Material Safety Data Sheet
acc. to OSHA and ANSI

1 Identification of substance:
Product details:
Product name: Manganese(II) sulfate tetrahydrate
Stock number:
B22081
L13670
Manufacturer/Supplier:
Alfa Aesar, A Johnson Matthey Company
Johnson Matthey Catalog Company, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Emergency Phone: (978) 521-6300
CHEMTREC: (800) 424-9300
Web Site: www.alfa.com
Information Department: Health, Safety and Environmental Department
Emergency information:
During normal hours the Health, Safety and Environmental Department.
After normal hours call Chemtrec at (800) 424-9300.

2 Composition/Data on components:
Chemical characterization:
Description: (CAS#)
Manganese(II) sulfate tetrahydrate (CAS# 10101-68-5): 100%
Identification number(s):
EINECS Number: 232-089-9

3 Hazards identification
Hazard description:

Xn Harmful
N Dangerous for the environment

Information pertaining to particular dangers for man and environment
R 48/20/22 Harmful: danger of serious damage to health by prolonged exposure through inhalation and if swallowed.
R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

Classification system
HMIS ratings (scale 0-4)
(Hazardous Materials Identification System)

<table>
<thead>
<tr>
<th>HEALTH</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE</td>
<td>0</td>
</tr>
<tr>
<td>REACTIVITY</td>
<td>1</td>
</tr>
</tbody>
</table>

Health (acute effects) = 2
Flammability = 0
Reactivity = 1

4 First aid measures
After inhalation
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.

After skin contact
Immediately wash with water and soap and rinse thoroughly.

(Contd. on page 2)
5 Fire fighting measures

Suitable extinguishing agents
Product is not flammable. Use fire fighting measures that suit the surrounding fire.
Special hazards caused by the material, its products of combustion or resulting gases:
In case of fire, the following can be released:
- Metal oxide fume
- Sulfur oxides (SOx)
Protective equipment:
- Wear self-contained respirator.
- Wear fully protective impervious suit.

6 Accidental release measures

Person-related safety precautions:
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
Measures for environmental protection:
Do not allow material to be released to the environment without proper governmental permits.
Measures for cleaning/collection:
Dispose contaminated material as waste according to item 13.
Additional information:
See Section 7 for information on safe handling
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

Handling
Information for safe handling:
- Keep container tightly sealed.
- Store in cool, dry place in tightly closed containers.
- Ensure good ventilation at the workplace.
- Prevent formation of dust.
Information about protection against explosions and fires:
- The product is not flammable

Storage
Requirements to be met by storerooms and receptacles:
No special requirements.
Information about storage in one common storage facility:
- Store away from oxidizing agents.
Further information about storage conditions:
- Keep container tightly sealed.
- Store in cool, dry conditions in well sealed containers.
8 Exposure controls and personal protection

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Components with limit values that require monitoring at the workplace:
Manganese, elemental & inorganic compounds (as Mn)
mg/m³
ACGIH TLV 0.2
Austria MAK 5
Belgium TWA 5
Denmark TWA 2.5
Finland TWA 0.5
Hungary TWA 0.3; 0.6-STELO
Germany MAK 0.55
Japan OEL 0.3 (respirable dust)
Korea TLV 0.2
Netherlands MAC-TGG 1; 3-MAC-K
Norway TWA 2.5
Poland TWA 0.3; 5-MAC
Russia 0.2-STELO (fume)
Sweden NGV 1; 2.5-TGV (respirable dust)
2.5; 5-TGV (total dust)
United Kingdom TWA 5
USA PEL 5-Ceiling

Additional information: No data

Personal protective equipment
General protective and hygienic measures
The usual precautionary measures for handling chemicals should be followed.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.

Breathing equipment:
Use suitable respirator when high concentrations are present.

Protection of hands:
Impervious gloves
Check protective gloves prior to each use for their proper condition.

Material of gloves
The selection of suitable gloves not only depends on the material, but also on quality. Quality will vary from manufacturer to manufacturer.

Eye protection: Safety glasses
Body protection: Protective work clothing.

