SAFETY DATA SHEET

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: VinylMagnesium bromide solution

Product Number: 225584
Brand: Aldrich

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone: +1 314 771-5765
Fax: +1 800 325-5052

1.4 Emergency telephone

Emergency Phone #: 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

- Flammable liquids (Category 2), H225
- Chemicals which, in contact with water, emit flammable gases (Category 1), H260
- Acute toxicity, Oral (Category 4), H302
- Skin corrosion (Category 1A), H314
- Serious eye damage (Category 1), H318
- Carcinogenicity (Category 2), H351
- Specific target organ toxicity - single exposure (Category 3), Respiratory system, Central nervous system, H335, H336

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

For the full text of the hazard statements and precautionary statements, see Section 16.
Signal Word  Danger

Hazard statement(s)
H225  Highly flammable liquid and vapor.
H260  In contact with water releases flammable gases which may ignite spontaneously.
H302  Harmful if swallowed.
H314  Causes severe skin burns and eye damage.
H335  May cause respiratory irritation.
H336  May cause drowsiness or dizziness.
H351  Suspected of causing cancer.

Precautionary statement(s)
P201  Obtain special instructions before use.
P202  Do not handle until all safety precautions have been read and understood.
P210  Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P223  Do not allow contact with water.
P231 + P232  Handle under inert gas. Protect from moisture.
P233  Keep container tightly closed.
P240  Ground/bond container and receiving equipment.
P241  Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242  Use only non-sparking tools.
P243  Take precautionary measures against static discharge.
P261  Avoid breathing mist or vapors.
P264  Wash skin thoroughly after handling.
P270  Do not eat, drink or smoke when using this product.
P271  Use only outdoors or in a well-ventilated area.
P280  Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330  IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P301 + P330 + P331  IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353  IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310  IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310  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/ doctor.
P308 + P313  IF exposed or concerned: Get medical advice/ attention.
P335 + P334  Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P363  Wash contaminated clothing before reuse.
P370 + P378  In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P402 + P404  Store in a dry place. Store in a closed container.
P403 + P233  Store in a well-ventilated place. Keep container tightly closed.
P403 + P235  Store in a well-ventilated place. Keep cool.
P405  Store locked up.
P501  Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS
Reacts violently with water.
May form explosive peroxides.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetrahydrofuran</td>
<td>Flam. Liq. 2; Acute Tox. 4; Eye Irrit. 2A; Carc. 2; STOT SE 3; H225, H302, H319, H351, H335, H336 Concentration limits: &gt;= 25 %: Eye Irrit. 2, H319; &gt;= 25 %: STOT SE 3, H335;</td>
<td>&gt;= 70 - &lt; 90 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>109-99-9</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>203-726-8</td>
<td></td>
</tr>
<tr>
<td>Index-No.</td>
<td>603-025-00-0</td>
<td></td>
</tr>
<tr>
<td>Bromovinylmagnesium</td>
<td>1; Skin Corr. 1A; Eye Dam. 1; H260, H314, H318</td>
<td>&gt;= 10 - &lt; 20 %</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>1826-67-1</td>
<td></td>
</tr>
<tr>
<td>EC-No.</td>
<td>217-375-3</td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/shower. Call a physician immediately.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most), avoid vomiting (risk of perforation). Call a physician immediately. Do not attempt to neutralise.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available
SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
Water Foam

5.2 Special hazards arising from the substance or mixture
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
May not get in touch with: Water
Development of hazardous combustion gases or vapours possible in the event of fire.
Forms explosive mixtures with air at ambient temperatures.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert. For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols. Keep workplace dry. Do not allow product to come into contact with water.
**Advice on protection against fire and explosion**
Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.

**Hygiene measures**
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 **Conditions for safe storage, including any incompatibilities**

**Storage conditions**
Tightly closed. Keep away from heat and sources of ignition. Never allow product to get in contact with water during storage.
Handle and store under inert gas. Dry residue is explosive. Test for peroxide formation periodically and before distillation.

**Storage class**
Storage class (TRGS 510): 4.3: Hazardous materials, which set free flammable gases upon contact with water

7.3 **Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

### SECTION 8: Exposure controls/personal protection

8.1 **Control parameters**

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetrahydrofuran</td>
<td>109-99-9</td>
<td>TWA</td>
<td>50 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
<td></td>
<td></td>
<td>Confirmed animal carcinogen with unknown relevance to humans</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Danger of cutaneous absorption</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEL</td>
<td>100 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Confirmed animal carcinogen with unknown relevance to humans</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Danger of cutaneous absorption</td>
</tr>
<tr>
<td>Parameters</td>
<td>Value</td>
<td>Biological specimen</td>
<td>Basis</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-------</td>
<td>---------------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>TWA</td>
<td>200 ppm 590 mg/m³</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWA</td>
<td>200 ppm 590 mg/m³</td>
<td>USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEL</td>
<td>200 ppm 590 mg/m³</td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STEL</td>
<td>250 ppm 735 mg/m³</td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Biological occupational exposure limits

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Parameters</th>
<th>Value</th>
<th>Biological specimen</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetrahydrofuran</td>
<td>109-99-9</td>
<td>Tetrahydrofuran</td>
<td>2 mg/l</td>
<td>Urine</td>
<td>ACGIH - Biological Exposure Indices (BEI)</td>
</tr>
</tbody>
</table>

**Remarks**: End of shift (As soon as possible after exposure ceases)

### 8.2 Exposure controls

**Appropriate engineering controls**
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

**Personal protective equipment**

**Eye/face protection**
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles.

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 10 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.
Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties
9.1 Information on basic physical and chemical properties

