SAFETY DATA SHEET
Geranylgeranyl Pyrophosphate (ammonium salt)

Section 1. Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product Code: 63330
Product Name: Geranylgeranyl Pyrophosphate (ammonium salt)
Synonyms: P-[(2E,6E,10E)-3,7,11,15-tetramethyl-2,6,10,14-hexadecatetraen-1-yl] ester-diphosphoric acid, triammonium salt; GGPP;

1.2 Relevant identified uses of the substance or mixture and uses advised against:
Relevant identified uses: For research use only, not for human or veterinary use.

1.3 Details of the Supplier of the Safety Data Sheet:
Company Name: Cayman Chemical Company
1180 E. Ellsworth Rd.
Ann Arbor, MI 48108
Web site address: www.caymanchem.com
Information: Cayman Chemical Company +1 (734)971-3335

1.4 Emergency telephone number:
Emergency Contact: CHEMTREC Within USA and Canada: +1 (800)424-9300
CHEMTREC Outside USA and Canada: +1 (703)527-3887

Section 2. Hazards Identification

2.1 Classification of the Substance or Mixture:
Flammable Liquids, Category 2
Acute Toxicity: Inhalation, Category 3
Acute Toxicity: Oral, Category 3
Acute Toxicity: Skin, Category 3
Skin Corrosion/Irritation, Category 1B
Specific Target Organ Toxicity (single exposure), Category 1
Aquatic Toxicity (Acute), Category 1

2.2 Label Elements:

GHS Signal Word: Danger
GHS Hazard Phrases:
H225: Highly flammable liquid and vapor.
H301: Toxic if swallowed.
H311: Toxic in contact with skin.
H314: Causes severe skin burns and eye damage.
H331: Toxic if inhaled.
H370: Causes damage to organs (eyes).
H400: Very toxic to aquatic life.
GHS Precaution Phrases:
- P210: Keep away from (heat/sparks/open flames/hot surfaces). - No smoking.
- P260: Do not breathe (dust/fume/gas/mist/vapours/spray).
- P264: Wash (hands) thoroughly after handling.
- P273: Avoid release to the environment.
- P280: Wear (protective gloves/protective clothing/eye protection/face protection).

GHS Response Phrases:
- P301+310: IF SWALLOWED: P310: Immediately call a POISON CENTER or doctor/physician.
- P302+352: IF ON SKIN: Wash with plenty of soap and water.
- P303+361+353: IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower.
- P304+340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- P305+351+338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P308+311: If exposed of concerned: Call a (POISON CENTER/Doctor/...).
- P321: Specific treatment (see ... on this label).
- P330: Rinse mouth.
- P361+364: Take off immediately all contaminated clothing and wash it before reuse.
- P363: Wash contaminated clothing before reuse.
- P391: Collect spillage.

GHS Storage and Disposal Phrases:
Please refer to Section 7 for Storage and Section 13 for Disposal information.

2.3 Adverse Human Health Effects and Symptoms:
- Causes damage to organs (eyes).
- Causes severe skin burns and eye damage.
- Material may be irritating to the mucous membranes and upper respiratory tract.
- May be fatal or cause blindness if swallowed.
- May cause eye, skin, or respiratory system irritation.
- Toxic if swallowed, inhaled, or absorbed through the skin.
- Very toxic to aquatic life.
To the best of our knowledge, the toxicological properties have not been thoroughly investigated.

### Section 3. Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>CAS # / RTECS #</th>
<th>Hazardous Components (Chemical Name)/ REACH Registration No.</th>
<th>Concentration</th>
<th>EC No./ EC Index No.</th>
<th>GHS Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>313263-08-0 NA</td>
<td>Geranylgeranyl Pyrophosphate (ammonium salt)</td>
<td>0.1 %</td>
<td>NA</td>
<td>No data available.</td>
</tr>
</tbody>
</table>
| 67-56-1 PC1400000 | Methanol                                                   | 70.0 %        | 200-659-6 603-001-00-X | Flam. Liq. 2: H225  
Acute Tox.(O) 3: H301  
Acute Tox.(D) 3: H311  
Acute Tox.(I) 3: H331  
STOT (SE) 1: H370 |
| 1336-21-6 BQ9625000 | Ammonium hydroxide                                        | 30.0 %        | 215-647-6 007-001-01-2 | Skin Corr. 1B: H314  
Aquatic (A) 1: H400 |
Section 4. First Aid Measures

4.1 Description of First Aid Measures:

In Case of Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Get immediate medical attention.

