1 Identification of substance:

Product details:

Product name: Phenylmagnesium bromide, 3M in ether

Stock number: 87326

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#)
Phenylmagnesium bromide (CAS# 100-58-3): 40-50%
Diethyl ether (CAS# 60-29-7): 50-60%

3 Hazards identification

Hazard description:

C Corrosive
F+ Extremely flammable

Information pertaining to particular dangers for man and environment
R 12 Extremely flammable.
R 14/15 Reacts violently with water, liberating extremely flammable gases.
R 19 May form explosive peroxides.
R 22 Harmful if swallowed.
R 35 Causes severe burns.
R 66 Repeated exposure may cause skin dryness or cracking
R 67 Vapours may cause drowsiness and dizziness

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

<table>
<thead>
<tr>
<th>HEALTH</th>
<th>FIRE</th>
<th>REACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Health (acute effects) = 3
Flammability = 4
Reactivity = 3

GHS label elements

Danger

2.6/1 - Extremely flammable liquid and vapour.
2.12/2 - In contact with water releases flammable gas.

Danger

3.1/3 - Toxic if swallowed.
3.8/3 - May cause drowsiness or dizziness.

Danger

3.2/1A - Causes severe skin burns and eye damage.

Prevention:
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Handle under inert gas. Protect from moisture.
Keep container tightly closed.
Ground/bond container and receiving equipment.
Material Safety Data Sheet
acc. to OSHA and ANSI

Product name: Phenylmagnesium bromide, 3M in ether

Use explosion-proof electrical/ventilating/lighting/equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Do not breathe dust/fume/gas/mist/vapours/spray.
Avoid breathing dust/fume/gas/mist/vapours/spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.

Response:
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
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 or doctor/physician.
Call a POISON CENTER or doctor/physician if you feel unwell.
Specific treatment (see label).
Rinse mouth.
Brush off loose particles from skin. Immerse in cool water/wrap in wet bandages.
Wash contaminated clothing before reuse.
In case of fire: Use for extinction: CO2, powder or water spray.

Storage:
Store in a dry place. Store in a closed container.
Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal:
Dispose of contents/container in accordance with local/regional/national/international regulations.

4 First aid measures
General information Immediately remove any clothing soiled by the product.
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.
Seek immediate medical advice.
After eye contact Rinse opened eye for several minutes under running water. Then consult a doctor.
After swallowing Seek immediate medical advice.

5 Fire fighting measures
Suitable extinguishing agents Extinguishing powder. Do not use water.
For safety reasons unsuitable extinguishing agents
Carbon dioxide
Water
Special hazards caused by the material, its products of combustion or resulting gases:
Reacts violently with water
In case of fire, the following can be released:
Carbon monoxide and carbon dioxide
Hydrogen bromide (HBr)
Metal oxide fume
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
Keep away from ignition sources
Measures for environmental protection:
Do not allow material to be released to the environment without proper governmental permits.

(Contd. of page 1)
(Contd. on page 3)
Product name: Phenylmagnesium bromide, 3M in ether

Measures for cleaning/collecting:
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Use neutralizing agent.
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
Do not flush with water or aqueous cleansing agents
Keep away from ignition sources.

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:
Handle under dry protective gas.
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
Open and handle container with care.

Information about protection against explosions and fires:
Keep ignition sources away.
Protect against electrostatic charges.
Fumes can combine with air to form an explosive mixture.
Do not distill to dryness.
Explosive peroxides may form, handle container cautiously.

Storage
Requirements to be met by storerooms and receptacles: Store in a cool location.
Information about storage in one common storage facility:
Store away from oxidizing agents.
Store in the dark.
Store away from water/moisture.
Further information about storage conditions:
Store under dry inert gas.
This product is moisture sensitive.
Store in cool, dry conditions in well sealed containers.
Protect from humidity and water.
Protect from exposure to light.
Avoid contact with air/oxygen (formation of peroxide).
Check container pressure periodically to prevent explosive peroxides.

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:

(Contd. of page 4)
9 Physical and chemical properties:

<table>
<thead>
<tr>
<th>General Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Form:</strong></td>
</tr>
<tr>
<td><strong>Color:</strong></td>
</tr>
<tr>
<td><strong>Odor:</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Change in condition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Melting point/Melting range:</strong> Not determined</td>
</tr>
<tr>
<td><strong>Boiling point/Boiling range:</strong> Not determined</td>
</tr>
<tr>
<td><strong>Sublimation temperature / start:</strong> Not determined</td>
</tr>
</tbody>
</table>

| Flash point: | -45°C (-49°F) (ethyl ether) |
| Ignition temperature: | 160°C (320°F) (ethyl ether 0) |
| Decomposition temperature: | Not determined |
| Danger of explosion: | May form explosive peroxides. Do not distill to dryness. |

<table>
<thead>
<tr>
<th>Explosion limits:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lower:</strong></td>
</tr>
<tr>
<td><strong>Upper:</strong></td>
</tr>
</tbody>
</table>

| Vapor pressure: | Not determined |
| Density at 20°C (68°F): | 1.14 g/cm³ |

<table>
<thead>
<tr>
<th>Solubility in / Miscibility with Water:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reacts violently</td>
</tr>
<tr>
<td>Contact with water releases flammable gases</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:
- Water/moisture
- Acids
- Oxidizing agents
- Light

Dangerous reactions
- Contact with water releases flammable gases
- Reacts violently with water

Dangerous products of decomposition:
- Flammable gases/vapors
- Carbon monoxide and carbon dioxide
- Hydrogen bromide
- Metal oxide fume

11 Toxicological information

Acute toxicity:
Primary irritant effect:
- on the skin: Strong corrosive effect on skin and mucous membranes.
- on the eye: Strong corrosive effect.

