thoroughly after handling. Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

## 7.2. Conditions for safe storage, including any incompatibilities

Technical measures:

Comply with applicable regulations.

Storage conditions:

Keep only in the original container in a cool, well ventilated place away from : Ignition sources, Incompatible materials. Keep container closed when not in use. Store in a well-ventilated place. Keep cool.

Incompatible products:

Strong bases. Strong acids.

Incompatible materials:

Sources of ignition. Direct sunlight.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

TSI-FSA (1317-37-9)		
ACGIH	ACGIH TWA (mg/m <sup>3</sup> )	1.4 mg/m <sup>3</sup>
ACGIH	ACGIH TWA (ppm)	1 ppm
ACGIH	ACGIH STEL (mg/m <sup>3</sup> )	7 mg/m <sup>3</sup>
ACGIH	ACGIH STEL (ppm)	5 ppm
Iron sulfide (FeS) (1317-37-9)		
Not applicable		

### Sodium sulfide (1313-82-2)

Not applicable

### 8.2. Exposure controls

Appropriate engineering controls:

Ensure good ventilation of the work station.

Personal protective equipment:

Avoid all unnecessary exposure.

Hand protection:

Wear protective gloves.

Eye protection:

Chemical goggles or face shield. Safety glasses.

Skin and body protection:

Wear suitable protective clothing.

Respiratory protection:

Wear appropriate mask.

Environmental exposure controls:

Avoid release to the environment.

Other information:

Do not eat, drink or smoke during use.



## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Physical state:	Liquid
Appearance:	Black liquid with visible suspended solids.
Color:	Black
Odor:	Rotten eggs
Odor threshold:	No data available
pH:	11.5 - 12.8
Melting point:	Not applicable
Freezing point:	No data available
Boiling point:	No data available
Flash point:	No data available
Relative evaporation rate (butyl acetate=1):	No data available
Flammability (solid, gas):	Non-flammable
Vapor pressure:	No data available
Relative vapor density at 20 °C:	No data available
Relative density:	1.15 - 1.22
Solubility:	Minimally soluble in water.
Log Pow:	No data available
Auto-ignition temperature:	No data available
Decomposition temperature:	No data available
Viscosity, kinematic:	No data available
Viscosity, dynamic:	No data available
Explosion limits:	No data available
Explosive properties:	No data available
Oxidizing properties:	No data available

### 9.2. Other information

No additional information available

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

Acidic vapors.

### 10.2. Chemical stability

Not established.



### 10.3. Possibility of hazardous reactions

Contact with acids liberates toxic gas.

### 10.4. Conditions to avoid

Direct sunlight. Extremely high or low temperatures.

### 10.5. Incompatible materials

Acids will cause the release of highly toxic Hydrogen Sulfide. Reacts violently with diazonium salts. Ferrous sulfide(s) solution is not compatible with copper, zinc, aluminum or their **alloys** (i.e. bronze, brass, galvanized metals, etc.). Corrosive to steel above 150° F (65.5° C). These materials of construction should not be used in handling systems or storage containers for this product.

### 10.6. Hazardous decomposition products

Hazardous decomposition products formed under fire may include sulfur oxides, iron oxides.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

Acute toxicity: Not classified

Sodium Sulfide (113-82-2)	
LD50 oral rat	208 mg/kg
ATE US (oral)	208.000 mg/kg body weight
LD50 dermal rabbit	< 340 mg/kg
ATE US (dermal)	300.000 mg/kg body weight

Skin corrosion/irritation: Causes skin irritation. pH: 11.5 - 12.8  
Serious eye damage/irritation: Causes eye irritation. pH: 11.5 - 12.8  
Respiratory or skin sensitization: Not classified  
Germ cell mutagenicity: Not classified  
Carcinogenicity: Not classified  
Reproductive toxicity: Not classified  
Specific target organ toxicity (single exposure): Not classified  
Specific target organ toxicity (repeated exposure): Not classified  
Aspiration hazard: Not classified  
Potential Adverse human health effects and symptoms: Based on available data, the classification criteria are not met  
Symptoms/injuries after skin contact: Irritation.  
Symptoms/injuries after eye contact: Causes eye irritation.



