SAFETY DATA SHEET

1. Identification

Product identifier: Brandt Manganese Sulfate - Granular
Other means of identification:
- Product code: 33016
- Synonym(s): MANGANESE(II) SULFATE MONOHYDRATE

Recommended use: Agriculture / Horticulture - Micronutrient - Refer to product label

Recommended restrictions: None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer
- Company name: Brandt Consolidated, Inc.
- Address: 2935 South Koke Mill Road, Springfield, IL 62711 US
- Telephone: Corporate Office 1-217-547-5800
- Website: www.brandt.co
- E-mail: msds@brandt.co
- Contact person: EH&S / Regulatory Department
- Emergency phone number:
  - CHEMTREC (24 hours): USA, Canada, Puerto Rico 1-800-424-3900, Virgin Islands 1-800-424-3900, International Maritime +1 (703) 527-3887

2. Hazard(s) identification

Physical hazards: Not classified.
Health hazards: Specific target organ toxicity, repeated exposure - Category 2
OSHA defined hazards: Not classified.

Label elements

Signal word: Warning

Hazard statement: May cause damage to organs through prolonged or repeated exposure.

Precautionary statement
- Prevention: Observe good industrial hygiene practices.
- Response: Get medical advice/attention if you feel unwell.
- 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): Not classified.

Environmental hazards
- Hazardous to the aquatic environment, acute hazard - Category 2
- Hazardous to the aquatic environment, long-term hazard - Category 2

Supplemental information

Hazard statement: Toxic to aquatic life. Toxic to aquatic life with long lasting effects.

Precautionary statement
- Prevention: Avoid release to the environment.
- Response: Collect spillage.
- Not applicable.
3. Composition/information on ingredients

Mixtures

<table>
<thead>
<tr>
<th>Hazardous components</th>
<th>Chemical name</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manganese Sulfate, monohydrate</td>
<td>10034-96-5</td>
<td>90 - 100</td>
<td></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

| Inhalaion | Move to fresh air. Call a physician if symptoms develop or persist. |
| Skin contact | Wash off with soap and water. Get medical attention if irritation develops and persists. |
| Eye contact | Rinse with water. Get medical attention if irritation develops and persists. |
| Ingestion | Rinse mouth. Get medical attention if symptoms occur. |
| Most important symptoms/effects, acute and delayed | Prolonged exposure may cause chronic effects. |

Indication of immediate medical attention and special treatment needed | Provide general supportive measures and treat symptomatically.

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

5. Fire-fighting measures


Unsuitable extinguishing media | None known.

Specific hazards arising from the chemical | During fire, gases hazardous to health may be formed.

Special protective equipment and precautions for firefighters | Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire-fighting equipment/instructions | In the event of fire, cool tanks with water spray.

Specific methods | 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 out of low areas. Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate personal protective equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the MSDS.

Methods and materials for containment and cleaning up | Stop the flow of material, if this is without risk. Collect spillage. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water. For waste disposal, see section 13 of the MSDS.

Environmental precautions | Avoid release to the environment. Contact local authorities in case of spillage to drain/aquatic environment. Prevent further leakage or spillage if safe to do so. Do not contaminate water. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling | Avoid prolonged exposure. Provide adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices. Avoid release to the environment. Do not empty into drains.

Conditions for safe storage, including any incompatibilities | 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 MSDS).

8. Exposure controls/personal protection

Occupational exposure limits

<table>
<thead>
<tr>
<th>US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manganese Sulfate, monohydrate (CAS 10034-96-5)</td>
<td>Ceiling</td>
<td>5 mg/m3</td>
</tr>
</tbody>
</table>
### US. ACGIH Threshold Limit Values

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manganese Sulfate, monohydrate (CAS 10034-96-5)</td>
<td>TWA</td>
<td>0.1 mg/m³</td>
<td>Inhalable fraction.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.02 mg/m³</td>
<td>Respirable fraction.</td>
</tr>
</tbody>
</table>

