SECTION 1: Identification

1.1. Identification

Product name: MAGNESIUM METHYL CARBONATE, 2M in dimethylformamide
Product code: AKM506
Product form: Mixture
Physical state: Liquid
Formula: C₃H₆MgO₄∙XCO₂
Synonyms: STILES' REAGENT
          METHOXYMAGNESIUM METHYL CARBONATE
          METHYL METHOXYMAGNESIUM CARBONATE
          CARBONIC ACID, MONOMETHYL ESTER, MAGNESIUM COMPLEX
          MAGNESIUM, (HYDROGEN CARBONATO)METHOXY-, METHYL ESTER
Chemical family: METAL COMPOUND

1.2. Recommended use and restrictions on use

Recommended use: Chemical intermediate

1.3. Supplier

GELEST, INC.
11 East Steel Road
Morrisville, PA 19067
USA
T 215-547-1015 - F 215-547-2484 - (M-F): 8:00 AM - 5:30 PM EST
info@gelest.com - www.gelest.com

1.4. Emergency telephone number

Emergency number: CHEMTREC: 1-800-424-9300 (USA); +1 703-527-3887 (International)

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

GHS-US classification

- Flammable liquids Category 3: H226 - Flammable liquid and vapor
- Acute toxicity (dermal) Category 4: H312 - Harmful in contact with skin
- Skin corrosion/irritation Category 2: H315 - Causes skin irritation
- Serious eye damage/eye irritation Category 2: H319 - Causes serious eye irritation
- Reproductive toxicity Category 1B: H360 - May damage fertility or the unborn child

Full text of H statements: see section 16

2.2. GHS Label elements, including precautionary statements

GHS US labeling

Hazard pictograms (GHS US):

- Danger

Signal word (GHS US):

- Flammable liquid and vapor
- Harmful in contact with skin
- Causes skin irritation
- Causes serious eye irritation
- May damage fertility or the unborn child

Precautionary statements (GHS US):

- P201 - Obtain special instructions before use.
- P202 - Do not handle until all safety precautions have been read and understood.
- P280 - Wear protective gloves/protective clothing/eye protection/face protection.
- P308+P313 - If exposed or concerned: Get medical advice/attention.
- P210 - Keep away from heat, open flames, sparks. - No smoking.
- P233 - Keep container tightly closed.
- P240 - Ground/Bond container and receiving equipment
- P241 - Use explosion-proof electrical equipment
- P242 - Use only non-sparking tools.
- P243 - Take precautionary measures against static discharge.
- P264 - Wash hands thoroughly after handling.
- P303+P361+P353 - If on skin (or hair): take off immediately all contaminated clothing. rinse skin with water/shower.
P332+P313 - If skin irritation occurs: Get medical advice/attention.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337+P313 - If eye irritation persists: Get medical advice/attention.
P312 - Call a doctor if you feel unwell
P322 - Specific treatment (see first aid instructions on this label)
P332 - Take off contaminated clothing and wash it before reuse.
P370+P378 - In case of fire: Use alcohol resistant foam, carbon dioxide, dry chemical to extinguish.
P403+P235 - Keep in a cool place
P405 - Store locked up.
P501 - Dispose of contents/container to licensed waste disposal facility.

2.3. Hazards not otherwise classified (HNOC)
No additional information available

2.4. Unknown acute toxicity (GHS US)
Not applicable

SECTION 3: Composition/Information on ingredients

3.1. Substances
Not applicable

3.2. Mixtures

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>GHS-US classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>N,N-Dimethylformamide</td>
<td>(CAS-No.) 68-12-2</td>
<td>75-80</td>
<td>Flam. Liq. 3, H226 Acute Tox. 4 (Dermal), H312 Eye Irrit. 2A, H319 Rep. 1B, H360</td>
</tr>
<tr>
<td>Magnesium methyl carbonate</td>
<td>(CAS-No.) 4861-79-4</td>
<td>20-25</td>
<td>Skin Irrit. 2, H315 Eye Irrit. 2A, H319</td>
</tr>
</tbody>
</table>

Full text of hazard classes and H-statements : see section 16

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures general : Remove contaminated clothing and shoes. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). If possible show this sheet; if not available show packaging or label.

First-aid measures after inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If you feel unwell, seek medical advice.

First-aid measures after skin contact : Wash with plenty of soap and water. Get medical advice/attention.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical advice/attention.

First-aid measures after ingestion : Never give anything by mouth to an unconscious person. Get medical advice/attention.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects : May damage fertility or the unborn child.
Symptoms/effects after inhalation : May be harmful if inhaled. Dimethylformamide: May cause euphoria, muscular incoordination, headache, dizziness, vomiting, abdominal cramps, sweating, delirium, coma, convulsions.
Symptoms/effects after skin contact : Causes skin irritation. Harmful in contact with skin.
Symptoms/effects after eye contact : Causes serious eye irritation. Dimethylformamide causes concentric constriction of visual fields; decreased visual acuity; dilated, unresponsive pupils; pain, photophobia, blindness.
Symptoms/effects after ingestion : May be harmful if swallowed.