## SECTION 12: Ecological information

### 12.1. Toxicity

Ecology - general:

The product is not considered harmful to aquatic organisms or to cause long-term adverse effects in the environment.

**TSI-FSA (1317-37-9)**

LC50 fish 1

> 10000 mg/l Mosquito fish

<b>Sodium Sulfide (1313-82-2)</b>	
LC50 fish 1	7.7 - 29.1 mg/l (Exposure time: 96 h - Species: Poecilia reticulata)
EC50 Daphnia 1	2.1 mg/l (Exposure time: 48 h - Species: Daphnia magna)

### 12.2. Persistence and degradability TSI-FSA (1317-37-9)

Persistence and degradability	Not established.
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### 12.3. Bioaccumulative potential TSI-FSA (1317-37-9)

Bioaccumulative potential	Not established.
<b>Sodium Sulfide (16721-80-5)</b>	
Log Pow	-3.5 (at 25 °C)

### 12.4. Mobility in soil

No additional information available

### 12.5. Other adverse effects

Effect on the global warming:

No known effects from this product.

GWPmix comment:

No known effects from this product.

Other information:

Avoid release to the environment.

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

Waste treatment methods:

Dispose of contents/container in accordance with licensed collector's sorting instructions.

Waste disposal recommendations:

Dispose of contents/container to hazardous or special waste collection point, in accordance with local, regional, national and/or international regulation.

Ecology - waste materials:

Avoid release to the environment.

## SECTION 14: Transport information

Department of Transportation (DOT)





In accordance with DOT Not Regulated

**Transport by sea**

Not Regulated

**Air transport**

Not Regulated

**SECTION 15: Regulatory information**

**15.1.US Federal regulations**

**Iron sulfide (FeS) (1317-37-9)**

Listed on the United States TSCA (Toxic Substances Control Act) inventory

**Sodium Sulfide (1313-82-2)**

Listed on the United States TSCA (Toxic Substances Control Act) inventory

**15.2.International regulations**

**CANADA**

**Iron sulfide (FeS) (1317-37-9)**

Listed on the Canadian DSL (Domestic Substances List)

WHMIS Classification

Uncontrolled product according to WHMIS classification criteria

**Sodium Sulfide (1313-82-2)**

Listed on the Canadian DSL (Domestic Substances List)

**EU-Regulations**

**Iron sulfide (FeS) (1317-37-9)**

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

**Sodium Sulfide (1313-82-2)**

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

**National regulations**

**Iron sulfide (FeS) (1317-37-9)**

Listed on the AICS (Australian Inventory of Chemical Substances)

Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)

Listed on the Japanese ENCS (Existing & New

Chemical Substances) inventory

Listed on the Korean ECL (Existing Chemicals List)

Listed on NZIoC (New Zealand Inventory of Chemicals)

Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)

**Sodium Sulfide (1313-82-2)**

Listed on the AICS (Australian Inventory of Chemical Substances)



- Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
- Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
- Listed on the Korean ECL (Existing Chemicals List)
- Listed on NZIoC (New Zealand Inventory of Chemicals)
- Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
- Listed on INSQ (Mexican National Inventory of Chemical Substances)
- Listed on CICR (Turkish Inventory and Control of Chemicals)

### 15.3.US State Regulations

#### Sodium Sulfide (1313-82-2)

U.S. - Massachusetts - Right To Know List

U.S. - New Jersey - Right to Know Hazardous Substance List

### SECTION 16: Other information

Revision date: 06/14/2016

Other information: None.

Full text of H-phrases:

H301	Toxic if swallowed
H315	Causes skin irritation
H319	Causes serious eye irritation
H400	Very toxic to aquatic life

SDS US (GHS HazCom 2012)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product