### US. NIOSH: Pocket Guide to Chemical Hazards

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manganese Sulfate, monohydrate (CAS 10034-96-5)</td>
<td>STEL</td>
<td>3 mg/m³</td>
<td>Fume.</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>1 mg/m³</td>
<td>Fume.</td>
</tr>
</tbody>
</table>

### 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.

### Individual protection measures, such as personal protective equipment

- **Eye/face protection**: Wear safety glasses with side shields (or goggles).
- **Skin protection**:
  - **Hand protection**: For prolonged or repeated skin contact use suitable protective gloves.
  - **Other**: Wear suitable protective clothing.
- **Respiratory protection**: In case of insufficient ventilation, wear suitable respiratory equipment.
- **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.

### 9. Physical and chemical properties

#### Appearance

- **Physical state**: Solid.
- **Form**: Solid. Granular.
- **Color**: Light pink.
- **Odor**: Not available.
- **Odor threshold**: Not available.
- **pH**: Not available.

#### Salt-Out / Crystallization Temp

Not available.

#### Melting point/freezing point

1292 °F (700 °C) estimated

#### Initial boiling point and boiling range

1562 °F (850 °C) estimated

#### 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)

Not available.

#### Partition coefficient (n-octanol/water)

Not available.
Auto-ignition temperature  Not available.
Decomposition temperature  Not available.
Viscosity  Not available.

Other information
- Bulk density  84 - 88 lb/ft³
- Molecular formula  H₂O₄S.H₂O.Mn
- pH in aqueous solution  7.3 - 7.6 (5% Solution)

10. Stability and reactivity
Reactivity  The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability  Material is stable under normal conditions.
Possibility of hazardous reactions  No dangerous reaction known under conditions of normal use.
Conditions to avoid  Contact with incompatible materials.
Incompatible materials  Strong oxidizing agents.
Hazardous decomposition products  No hazardous decomposition products are known.

11. Toxicological information
Information on likely routes of exposure
- Ingestion  Due to lack of data the classification is not possible.
- Inhalation  Prolonged inhalation may be harmful. Due to lack of data the classification is not possible.
- Skin contact  Due to lack of data the classification is not possible.
- Eye contact  Due to lack of data the classification is not possible.

Symptoms related to the physical, chemical and toxicological characteristics
Direct contact with eyes may cause temporary irritation.

Information on toxicological effects
Acute toxicity
<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brandt Manganese Sulfate - Granular (CAS 10034-96-5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acute</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD100</td>
<td>Mouse</td>
<td>305 mg/kg, estimated</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD100</td>
<td>Mouse</td>
<td>146 mg/kg, estimated</td>
</tr>
<tr>
<td>LD50</td>
<td>Mouse</td>
<td>64 mg/kg, estimated</td>
</tr>
<tr>
<td><strong>Components</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manganese Sulfate, monohydrate (CAS 10034-96-5)</td>
<td></td>
<td></td>
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<tr>
<td><strong>Acute</strong></td>
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<td>64 mg/kg</td>
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</tbody>
</table>

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

Skin corrosion/irritation  Due to lack of data the classification is not possible.
Serious eye damage/eye irritation  Due to lack of data the classification is not possible.
Respiratory sensitization  Due to lack of data the classification is not possible.
Skin sensitization  Due to lack of data the classification is not possible.
Germ cell mutagenicity  No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity  Due to lack of data the classification is not possible.
Reproductive toxicity
Due to lack of data the classification is not possible.

Specific target organ toxicity - single exposure
Due to lack of data the classification is not possible.

Specific target organ toxicity - repeated exposure
May cause damage to organs through prolonged or repeated exposure.

Aspiration hazard
Due to lack of data the classification is not possible.

Chronic effects
Prolonged inhalation may be harmful. May cause damage to organs through prolonged or repeated exposure.

12. Ecological information

Ecotoxicity
Toxic to aquatic life with long lasting effects. Accumulation in aquatic organisms is expected.