Sensitization: No sensitizing effects known.

Subacute to chronic toxicity:
- Diethyl ether is a depressant of the central nervous system and is capable of causing intoxication, drowsiness, stupor and unconsciousness. Severe exposure may cause respiratory failure and death. On contact it may irritate the eyes.
- Inorganic bromides may produce depression, emaciation and in severe cases, psychosis and mental deterioration. Bromoderma, a bromide rash, often occurs when bromide inhalation or administration is prolonged. This rash is usually found on the face and resembles acne and furunculosis.
- Inhalation of magnesium compounds may cause metal fume fever. Metallic magnesium which perforates the skin may cause local lesions. Some magnesium salts have produced muscle weakness, cardiac arrhythmias, respiratory effects and changes in blood chemistry following ingestion.

Subacute to chronic toxicity:
- Corrosive materials are acutely destructive to the respiratory tract, eyes, skin and digestive tract. Eye contact may result in permanent damage and complete vision loss. Inhalation may result in respiratory effects such as inflammation, edema, and chemical pneumonitis. May cause coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. Ingestion may cause damage to the mouth, throat and esophagus. May cause skin burns or irritation depending on the severity of the exposure.

Additional toxicological information:
- Swallowing will lead to a strong corrosive effect on mouth and throat and to the danger of perforation of esophagus and stomach.
- To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.
- No classification data on carcinogenic properties of this material is available from the EPA, IARC, NTP, OSHA or ACGIH.

12 Ecological information:

General notes:
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
Do not allow material to be released to the environment without proper governmental permits.

13 Disposal considerations

Product:
Recommendation: Consult state, local or national regulations to ensure proper disposal.
### 14 Transport information

**DOT regulations:**

<table>
<thead>
<tr>
<th>Hazard class</th>
<th>4.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification number</td>
<td>UN3399</td>
</tr>
<tr>
<td>Packing group</td>
<td>II</td>
</tr>
<tr>
<td>Proper shipping name (technical name)</td>
<td>ORGANOMETALLIC SUBSTANCE, LIQUID, WATER REACTIVE, FLAMMABLE (Phenylmagnesium bromide/ethyl ether)</td>
</tr>
<tr>
<td>Label</td>
<td>4.3+3</td>
</tr>
</tbody>
</table>

**Land transport ADR/RID (cross-border):**

<table>
<thead>
<tr>
<th>ADR/RID class</th>
<th>4.3 (WF1) Substances which, in contact with water, emit flammable gases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danger code (Kemler)</td>
<td>323</td>
</tr>
<tr>
<td>UN-Number</td>
<td>3399</td>
</tr>
<tr>
<td>Packaging group</td>
<td>II</td>
</tr>
<tr>
<td>Description of goods</td>
<td>3399 ORGANOMETALLIC SUBSTANCE, LIQUID, WATER REACTIVE, FLAMMABLE</td>
</tr>
</tbody>
</table>

**Maritime transport IMDG:**

<table>
<thead>
<tr>
<th>IMDG Class</th>
<th>4.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN Number</td>
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**Air transport ICAO-TI and IATA-DGR:**

<table>
<thead>
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<th>ICAO/IATA Class</th>
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<tr>
<td>UN/ID Number</td>
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</table>

**UN "Model Regulation":**

UN3399, ORGANOMETALLIC SUBSTANCE, LIQUID, WATER REACTIVE, FLAMMABLE
### 15 Regulations

#### Product related hazard informations:

**Hazard symbols:**
- C: Corrosive
- F+: Extremely flammable

**Risk phrases:**
- 12: Extremely flammable.
- 14/15: Reacts violently with water, liberating extremely flammable gases.
- 19: May form explosive peroxides.
- 22: Harmful if swallowed.
- 35: Causes severe burns.
- 66: Repeated exposure may cause skin dryness or cracking
- 67: Vapours may cause drowsiness and dizziness

**Safety phrases:**
- 9: Keep container in a well-ventilated place.
- 12: Keep away from sources of ignition - No smoking.
- 26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- 29: Do not empty into drains.
- 30: Never add water to this product.
- 33: Take precautionary measures against static discharges.
- 36/37/39: Wear suitable protective clothing, gloves and eye/face protection.
- 45: In case of accident or if you feel unwell, seek medical advice immediately.

#### National regulations

All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.

Information about limitation of use: For use only by technically qualified individuals.

### 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: Zachariah Holt

Abbreviations and acronyms:
- ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
- RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)
- IMDG: International Maritime Code for Dangerous Goods
- DOT: US Department of Transportation
- IATA: International Air Transport Association
- IATA-DGR: Dangerous Goods Regulations by the "International Air Transport Association" (IATA)
- ICAO: International Civil Aviation Organization
- ICAO-TI: Technical Instructions by the "International Civil Aviation Organization" (ICAO)
- GHS: Globally Harmonized System of Classification and Labelling of Chemicals
- CAS: Chemical Abstracts Service (division of the American Chemical Society)
- HMIS: Hazardous Materials Identification System (USA)

USA