In Case of Skin Contact: Immediately wash skin with soap and plenty of water for at least 15 minutes. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.

In Case of Eye Contact: Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. Have eyes examined and tested by medical personnel.

In Case of Ingestion: Wash out mouth with water provided person is conscious. Never give anything by mouth to an unconscious person. Get medical attention. Do NOT induce vomiting unless directed to do so by medical personnel.

4.2 Important Symptoms and Effects, Both Acute and Delayed:

Overexposure may cause: confusion, dermatitis, headache, drowsiness, dizziness, gastrointestinal disturbance, optic nerve damage (blindness), nausea, unconsciousness, vomiting, visual disturbance, weakness.

May cause convulsions.

Once methanol is absorbed into the body, it is very slowly eliminated.

Section 5. Fire Fighting Measures

5.1 Suitable Extinguishing Media: Use alcohol-resistant foam, carbon dioxide, water, or dry chemical spray.

Unsuitable Extinguishing Media: Use water spray to cool fire-exposed containers.

5.2 Flammable Properties and Hazards: Can release vapors that form explosive mixtures at temperatures at or above the flashpoint.

Container explosion may occur under fire conditions.

Emits toxic fumes under fire conditions.

Sensitive to static discharge.

Vapors can travel to a source of ignition and flash back.

No data available.

Flash Pt: 11.00 C  Method Used: Closed Cup

Explosive Limits:

LEL: 6.0% at 25.0 C  UEL: 36.0% at 25.0 C

Autoignition Pt: 385.00 C

5.3 Fire Fighting Instructions: As in any fire, wear self-contained breathing apparatus pressure-demand (NIOSH approved or equivalent), and full protective gear to prevent contact with skin and eyes.

Note: Flammable as diluted in methanol.

Section 6. Accidental Release Measures

6.1 Protective Precautions, Protective Equipment and Emergency Procedures:

Avoid breathing vapors and provide adequate ventilation.

As conditions warrant, wear a NIOSH approved self-contained breathing apparatus, or respirator, and appropriate personal protection (rubber boots, safety goggles, and heavy rubber gloves).

6.2 Environmental Precautions:

Take steps to avoid release into the environment, if safe to do so.

6.3 Methods and Material For Containment and Cleaning:

Contain spill and collect, as appropriate.

Transfer to a chemical waste container for disposal in accordance with local regulations.
Section 7. Handling and Storage

7.1 Precautions To Be Taken

Avoid breathing dust/fume/gas/mist/vapours/spray.
Avoid prolonged or repeated exposure.
Keep away from sources of ignition.
Take precautionary measures against static discharge.

7.2 Precautions To Be Taken

Keep away from heat, sparks, and flame.
Keep container tightly closed.
Store in accordance with information listed on the product insert.

Section 8. Exposure Controls/Personal Protection

8.1 Exposure Parameters:

<table>
<thead>
<tr>
<th>CAS #</th>
<th>Chemical Name</th>
<th>Jurisdiction</th>
<th>Recommended Exposure Limits</th>
<th>Notations</th>
</tr>
</thead>
<tbody>
<tr>
<td>67-56-1</td>
<td>Methanol</td>
<td>ACGIH TLV</td>
<td>TLV: 200 ppm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Europe</td>
<td>TWA: 260 mg/m3 (200 ppm)</td>
<td>Skin Absorption</td>
</tr>
<tr>
<td></td>
<td></td>
<td>France VL</td>
<td>TWA: 260 mg/m3 (200 ppm)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>STEL: 1300 mg/m3 (1000 ppm)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>OSHA PELs</td>
<td>PEL: 200 ppm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Britain EH40</td>
<td>TWA: 266 mg/m3 (200 ppm)</td>
<td>Skin Absorption</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>STEL: 333 mg/m3 (250 ppm)</td>
<td></td>
</tr>
</tbody>
</table>

8.2 Exposure Controls:

8.2.1 Engineering Controls

Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

8.2.2 Personal protection equipment:

| Eye Protection: | Safety glasses |
| Protective Gloves: | Compatible chemical-resistant gloves |
| Other Protective Clothing: | Lab coat |
| Respiratory Equipment | NIOSH approved respirator, as conditions warrant. |
| (Specify Type): | |

Work/Hygienic/Maintenance Practices:

Facilities storing or utilizing this material should be equipped with an eyewash and a safety shower.
Wash thoroughly after handling.
No data available.