- a) Appearance
  Form: clear, liquid
  Color: dark orange

- b) Odor
  No data available

- c) Odor Threshold
  No data available

- d) pH
  No data available

- e) Melting point/freezing point
  No data available

- f) Initial boiling point and boiling range
  No data available

- g) Flash point
  -17.0 °C (1.4 °F)

- h) Evaporation rate
  No data available

- i) Flammability (solid, gas)
  No data available

- j) Upper/lower flammability or explosive limits
  No data available

- k) Vapor pressure
  No data available

- l) Vapor density
  No data available

- m) Density
  No data available
  Relative density
  No data available

- n) Water solubility
  No data available

- o) Partition coefficient: n-octanol/water
  No data available

- p) Autoignition temperature
  No data available

- q) Decomposition temperature
  No data available

- r) Viscosity
  No data available

- s) Explosive properties
  Not classified as explosive.
t) Oxidizing properties none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
Formation of peroxides possible.
Vapors may form explosive mixture with air.

10.2 Chemical stability
Sensitive to moisture

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Warming.
Moisture.

10.5 Incompatible materials
Oxidizing agents, Strong oxidizing agents, Oxygen, Alcohols, acids, Reacts violently with water.

10.6 Hazardous decomposition products
Peroxides
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects
Mixture

Acute toxicity
Oral: No data available
Acute toxicity estimate Oral - 1,906 mg/kg (Calculation method)
Symptoms: If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the esophagus and the stomach.
Symptoms: mucosal irritations, Cough, Shortness of breath, Possible damages:, damage of respiratory tract
Dermal: No data available
No data available

Skin corrosion/irritation
No data available
Mixture causes severe burns.

Serious eye damage/eye irritation
No data available
Mixture causes serious eye damage. Risk of blindness!
**Respiratory or skin sensitization**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**

Evidence of a carcinogenic effect.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Tetrahydrofuran)

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA’s list of regulated carcinogens.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**

Remarks: No data available
Mixture may cause respiratory irritation.
Mixture may cause drowsiness or dizziness.

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

11.2 Additional Information

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea
Other dangerous properties can not be excluded.

This substance should be handled with particular care.

Handle in accordance with good industrial hygiene and safety practice.

Stomach - Irregularities - Based on Human Evidence

**Components**

**Tetrahydrofuran**

**Acute toxicity**
LD50 Oral - Rat - male and female - 1,650 mg/kg
Remarks: (ECHA)
Symptoms: Irritation of mucous membranes
Inhalation: Irritating to respiratory system.
Symptoms: mucosal irritations, Cough, Shortness of breath, Possible damages:, damage of respiratory tract
Dermal: No data available

**Skin corrosion/irritation**
Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product.

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: Eye irritation
Remarks: (IUCLID)

**Respiratory or skin sensitization**
Sensitisation test: - Guinea pig
Result: negative
Remarks: (IUCLID)
Human experience
Result: negative
Remarks: (IUCLID)

**Germ cell mutagenicity**
Test Type: Ames test
Result: negative
Remarks: (IUCLID)

**Carcinogenicity**
Suspected of causing cancer.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
May cause respiratory irritation. - Respiratory system
May cause drowsiness or dizziness.
Acute oral toxicity - Irritation of mucous membranes
Acute inhalation toxicity - mucosal irritations, Cough, Shortness of breath, Possible damages:, damage of respiratory tract

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

---

**Bromovinylmagnesium**

**Acute toxicity**
Oral: No data available
Inhalation: No data available
Dermal: No data available

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitization**
No data available
Germ cell mutagenicity
No data available

Carcinogenicity
No data available

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

SECTION 12: Ecological information

12.1 Toxicity
  Mixture
  No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

Components

Tetrahydrofuran
Toxicity to fish
flow-through test LC50 - Pimephales promelas (fathead minnow) - 2,160 mg/l - 96 h
(OECD Test Guideline 203)

Toxicity to daphnia and other aquatic invertebrates
static test EC50 - Daphnia magna (Water flea) - 3,485 mg/l - 48 h
(OECD Test Guideline 202)

Toxicity to algae
Cell multiplication inhibition test IC5 - Scenedesmus quadricauda (Green algae) - 3,700 mg/l - 8 d
Remarks: (maximum permissible toxic concentration)

Toxicity to bacteria
static test IC50 - activated sludge - 460 mg/l - 3 h
BromovinylMagnesium

No data available

**SECTION 13: Disposal considerations**

**13.1 Waste treatment methods**

**Product**
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

**SECTION 14: Transport information**

**DOT (US)**
- UN number: 3399  Class: 4.3 (3)  Packing group: II
- Proper shipping name: Organometallic substance, liquid, water-reactive, flammable (BromovinylMagnesium, Tetrahydrofuran)
- Reportable Quantity (RQ): 1154 lbs
- Poison Inhalation Hazard: No

**IMDG**
- UN number: 3399  Class: 4.3 (3)  Packing group: II  EMS-No: F-G, S-N
- Proper shipping name: ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE (BromovinylMagnesium, Tetrahydrofuran)

**IATA**
- UN number: 3399  Class: 4.3 (3)  Packing group: II
- Proper shipping name: Organometallic substance, liquid, water-reactive, flammable (BromovinylMagnesium, Tetrahydrofuran)

**SECTION 15: Regulatory information**

**SARA 302 Components**
This material does not contain any components with a section 302 EHS TPQ.

**SARA 313 Components**
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**SARA 311/312 Hazards**
Fire Hazard, Reactivity Hazard, Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**
No components are subject to the Massachusetts Right to Know Act.
SECTION 16: Other information

Further information
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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