9 Physical and chemical properties:

<table>
<thead>
<tr>
<th>General Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form: Crystalline</td>
</tr>
<tr>
<td>Color: Pink</td>
</tr>
<tr>
<td>Odor: Not determined</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Change in condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting point/Melting range: Not determined</td>
</tr>
<tr>
<td>Boiling point/Boiling range: Not determined</td>
</tr>
</tbody>
</table>
**Product name:** Manganese(II) sulfate tetrahydrate

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sublimation temperature / start</td>
<td>Not determined</td>
</tr>
<tr>
<td>Flash point</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Ignition temperature</td>
<td>Not determined</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Not determined</td>
</tr>
<tr>
<td>Danger of explosion</td>
<td>Product does not present an explosion hazard.</td>
</tr>
<tr>
<td>Explosion limits:</td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>Not determined</td>
</tr>
<tr>
<td>Upper</td>
<td>Not determined</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>Not determined</td>
</tr>
<tr>
<td>Density</td>
<td>Not determined</td>
</tr>
</tbody>
</table>

**10 Stability and reactivity**

- **Thermal decomposition / conditions to be avoided:**
  Decomposition will not occur if used and stored according to specifications.
- **Materials to be avoided:** Oxidizing agents
- **Dangerous reactions:** No dangerous reactions known
- **Dangerous products of decomposition:**
  - Metal oxide fume
  - Sulfur oxides (SOx)

**11 Toxicological information**

- **Acute toxicity:**
- **Primary irritant effect:**
  - on the skin: Irritant to skin and mucous membranes.
  - on the eye: Irritating effect.
- **Sensitization:** No sensitizing effects known.
- **Subacute to chronic toxicity:**
  Chronic exposure to manganese may cause impairment to the central nervous system. Symptoms include sluggishness, sleepiness, muscle weakness, loss of facial muscle control, edema, emotional disturbances, spastic gait and falling.
- **Additional toxicological information:**
  To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.
- **EPA-D:** Not classifiable as to human carcinogenicity: inadequate human and animal evidence of carcinogenicity or no data are available.

**12 Ecological information:**

- **Ecotoxicological effects:**
- **Remark:** Toxic for fish
- **General notes:**
  Do not allow product to reach ground water, water course or sewage system.
  Danger to drinking water if even small quantities leak into the ground.
  Also poisonous for fish and plankton in water bodies.
Product name: Manganese(II) sulfate tetrahydrate

Do not allow material to be released to the environment without proper governmental permits.
Toxic for aquatic organisms

13 Disposal considerations

Product:
Recommendation
Consult state, local or national regulations to ensure proper disposal.

Uncleaned packagings:
Recommendation: Disposal must be made according to official regulations.

14 Transport information

DOT regulations:

Hazard class: 9
Identification number: UN3077
Packing group: III
Proper shipping name (technical name): ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Manganese(II) sulfate tetrahydrate)
Label 9

Land transport ADR/RID (cross-border)

ADR/RID class: 9 (M7) Miscellaneous dangerous substances and articles
Danger code (Kemler): 90
UN-Number: 3077
Packaging group: III
Description of goods: 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Manganese(II) sulfate tetrahydrate)

Maritime transport IMDG:

IMDG Class: 9
UN Number: 3077
Label 9
Packaging group: III
Product name: Manganese(II) sulfate tetrahydrate

Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Manganese(II) sulfate tetrahydrate)

Air transport ICAO-TI and IATA-DGR:

ICAO/IATA Class: 9
UN/ID Number: 3077
Label 9
Packaging group: III
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Manganese(II) sulfate tetrahydrate)

15 Regulations

Product related hazard informations:

Hazard symbols:
Xn Harmful
N Dangerous for the environment

Risk phrases:
48/20/22 Harmful: danger of serious damage to health by prolonged exposure through inhalation and if swallowed.
51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

Safety phrases:
22 Do not breathe dust.
61 Avoid release to the environment. Refer to special instructions/Safety data sheets

National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.
All components of this product are listed on the Canadian Domestic Substances List (DSL).

Information about limitation of use:
For use only by technically qualified individuals.
This product contains manganese and is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR372.

16 Other information:
Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Department issuing MSDS: Health, Safety and Environmental Department.
Contact: Paul V. Connolly