SAFETY DATA SHEET

1. Identification

Product identifier

Product Name MAGNESIUM ALUMINATE SPINEL

Other means of identification

Product Code(s) 340

Synonyms None

Recommended use of the chemical and restrictions on use

Recommended use Refractory

Restrictions on use No information available

Details of the supplier of the safety data sheet

Supplier Address

Almatis, Inc.
P.O. Box 300
4701 Alcoa Road
Bauxite, AR 72022
USA
Telephone: +1 501-776-4677

Emergency telephone number

Emergency Telephone 3E Global Incident Response Hotline (Almatis access code: 334735)
US/Canada: +01 760 476 3962, +1 866 519 4752

2. Hazard(s) identification

Classification

This chemical is not considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Hazards not otherwise classified (HNOC)

Not applicable

Label elements

None

Hazard statements

Not classified

Precautionary Statements - Prevention
340 - MAGNESIUM ALUMINATE SPINEL

Revision date 10-Jul-2019

Not applicable

None needed according to classification criteria.

Precautionary Statements - Storage
Store in a well-ventilated place. Keep cool.

Precautionary Statements - Disposal
Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable.

Other information
Not applicable.

3. Composition/information on ingredients

Substance
Not applicable.

Mixture

Synonyms
AR 78. AR 90. MR 66.

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS No</th>
<th>Weight-%</th>
<th>Trade secret</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinel (Mg(AlO2)2)</td>
<td>1302-67-6</td>
<td>85-100</td>
<td>*</td>
</tr>
<tr>
<td>Aluminum oxide</td>
<td>1344-28-1</td>
<td>5-15</td>
<td>*</td>
</tr>
<tr>
<td>Magnesium oxide</td>
<td>1309-48-4</td>
<td>0-5</td>
<td>*</td>
</tr>
</tbody>
</table>

*The exact percentage (concentration) of composition has been withheld as a trade secret.

4. First-aid measures

Description of first aid measures

Inhalation
Remove to fresh air.

Eye contact
Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.

Skin contact
Wash skin with soap and water.

Ingestion
Clean mouth with water and drink afterwards plenty of water.

Most important symptoms and effects, both acute and delayed

Symptoms
Contact with dust can cause mechanical irritation or drying of the skin.

Indication of any immediate medical attention and special treatment needed

Note to physicians
Treat symptomatically.

5. Fire-fighting measures

Suitable Extinguishing Media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
No information available.
Specific hazards arising from the chemical
Avoid generation of dust.

Explosion data
Sensitivity to mechanical impact None.
Sensitivity to static discharge None.

Special protective equipment for fire-fighters
Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Personal precautions
Ensure adequate ventilation. Avoid generation of dust. Avoid contact with eyes. Use personal protective equipment as required. Do not breathe dust. Take precautionary measures against static discharges.

Other information
Refer to protective measures listed in Sections 7 and 8.

Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Prevent dust cloud.

Methods for cleaning up
Pick up and transfer to properly labeled containers. Sweep up and shovel into suitable containers for disposal.

7. Handling and storage

Precautions for safe handling

Advice on safe handling
Handle in accordance with good industrial hygiene and safety practice. Ensure adequate ventilation. Avoid generation of dust. Do not breathe dust. Avoid contact with eyes.

Conditions for safe storage, including any incompatibilities

Storage Conditions
Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls/personal protection

Control parameters

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum oxide 1344-28-1</td>
<td>TWA: 1 mg/m³ respirable particulate matter</td>
<td>TWA: 15 mg/m³ total dust TWA: 5 mg/m³ respirable fraction (vacated) TWA: 10 mg/m³ total dust (vacated) TWA: 5 mg/m³ respirable fraction</td>
<td>-</td>
</tr>
<tr>
<td>Magnesium oxide 1309-48-4</td>
<td>TWA: 10 mg/m³ inhalable particulate matter</td>
<td>TWA: 15 mg/m³ fume, total particulate (vacated) TWA: 10 mg/m³ fume and total particulate</td>
<td>IDLH: 750 mg/m³ fume</td>
</tr>
</tbody>
</table>

Appropriate engineering controls

Engineering controls
Apply technical measures to comply with the occupational exposure limits. Showers.
Eyewash stations. Ventilation systems.