4.3. Immediate medical attention and special treatment, if necessary
No additional information available

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media : Alcohol-resistant foam. Carbon dioxide. Dry chemical.

Unsuitable extinguishing media : Water.

5.2. Specific hazards arising from the chemical

Fire hazard : Flammable liquid and vapor. Irritating fumes and organic acid vapors may develop when material is exposed to elevated temperatures or open flame.

Explosion hazard : May form flammable/explosive vapor-air mixture.

5.3. Special protective equipment and precautions for fire-fighters

Firefighting instructions : Exercise caution when fighting any chemical fire.
MAGNESIUM METHYL CARBONATE, 2M in dimethylformamide
Safety Data Sheet

Protection during firefighting: Do not enter fire area without proper protective equipment, including respiratory protection. Avoid all eye and skin contact and do not breathe vapor and mist.

Other information: Reacts with water, releasing magnesium hydroxide and dimethylformamide.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures: Eliminate ignition sources. Use special care to avoid static electric charges.

6.1.1. For non-emergency personnel
Protective equipment: Wear protective equipment as described in Section 8.
Emergency procedures: Evacuate unnecessary personnel.

6.1.2. For emergency responders
Protective equipment: Do not attempt to take action without suitable protective equipment. Equip cleanup crew with proper protection. For further information refer to section 8: “Exposure controls/personal protection”.

6.2. Environmental precautions
Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

For containment: Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams.
Methods for cleaning up: Clean up any spills as soon as possible, using an absorbent material to collect it. Use only non-sparking tools.

6.4. Reference to other sections
See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Additional hazards when processed: Handle empty containers with care because residual vapors are flammable. Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Precautions for safe handling: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Avoid all eye and skin contact and do not breathe vapor and mist. Ground/bond container and receiving equipment. Take precautionary measures against static discharge. Use only in well ventilated areas. Use only non-sparking tools.
Hygiene measures: Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product. Contaminated work clothing should not be allowed out of the workplace.

7.2. Conditions for safe storage, including any incompatibilities
Technical measures: Proper grounding procedures to avoid static electricity should be followed. Use explosion-proof electrical equipment.
Storage conditions: Keep container tightly closed. Keep in a cool place. Store locked up.
Storage area: Store in a well-ventilated place. Store away from heat.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

<table>
<thead>
<tr>
<th>N,N-Dimethylformamide (68-12-2)</th>
<th>ACGIH</th>
<th>OSHA</th>
<th>OSHA</th>
<th>NIOSH</th>
<th>NIOSH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ACGIH TWA (ppm)</td>
<td>OSHA PEL (TWA) (mg/m³)</td>
<td>OSHA PEL (TWA) (ppm)</td>
<td>NIOSH REL (TWA) (mg/m³)</td>
<td>NIOSH REL (TWA) (ppm)</td>
</tr>
<tr>
<td>ACGIH</td>
<td>10 ppm</td>
<td>30 mg/m³</td>
<td>10 ppm</td>
<td>30 mg/m³</td>
<td>10 ppm</td>
</tr>
<tr>
<td>OSHA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8.2. Appropriate engineering controls
Appropriate engineering controls: Provide local exhaust or general room ventilation.

8.3. Individual protection measures/Personal protective equipment

Personal protective equipment:

Avoid all unnecessary exposure. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.
Hand protection:
Impervious gloves such as neoprene or nitrile rubber gloves

Eye protection:
Goggles. Contact lenses should not be worn

Skin and body protection:
Wear suitable protective clothing

Respiratory protection:
Where exposure through inhalation may occur from use, use full face NIOSH-certified respirator with APF of 50; organic vapor (black cartridge) is recommended, if air-purifying respirator selected.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Appearance</td>
<td>Solution</td>
</tr>
<tr>
<td>Molecular mass</td>
<td>130.39 g/mol</td>
</tr>
<tr>
<td>Color</td>
<td>Clear to slightly hazy.</td>
</tr>
<tr>
<td>Odor</td>
<td>Alcohol</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>Refractive index</td>
<td>No data available</td>
</tr>
<tr>
<td>pH</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative evaporation rate (butyl acetate=1)</td>
<td>No data available</td>
</tr>
<tr>
<td>Melting point</td>
<td>&lt; 0 °C (sol'n)</td>
</tr>
<tr>
<td>Freezing point</td>
<td>No data available</td>
</tr>
<tr>
<td>Boiling point</td>
<td>153 °C (initial, DMF)</td>
</tr>
<tr>
<td>Flash point</td>
<td>58 °C</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>445 °C</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Flammable liquid and vapor</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>3.7 mm Hg (DMF)</td>
</tr>
<tr>
<td>Relative vapor density at 20 °C</td>
<td>&gt; 1</td>
</tr>
<tr>
<td>Relative density</td>
<td>1.103</td>
</tr>
<tr>
<td>% Volatiles</td>
<td>&gt; 75 %</td>
</tr>
<tr>
<td>Solubility</td>
<td>Reacts with water.</td>
</tr>
<tr>
<td>Log Pow</td>
<td>No data available</td>
</tr>
<tr>
<td>Log Kow</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity, kinematic</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity, dynamic</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No data available</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosion limits</td>
<td>No data available</td>
</tr>
</tbody>
</table>