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brandt Manganese Sulfate - Granular (CAS 10034-96-5)</td>
<td>Crustacea</td>
<td>EC50 Daphnia 81.9833 mg/l, 48 hours, estimated</td>
</tr>
<tr>
<td></td>
<td>Fish</td>
<td>LC50 Fish 1012.3 mg/l, 96 hours, estimated</td>
</tr>
<tr>
<td>Components</td>
<td>Species</td>
<td>Test Results</td>
</tr>
<tr>
<td></td>
<td>Aquatic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crustacea</td>
<td>EC50 Water flea (Daphnia magna) 7.09 - 9.36 mg/l, 48 hours</td>
</tr>
<tr>
<td></td>
<td>Fish</td>
<td>LC50 Fathead minnow (Pimephales promelas) 24.3 - 38.9 mg/l, 96 hours</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
Not available.

Mobility in soil
Not 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.

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

General
IMDG Regulated Marine Pollutant.

DOT
Not regulated as dangerous goods.

IATA
<table>
<thead>
<tr>
<th>UN number</th>
<th>Environmentally hazardous substance, solid, n.o.s. (Manganese Sulfate, monohydrate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN proper shipping name</td>
<td>9</td>
</tr>
<tr>
<td>Transport hazard class(es)</td>
<td>III</td>
</tr>
<tr>
<td>Packing group</td>
<td>9L</td>
</tr>
<tr>
<td>ERG code</td>
<td>9</td>
</tr>
<tr>
<td>Special precautions for user</td>
<td>Read safety instructions, SDS and emergency procedures before handling.</td>
</tr>
</tbody>
</table>

IMDG
<table>
<thead>
<tr>
<th>UN number</th>
<th>ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Manganese Sulfate, monohydrate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN proper shipping name</td>
<td>9</td>
</tr>
<tr>
<td>Transport hazard class(es)</td>
<td>III</td>
</tr>
<tr>
<td>Packing group</td>
<td>9</td>
</tr>
<tr>
<td>Environmental hazards</td>
<td>Yes</td>
</tr>
<tr>
<td>Marine pollutant</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

General information
IMDG Regulated Marine Pollutant.

IATA; IMDG

Marine pollutant

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)
Manganese Sulfate, monohydrate (CAS 10034-96-5) LISTED

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

SARA 304 Emergency release notification
Not regulated.
Superfund Amendments and Reauthorization Act of 1986 (SARA)

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

SARA 302 Extremely hazardous substance
- No

SARA 311/312 Hazardous chemical
- No

Other federal regulations
- Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
  - Manganese Sulfate, monohydrate (CAS 10034-96-5)
- Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)
  - Not regulated.
- Safe Drinking Water Act (SDWA)
  - Not regulated.
- Drug Enforcement Administration (DEA), List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2))
  - Not listed.
- Food and Drug Administration (FDA)
  - Not regulated.

US state regulations
- US. Massachusetts RTK - Substance List
  - Not regulated.
- US. New Jersey Worker and Community Right-to-Know Act
  - Manganese Sulfate, monohydrate (CAS 10034-96-5) 500 lbs
- US. Pennsylvania RTK - Hazardous Substances
  - Not regulated.
- US. Rhode Island RTK
  - Manganese Sulfate, monohydrate (CAS 10034-96-5)
- US. California Proposition 65
  - Not Listed.

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>

*"Yes" indicates this product complies 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 02-26-2014
Version # 01
Further information Not available.
Disclaimer

While the information contained herein are presented in good faith and believed to be accurate, it is provided for your guidance only. Because many factors may affect processing or application, we recommend that you make tests to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including warranties of merchantability or fitness for a particular purpose, are made regarding products described or information set forth, or that the products, or information may be used without infringing the intellectual property rights of others. In no case shall the information provided be considered a part of our terms and conditions of sale. Further, you expressly understand and agree that the information furnished by our company hereunder are given gratis and we assume no obligation or liability for the information given or results obtained, all such being given and accepted at your risk.