Material Safety Data Sheet

acc. to OSHA and ANSI
Printing date 11/10/2003 Reviewed on 09/29/2003

1 Identification of substance:
   o Product details:
     o Product name: Vinylimagnesium bromide, 0.8-1.0M in THF
     o Stock number: 89427
     o 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
     o Information Department: Health, Safety and Environmental Department
     o 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:
   o Chemical characterization:
     Description: (CAS#)
     vinylimagnesium bromide (CAS# 1826-67-1); 12-17%
     tetrahydrofuran (CAS# 109-99-9); 83-88%
     o Identification number(s):
       o EINECS Number: 217-375-3
       o EU Number: 603-025-00-0

3 Hazards identification
   o Hazard description:
     C Corrosive
     F Highly flammable
   o Information pertaining to particular dangers for man and environment
     R 11 Highly flammable.
     R 14/15 Reacts violently with water, liberating extremely flammable gases.
R 35 Causes severe burns.
R 41 Risk of serious damage to eyes.

- Classification system
- HMIS ratings (scale 0-4)

(Hazardous Materials Identification System)
Health (acute effects) = 3
Flammability = 3
Reactivity = 3

- 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
    Water
    Carbon dioxide
  - 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.
  - 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:**
    Keep container tightly sealed.
    Handle under dry protective gas.
    Store in cool, dry place in tightly closed containers.
    Keep away from heat and direct sunlight.
    Ensure good ventilation at the workplace.
  - **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.

  - **Storage**
  - **Requirements to be met by storerooms and receptacles:**
    Store in a cool location.
  - **Information about storage in one common storage facility:**
    Do not store together with oxidizing and acidic materials.
    Store away from water/moisture.
  - **Further information about storage conditions:**
    Keep container tightly sealed.
    Store in cool, dry conditions in well sealed containers.
    Protect from heat and direct sunlight.
    Store under lock and key and with access restricted to technical experts or their assistants only.

- **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:**

  Tetrahydrofuran  \[ \text{ppm} \]
  ACGIH TLV \[ 200; 250- STEL \]
  Austria TWA \[ 200 \]
  Belgium TWA \[ 200; 250- STEL \]
Denmark TWA 200
Finland TWA 100; 150-STEEL
France TWA 200
Germany TWA 200
Hungary TWA 200 mg/m3; 400 mg/m3-STEEL
Netherlands TWA 100 (skin)
Russia TWA 200; 100 mg/m3-STEEL
Sweden TWA 50
Switzerland TWA 200; 1000-STEEL
United Kingdom TWA 100; 200-STEEL (skin)
USA PEL 200

- 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.
  Avoid contact with the eyes.
  Avoid contact with the eyes and skin.

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

- Protection of hands: Impervious gloves

- Eye protection:
  Safety glasses
  Tightly sealed goggles
  Full face protection

- Body protection: Protective work clothing.

- 9 Physical and chemical properties:

  - General Information

  - Form: Solution
  - Color: Brown
  - Odor: Ether-like

<table>
<thead>
<tr>
<th>Value/Range</th>
<th>Unit</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Melting point/Melting range:</td>
<td>Not determined</td>
<td></td>
</tr>
<tr>
<td>Boiling point/Boiling range:</td>
<td>Not determined</td>
<td></td>
</tr>
<tr>
<td>Sublimation temperature / start:</td>
<td>Not determined</td>
<td></td>
</tr>
<tr>
<td>Flash point:</td>
<td>-17 °C</td>
<td></td>
</tr>
<tr>
<td>Ignition temperature:</td>
<td>Not determined</td>
<td></td>
</tr>
<tr>
<td>Decomposition temperature:</td>
<td>Not determined</td>
<td></td>
</tr>
</tbody>
</table>
- **Danger of explosion:**
  Product is not explosive. However, formation of explosive air/vapor mixtures is possible.

- **Explosion limits:**
  - Lower: Not determined
  - Upper: Not determined

- **Vapor pressure:** Not determined

- **Density:** at 20 °C 0.891 g/cm³

- **Solubility in / Miscibility with**
  - Water: Not determined

---

- **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
    - Oxidizing agents
    - Acids
    - Oxygen
    - Carbon dioxide

  - **Dangerous reactions**
    - Explosive reaction with water
    - Contact with water releases flammable gases
    - Reacts with oxygen
    - Can react violently with oxygen rich (oxidizing) material.
    - Danger of Explosion.
    - Reacts with acids
    - Reacts with carbon dioxide

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

---

- **11 Toxicological information**

  - **Acute toxicity:**
  - **Primary irritant effect:**
    - **on the skin:**
      Strong corrosive effect on skin and mucous membranes.
      Irritant to skin and mucous membranes.
    - **on the eye:**
      Strong corrosive effect.
      Strong irritant with the danger of severe eye injury.
      Irritating effect.
- Sensitization: No sensitizing effects known.
- Subacute to chronic toxicity:
  THF is irritating to eyes and mucous membranes and may cause narcosis in high concentrations. May cause liver and kidney injury.
  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.
- 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 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.
- Uncleaned packaging:
- Recommendation:
  Disposal must be made according to official regulations.

- 14 Transport information
  - DOT regulations:
  - Hazard class: 4.3
  - Identification number: UN3207
  - Packing group: II
  - Proper shipping name (technical name):
    Organometallic compound solution,
water-
vinyilmagnesium
THF

- Land transport ADR/RID  (cross-border)
  - ADR/RID class: 4.3 Substances which, in contact with
  - Item: emit flammable gases
  - Danger code (Kemler): 3b
  - UN-Number: X382
  - Description of goods: Organometallic compound solution,
                          reactive, flammable, n.o.s.,
                          bromide, 0.8-1.0M in
                          water-
                          vinyilmagnesium
                          THF

- Maritime transport IMDG:
  - IMDG Class: 4.3
  - UN Number: 3207
  - Packaging group: II
  - Proper shipping name: Organometallic compound solution,
                          reactive, flammable, n.o.s.,
                          bromide, 0.8-1.0M in
                          water-
                          vinyilmagnesium
                          THF

- Air transport ICAO-TI and IATA-DGR:
  - ICAO/IATA Class: 4.3
  - UN/ID Number: 3207
  - Packaging group: II
  - Proper shipping name: Organometallic compound solution,
                          reactive, flammable, n.o.s.,
                          bromide, 0.8-1.0M in
                          water-
                          vinyilmagnesium
                          THF

- 15 Regulations

  - Product related hazard informations:

    - Hazard symbols:
      C Corrosive
      F Highly flammable

    - Risk phrases:
      11 Highly flammable.
      14/15 Reacts violently with water, liberating extremely
             flammable gases.
      35 Causes severe burns.
41  Risk of serious damage to eyes.

○ **Safety phrases:**
  - 8  Keep container dry.
  - 16 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.
  - 30 Never add water to this product.
  - 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
  - 43 In case of fire, use powdered extinguishing agent. Never use water.
  - 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:** Darrell R. Sanders