SAFETY DATA SHEET

1. Identification

Product identifier: Bismuth nitrate

Other means of identification

Product code: 1267

Recommended use: Catalyst

Recommended restrictions: None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Manufacturer / Supplier: The Shepherd Chemical Company
Address: 4900 Beech Street
Norwood, Ohio 45212 USA
Telephone: 513-731-1110
Fax: 513-731-2151
Emergency USA: CHEMTREC: 800-424-9300
Emergency International: CHEMTREC: 00 1 703-527-3887
Emergency EU: +112

2. Hazard(s) identification

Physical hazards: Oxidizing solids Category 2
Health hazards: Serious eye damage/eye irritation Category 1
Environmental hazards: Not classified.
OSHA defined hazards: Not classified.

Label elements

Signal word: Danger
Hazard statement: May intensify fire; oxidizer. Causes serious eye damage.
Precautionary statement

Prevention: Keep away from heat. Keep away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles. Wear protective gloves/eye protection/face protection.

Response: 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. In case of fire: Use appropriate media to extinguish.

Storage: Store away from incompatible materials.
Disposal: Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC): None known.
Supplemental information: Not applicable.

3. Composition/information on ingredients

Mixtures

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bismuth trinitrate</td>
<td></td>
<td>10361-44-1</td>
<td>81%</td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td>7732-18-5</td>
<td>19%</td>
</tr>
</tbody>
</table>

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. First-aid measures

Inhalation: Move to fresh air. If breathing is difficult, give oxygen. Call a physician if symptoms develop or persist. If not breathing, give artificial respiration, preferably mouth-to-mouth. Call a physician.

Skin contact: Wash off with soap and water. Get medical attention if irritation develops and persists. Wash skin thoroughly with soap and water. Contact physician if irritation continues.
Eye contact
Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.

Ingestion
Call a physician immediately. Rinse mouth. Never give anything by mouth to an unconscious person. If swallowed, induce vomiting immediately as directed by medical personnel. Give several glasses of water.

Most important symptoms/effects, acute and delayed
Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.

Indication of immediate medical attention and special treatment needed
Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.

General information
Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures
Suitable extinguishing media
Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).

Unsuitable extinguishing media
None known.

Specific hazards arising from the chemical
May intensify fire; oxidizer.

Special protective equipment and precautions for firefighters
Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

Fire-fighting equipment/instructions
In the event of fire, cool tanks with water spray. Move containers from fire area if you can do so without risk. For massive fire in cargo area, use unmanned hose holder or monitor nozzles, if possible. If not, withdraw and let fire burn out.

Specific hazards arising from media
None known.

Specific hazards arising from physical state
None known.

Specific hazards arising from reactivity
None known.

General fire hazards
Cool containers exposed to flames with water until well after the fire is out.

6. Accidental release measures
Personal precautions, protective equipment and emergency procedures
Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep out of low areas. Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up
Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Keep combustibles (wood, paper, oil, etc.) away from spilled material. Stop the flow of material, if possible. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water. For waste disposal, see section 13 of the SDS.

Environmental precautions
Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage
Precautions for safe handling
Keep away from heat. Take any precaution to avoid mixing with combustibles. Do not get this material in contact with eyes. Provide adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices. Wash thoroughly after handling. Avoid contact with eyes, skin, and clothing. Avoid breathing dust or vapor.

Conditions for safe storage, including any incompatibilities
Keep in a dry, cool place. Keep away from heat. Store in original tightly closed container. Store in a cool, dry place out of direct sunlight. Store away from incompatible materials (see Section 10 of the SDS). Do not store near combustible materials. Store in closed containers. Keep away from flammable and combustible materials.

8. Exposure controls/personal protection
Occupational exposure limits
No exposure limits noted for ingredient(s).

Biological limit values
No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls
Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Provide eyewash station. Provide general and/or local exhaust ventilation.

Individual protection measures, such as personal protective equipment
Eye/face protection
Wear eye/face protection. Wear safety glasses with side shields (or goggles) and a face shield.

Skin protection
Hand protection
Wear protective gloves.

Other
Wear suitable protective clothing.

Respiratory protection
Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits.
Thermal hazards
Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations
Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

**Appearance**
crystals

**Physical state**
Solid.

**Form**
Solid.

**Color**
Colorless.

**Odor**
Nitric acid.

**Odor threshold**
Not available.

**pH**
Not available.

**Melting point/freezing point**
Not available.

**Initial boiling point and boiling range**
Not available.

**Flash point**
Not available.

**Evaporation rate**
Not available.

**Flammability (solid, gas)**
Not available.

**Upper/lower flammability or explosive limits**
- Flammability limit - lower (%) Not available.
- Flammability limit - upper (%) Not available.
- Explosive limit - lower (%) Not available.
- Explosive limit - upper (%) Not available.