9.2. Other information
No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity
No additional information available

10.2. Chemical stability
Stable.

10.3. Possibility of hazardous reactions
Material decomposes slowly in contact with air by reaction with water and carbon dioxide.

10.4. Conditions to avoid
Heat. Open flame. Sparks.

10.5. Incompatible materials
Air. Carbon dioxide. Water.
10.6. Hazardous decomposition products
Organic acid vapors. Magnesium oxide fumes.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity: Not classified

<table>
<thead>
<tr>
<th>MAGNESIUM METHYL CARBONATE, 2M in dimethylformamide (4861-79-4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATE US (dermal)</td>
</tr>
</tbody>
</table>

**N,N-Dimethylformamide (68-12-2)**

<table>
<thead>
<tr>
<th>Exposure Route</th>
<th>LD50 oral</th>
<th>LD50 dermal</th>
<th>LC50 inhalation</th>
<th>ATE US (oral)</th>
<th>ATE US (dermal)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2800 mg/kg</td>
<td>1100 mg/kg</td>
<td>1948 ppm/4h</td>
<td>2800 mg/kg body weight</td>
<td>1100 mg/kg body weight</td>
</tr>
</tbody>
</table>

Skin corrosion/irritation: Causes skin irritation.
Serious eye damage/irritation: Causes serious eye irritation.
Respiratory or skin sensitization: Not classified
Germ cell mutagenicity: Not classified
Carcinogenicity: Not classified

None of the components in this product at concentrations >0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

**N,N-Dimethylformamide (68-12-2)**

<table>
<thead>
<tr>
<th>IARC group</th>
<th>3 - Not classifiable</th>
</tr>
</thead>
</table>

Reproductive toxicity: May damage fertility or the unborn child.
Specific target organ toxicity – single exposure: Not classified
Specific target organ toxicity – repeated exposure: Not classified
Aspiration hazard: Not classified
Potential Adverse human health effects and symptoms: Dimethylformamide is a suspected carcinogen, exhibiting experimental teratogenic and reproductive effects.
Symptoms/effects after inhalation: May be harmful if inhaled. Dimethylformamide: May cause euphoria, muscular incoordination, headache, dizziness, vomiting, abdominal cramps, sweating, delirium, coma, convulsions.
Symptoms/effects after skin contact: Causes skin irritation. Harmful in contact with skin.
Symptoms/effects after eye contact: Causes serious eye irritation. Dimethylformamide causes concentric constriction of visual fields; decreased visual acuity; dilated, unresponsive pupils; pain, photophobia, blindness.
Symptoms/effects after ingestion: May be harmful if swallowed.

SECTION 12: Ecological information

12.1. Toxicity

**N,N-Dimethylformamide (68-12-2)**

<table>
<thead>
<tr>
<th>Exposure Route</th>
<th>LC50 fish 1</th>
<th>EC50 Daphnia 1</th>
<th>LC50 fish 2</th>
<th>EC50 Daphnia 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6300 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus)</td>
<td>7500 mg/l (Exposure time: 48 h - Species: Daphnia magna)</td>
<td>9800 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [flow-through])</td>
<td>8485 mg/l (Exposure time: 48 h - Species: Daphnia magna [semi-static])</td>
</tr>
</tbody>
</table>

12.2. Persistence and degradability
No additional information available

12.3. Bioaccumulative potential

**N,N-Dimethylformamide (68-12-2)**

<table>
<thead>
<tr>
<th>BCF fish 1</th>
<th>0.3 - 1.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Pow</td>
<td>-1.020</td>
</tr>
</tbody>
</table>

12.4. Mobility in soil
No additional information available

12.5. Other adverse effects

Other adverse effects: This substance may be hazardous to the environment.
Effect on the ozone layer: No additional information available
## SECTION 13: Disposal considerations

<table>
<thead>
<tr>
<th>13.1. Disposal methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewage disposal recommendations</td>
</tr>
<tr>
<td>Product/Packaging disposal recommendations</td>
</tr>
<tr>
<td>Additional information</td>
</tr>
<tr>
<td>Ecology - waste materials</td>
</tr>
</tbody>
</table>