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

**Eye/face protection**
No special protective equipment required.

**Hand protection**
Wear suitable gloves.

**Skin and body protection**
If there is a risk of contact: Wear suitable protective clothing.

**Respiratory protection**
No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.

**General hygiene considerations**
Do not breathe dust.

### 9. Physical and chemical properties

**Information on basic physical and chemical properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks • Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Solid Powder, granules, Balls</td>
<td></td>
</tr>
<tr>
<td>Appearance</td>
<td>white Powder, granules, Balls</td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>white</td>
<td></td>
</tr>
<tr>
<td>Odor</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Odor threshold</td>
<td>No information available</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>No data available</td>
<td>None known</td>
</tr>
<tr>
<td>Melting point / freezing point</td>
<td>No data available</td>
<td>None known</td>
</tr>
<tr>
<td>Boiling point / boiling range</td>
<td>No data available</td>
<td>None known</td>
</tr>
<tr>
<td>Flash point</td>
<td>No data available</td>
<td>None known</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No data available</td>
<td>None known</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>No data available</td>
<td>None known</td>
</tr>
<tr>
<td>Flammability Limit in Air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper flammability or explosive limits</td>
<td>No data available</td>
<td></td>
</tr>
<tr>
<td>Lower flammability or explosive limits</td>
<td>No data available</td>
<td></td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>No data available</td>
<td>None information available</td>
</tr>
<tr>
<td>Vapor density</td>
<td>No data available</td>
<td>None information available</td>
</tr>
<tr>
<td>Relative density</td>
<td>No data available</td>
<td>None known</td>
</tr>
<tr>
<td>Water solubility</td>
<td>insoluble</td>
<td></td>
</tr>
<tr>
<td>Solubility in other solvents</td>
<td>No data available</td>
<td></td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>No data available</td>
<td>None known</td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>-</td>
<td>Does not ignite</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
<td>None information available</td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>No data available</td>
<td>None information available</td>
</tr>
<tr>
<td>Dynamic viscosity</td>
<td>No data available</td>
<td>None information available</td>
</tr>
</tbody>
</table>

**Other information**

<table>
<thead>
<tr>
<th>Explosive properties</th>
<th>No information available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxidizing properties</td>
<td>No information available</td>
</tr>
<tr>
<td>Softening point</td>
<td>No information available</td>
</tr>
<tr>
<td>Molecular weight</td>
<td>No information available</td>
</tr>
<tr>
<td>VOC Content (%)</td>
<td>No information available</td>
</tr>
<tr>
<td>Liquid Density</td>
<td>3.0-3.4 g/cm³</td>
</tr>
<tr>
<td>Bulk density</td>
<td>0.7-2.7 g/cm³</td>
</tr>
</tbody>
</table>

### 10. Stability and reactivity

**Reactivity**
No information available.

**Chemical stability**
Stable under normal conditions.
Possibility of hazardous reactions: None under normal processing.

Conditions to avoid: dust formation.

Incompatible materials: None known based on information supplied.

Hazardous decomposition products: None known based on information supplied.

11. Toxicological information

Information on likely routes of exposure

Product Information

- Inhalation: May cause irritation of respiratory tract.
- Eye contact: Dust contact with the eyes can lead to mechanical irritation.
- Skin contact: May cause irritation.
- Ingestion: Specific test data for the substance or mixture is not available.

Symptoms related to the physical, chemical and toxicological characteristics

Symptoms: No information available.

Numerical measures of toxicity

No information available

Component Information

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum oxide</td>
<td>&gt; 5000 mg/kg ( Rat )</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1344-28-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnesium oxide</td>
<td>= 3990 mg/kg ( Rat )</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1309-48-4</td>
<td>= 3870 mg/kg ( Rat )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Skin corrosion/irritation: No information available.

Serious eye damage/eye irritation: No information available.

Respiratory or skin sensitization: No information available.