**Vapor pressure**
0 hPa estimated

**Vapor density**
Not available.

**Relative density**
Not available.

**Solubility(ies)**
- Solubility (water) Not available.

**Partition coefficient**
(n-octanol/water) Not available.

**Auto-ignition temperature**
Not available.

**Decomposition temperature**
Not available.

**Viscosity**
Not available.

**Other information**
- Molecular formula Bi.3HNO3
- Percent volatile 0 % estimated estimated
- Specific gravity 2.83
- VOC (Weight %) 0 % estimated

**Loose Packing Density**
Not available.

10. Stability and reactivity

**Reactivity**
The product is stable and non-reactive under normal conditions of use, storage and transport.

**Chemical stability**
This product is stable. Hazardous polymerization will not occur.

**Possibility of hazardous reactions**
No dangerous reaction known under conditions of normal use.

**Conditions to avoid**
Excessive heat. Contact with incompatible materials.

**Incompatible materials**
Incompatible with easily oxidizable materials.

**Hazardous decomposition products**
Thermal decomposition may produce toxic oxides of nitrogen, which are harmful to eyes, skin and respiratory tract.

11. Toxicological information

**Information on likely routes of exposure**

**Ingestion**
Expected to be a low ingestion hazard.
Inhalation  
No adverse effects due to inhalation are expected.

Skin contact  
Not available.

Eye contact  
Causes serious eye damage.

Symptoms related to the physical, chemical and toxicological characteristics  
Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.

Information on toxicological effects

Acute toxicity

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bismuth nitrate (CAS Mixture)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td>Mouse</td>
<td>21 mg/kg intravenous</td>
</tr>
<tr>
<td>LDL0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Estimates for product may be based on additional component data not shown.

Skin corrosion/irritation  
Prolonged skin contact may cause temporary irritation.

Serious eye damage/eye irritation  
Causes serious eye damage.

Respiratory or skin sensitization

Respiratory sensitization  
Not available.

Skin sensitization  
This product is not expected to cause skin sensitization.

Germ cell mutagenicity  
No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity  
This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

Reproductive toxicity  
This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure  
Not classified.

Specific target organ toxicity - repeated exposure  
Not classified.

Aspiration hazard  
Not available.

12. Ecological information

Ecotoxicity  
The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

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<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bismuth nitrate (CAS Mixture)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crustacea</td>
<td>EC50</td>
<td>Daphnia</td>
</tr>
</tbody>
</table>

* Estimates for product may be based on additional component data not shown.

Persistence and degradability  
No data is available on the degradability of this product.

Bioaccumulative potential  
No data available.

Mobility in soil  
No data available.

Other adverse effects  
No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions  
Collect and reclaim or dispose in sealed containers at licensed waste disposal site. This material and its container must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations. Neutralize and flush solution into sewer connected to wastewater treatment system in compliance with applicable laws and regulations.

Local disposal regulations  
Dispose in accordance with all applicable regulations.

Hazardous waste code  
The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products  
Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging  
Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.
### 14. Transport information

#### DOT
- **UN number**: UN1477
- **UN proper shipping name**: NITRATES, INORGANIC, N.O.S. (Bismuth nitrate)
- **Transport hazard class(es)**
  - **Class**: 5.1
  - **Subsidiary risk**: -
  - **Packing group**: III
- **Special precautions for user**: Read safety instructions, SDS and emergency procedures before handling.

#### IATA
- **UN number**: UN1477
- **UN proper shipping name**: NITRATES, INORGANIC, N.O.S. (Bismuth nitrate)
- **Transport hazard class(es)**
  - **Class**: 5.1
  - **Subsidiary risk**: -
  - **Packing group**: III
- **Special precautions for user**: Read safety instructions, SDS and emergency procedures before handling.

#### IMDG
- **UN number**: UN1477
- **UN proper shipping name**: NITRATES, INORGANIC, N.O.S. (Bismuth nitrate)
- **Transport hazard class(es)**
  - **Class**: 5.1
  - **Subsidiary risk**: -
  - **Packing group**: III
- **Marine pollutant**: No.
- **EmS**: Not available.
- **Special precautions for user**: Read safety instructions, SDS and emergency procedures before handling.

#### Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
- **DOT**: Not applicable.
- **IATA; IMDG**: Not applicable.

### 15. Regulatory information

#### US federal regulations
- **This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.**
- **TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)**: Not regulated.
CERCLA Hazardous Substance List (40 CFR 302.4)
Not listed.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - Yes
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance
No

SARA 311/312 Hazardous chemical
Yes

SARA 313 (TRI reporting)

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS number</th>
<th>% by wt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrate compounds (water dissociable)</td>
<td>10361-44-1</td>
<td>81%</td>
</tr>
</tbody>
</table>

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)
Not regulated.

Safe Drinking Water Act (SDWA)
Not regulated.

US state regulations

US. Massachusetts RTK - Substance List
Not regulated.

US. New Jersey Worker and Community Right-to-Know Act
Not regulated.

US. Pennsylvania RTK - Hazardous Substances
Not regulated.

US. Rhode Island RTK
Not regulated.

US. California Proposition 65
California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>No</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
</tr>
<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>Yes</td>
</tr>
<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
<td>Yes</td>
</tr>
<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 03-25-2015
Version # 01
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Revision Information

Hazardous Composition / Information on Ingredients: Ingredients
Physical & Chemical Properties: Multiple Properties
Toxicological Information: Toxicological Data
Transport Information: Proper Shipping Name/Packing Group
Regulatory Information: Safety Phrases
HazReg Data: North America
GHS: Classification