## SECTION 14: Transport information

### 14.1. UN number

| UN-No.(DOT) | 1993 |
| DOT NA no. | UN1993 |

### 14.2. UN proper shipping name

| Transport document description | UN1993 Flammable liquids, n.o.s. (MAGNESIUM METHYL CARBONATE, 2M in dimethylformamide), 3, III |
| Proper Shipping Name (DOT) | Flammable liquids, n.o.s. (MAGNESIUM METHYL CARBONATE, 2M in dimethylformamide) |
| Class (DOT) | 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120 |
| Packing group (DOT) | III - Minor Danger |
| Hazard labels (DOT) | 3 - Flammable liquid |

### 14.3. Additional information

Transport by sea

| DOT Vessel Stowage Location | A - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel. |

Air transport

| DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) | 60 L |
| DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) | 220 L |

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

<table>
<thead>
<tr>
<th>N,N-Dimethylformamide (68-12-2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
</tr>
<tr>
<td>Subject to reporting requirements of United States SARA Section 313</td>
</tr>
<tr>
<td>SARA Section 313 - Emission Reporting</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Magnesium methyl carbonate (4861-79-4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
</tr>
</tbody>
</table>

### 15.2. International regulations

#### CANADA

<table>
<thead>
<tr>
<th>N,N-Dimethylformamide (68-12-2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed on the Canadian DSL (Domestic Substances List)</td>
</tr>
</tbody>
</table>
Magnesium methyl carbonate (4861-79-4)
Listed on the Canadian NDSL (Non-Domestic Substances List)

EU-Regulations

N,N-Dimethylformamide (68-12-2)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Magnesium methyl carbonate (4861-79-4)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

National regulations

N,N-Dimethylformamide (68-12-2)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Japanese Pollutant Release and Transfer Register Law (PRTR Law)
Listed on the Canadian IDL (Ingredient Disclosure List)
Listed on INSQ (Mexican National Inventory of Chemical Substances)
Listed on CICR (Turkish Inventory and Control of Chemicals)

Magnesium methyl carbonate (4861-79-4)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)

15.3. US State regulations
California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

N,N-Dimethylformamide (68-12-2)
U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List

SECTION 16: Other information
Full text of H-phrases:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H226</td>
<td>Flammable liquid and vapor</td>
</tr>
<tr>
<td>H312</td>
<td>Harmful in contact with skin</td>
</tr>
<tr>
<td>H315</td>
<td>Causes skin irritation</td>
</tr>
<tr>
<td>H319</td>
<td>Causes serious eye irritation</td>
</tr>
<tr>
<td>H360</td>
<td>May damage fertility or the unborn child</td>
</tr>
</tbody>
</table>

Abbreviations and acronyms:
Abbreviations: ND: Not Determined, No Data; NA: Not Applicable; LD: Lethal Dose; LC: Lethal Concentration; ATE: Acute Toxicity Estimates; H: hour; °: °C unless otherwise stated; mm: millimeters Hg, torr; PEL: permissible exposure level; TWA: time weighted average; TLV: threshold limit value; TG: Test Guideline; NIOSH: National Institute for Occupational Safety and Health; IARC: International Agency for Research on Cancer; NTP: National Toxicology Program; HMIS: Hazardous Material Information System; CAS No.: Chemical Abstract Service Registration Number; EC No.: European Commission Registration Number; EC Index No.: European Commission Index Number; OECD: The Organisation for Economic Co-operation and Development; GHS: The Globally Harmonized System of Classification and Labelling; APF: Assigned Protection Factor.

Hazard Rating
Health:
3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given

Flammability:
2 Moderate Hazard - Materials which must be moderately heated or exposed to high ambient temperatures before ignition will occur. Includes liquids having a flash point at or above 100 F but below 200 F. (Classes II & IIIA)

Physical:
1 Slight Hazard - Materials that are normally stable but can become unstable (self-react) at high temperatures and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.

Prepared by safety and environmental affairs.

Date of issue: 04/25/2018
Version: 1.0

Print date: 04/09/2019
EN (English US)
SDS ID: AKM506
MAGNESIUM METHYL CARBONATE, 2M in dimethylformamide
Safety Data Sheet

SDS US (GHS HazCom 2012) - Custom
According to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

The information contained in this document has been gathered from reference materials and/or Gelest, Inc. test data and is to the best knowledge and belief of Gelest, Inc. accurate and reliable. Such information is offered solely for your consideration, investigation and verification. It is not suggested or guaranteed that the hazard precautions or procedures described are the only ones which exist. Gelest, Inc. makes no warranties, express or implied, with respect to the use of such information and assumes no responsibility therefore. Information on this safety data sheet is not intended to constitute a basis for product specifications.

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