Germ cell mutagenicity: No information available.

Carcinogenicity: No information available.

Reproductive toxicity: No information available.

STOT - single exposure: No information available.

STOT - repeated exposure: No information available.
Target organ effects  
No information available.

Aspiration hazard  
No information available.

Other adverse effects  
No information available.

Interactive effects  
No information available.

12. Ecological information

Ecotoxicity  
Aquatic toxicity is unlikely due to low solubility. Not considered to be harmful to aquatic life.

Persistence and degradability  
Not readily biodegradable.

Bioaccumulation  
Does not bioaccumulate.

Mobility  
No information available.

Other adverse effects  
No information available.

13. Disposal considerations

Waste treatment methods

Waste from residues/unused products  
Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation.

Contaminated packaging  
Do not reuse empty containers.

14. Transport information

DOT  
Not regulated

TDG  
Not regulated

MEX  
Not regulated

ICAO (air)  
Not regulated

IATA  
Not regulated

IMDG  
Not regulated

RID  
Not regulated

ADR  
Not regulated

ADN  
Not regulated

15. Regulatory information

International Inventories
TSCA Complies.
DSL/NDSL Complies.
EINECS/ELINCS Complies.
ENCS Complies.
IECSC Contact supplier for inventory compliance status.
KECL Complies.
PICCS Contact supplier for inventory compliance status.
AICS Complies.

Legend:
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

US Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>SARA 313 - Threshold Values %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum oxide - 1344-28-1</td>
<td>1.0</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications. Under the amended regulations at 40 CFR 370, EPCRA 311/312 Tier II reporting for the 2017 calendar year will need to be consistent with updated hazard classifications.

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

US State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Chemical name | New Jersey | Massachusetts | Pennsylvania |
---------------|------------|---------------|--------------|
Spinel (Mg(AlO2)2) 1302-67-6 | - | - | Present |
Aluminum oxide 1344-28-1 | X | X | X |
Magnesium oxide 1309-48-4 | X | X | X |
16. Other information

NFPA

<table>
<thead>
<tr>
<th>NFPA</th>
<th>Health hazards</th>
<th>Flammability</th>
<th>Instability</th>
<th>Physical and chemical properties</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

HMIS

<table>
<thead>
<tr>
<th>HMIS</th>
<th>Health hazards</th>
<th>Flammability</th>
<th>Physical hazards</th>
<th>Personal protection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>X</td>
</tr>
</tbody>
</table>

Chronic Hazard Star Legend: Not applicable

Key or legend to abbreviations and acronyms used in the safety data sheet

Legend  Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

TWA  TWA (time-weighted average)  STEL  STEL (Short Term Exposure Limit)

Ceiling  Maximum limit value  *  Skin designation

Key literature references and sources for data used to compile the SDS

Agency for Toxic Substances and Disease Registry (ATSDR)
U.S. Environmental Protection Agency ChemView Database
European Food Safety Authority (EFSA)
EPA (Environmental Protection Agency)
Acute Exposure Guideline Level(s) (AEGL(s))
U.S. Environmental Protection Agency Federal Insecticide, Fungicide, and Rodenticide Act
U.S. Environmental Protection Agency High Production Volume Chemicals
Food Research Journal
Hazardous Substance Database
International Uniform Chemical Information Database (IUCLID)
Japan GHS Classification
Australia National Industrial Chemicals Notification and Assessment Scheme (NICNAS)
NIOSH (National Institute for Occupational Safety and Health)
National Library of Medicine's ChemID Plus (NLM CIP)
National Library of Medicine's PubMed database (NLM PUBMED)
National Toxicology Program (NTP)
New Zealand's Chemical Classification and Information Database (CCID)
Organization for Economic Co-operation and Development High Production Volume Chemicals Program
Organization for Economic Co-operation and Development Screening Information Data Set
RTECS (Registry of Toxic Effects of Chemical Substances)
World Health Organization

Prepared By

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Revision date
10-Jul-2019

Revision Note
No information available.

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other
materials or in any process, unless specified in the text.

End of Safety Data Sheet