Section 9. Physical and Chemical Properties

9.1 Information on Basic Physical and Chemical Properties

| Physical States: | [ ] Gas  [X] Liquid  [ ] Solid |
| Appearance and Odor: | A solution in methanol:ammonium hydroxide (70:30) |
| pH: | No data. |
| Melting Point: | No data. |
| Boiling Point: | No data. |
| Flash Pt: | 11.00 C  Method Used: Closed Cup |
| Evaporation Rate: | No data. |
| Flammability (solid, gas): | No data available. |
| Explosive Limits: | LEL: 6.0% at 25.0 C  UEL: 36.0% at 25.0 C |
| Vapor Pressure (vs. Air or mm Hg): | 96 MM_HG at 20.0 C |
| Vapor Density (vs. Air = 1): | No data. |
Geranylgeranyl Pyrophosphate (ammonium salt)

Specific Gravity (Water = 1): No data.
Solubility in Water: No data.
Octanol/Water Partition Coefficient: No data.
Autoignition Pt: 385.00 C
Decomposition Temperature: No data.
Viscosity: No data.

9.2 Other Information
Percent Volatile: No data.
Molecular Formula & Weight: C20H33O7P2 • 3NH4  501.5

10.1 Reactivity: No data available.
10.2 Stability: Unstable [ ] Stable [ X ]
10.3 Stability Note(s): Stable if stored in accordance with information listed on the product insert.
Polymerization: Will occur [ ] Will not occur [ X ]
10.4 Conditions To Avoid: heat, flames and sparks
10.5 Incompatibility - Materials
acids
acid anhydrides
acid chlorides
alkali metals
oxidizing agents
reducing agents

10.6 Hazardous
Decomposition or Byproducts: carbon dioxoide

11.1 Information on Toxicological Effects:
The toxicological effects of this product have not been thoroughly studied.
Ammonium hydroxide - Toxicity Data: Oral LDLO (human): 43 mg/kg; Inhalation LCLO (human): 500 ppm; Inhalation TCLO (human): 408 ppm; Oral LD50 (rat): 350 mg/kg; Subcutaneous LDLO (mouse): 160 mg/kg;
Ammonium hydroxide - Irritation Data: Eyes (rabbit): 44 µg severe;
Methanol - Toxicity Data: Oral LD50 (rat): 5,600 mg/kg; Oral LD50 (rabbit): 14,200 mg/kg; Inhalation LC50 (rat): 64,000 ppm (4h); Inhalation LC50 (mouse): 61,100 ppm (134 m); Skin LD50 (rabbit): 15,800 mg/kg; Oral LDLO (human): 143 mg/kg;
Methanol - Irritation Data: Skin (rabbit): 20 mg (24h) moderate; Eyes (rabbit): 40 mg moderate;
Eyes (rabbit): 100 mg (24h) moderate;
Chronic Toxicological Effects:
Ammonium hydroxide - Investigated as a mutagen.
Methanol - Investigated as a mutagen and reproductive effector.

CAS # | Hazardous Components (Chemical Name) | NTP | IARC | ACGIH | OSHA
---|---|---|---|---|---
313263-08-0 | Geranylgeranyl Pyrophosphate (ammonium salt) | n.a. | n.a. | n.a. | n.a.
67-56-1 | Methanol | n.a. | n.a. | n.a. | n.a.
Section 12. Ecological Information

12.1 Toxicity: Avoid release into the environment. Runoff from fire control or dilution water may cause pollution.

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: No data available.

12.6 Other adverse effects: No data available.

Section 13. Disposal Considerations

13.1 Waste Disposal Method: Dispose in accordance with local, state, and federal regulations.

Section 14. Transport Information

14.1 LAND TRANSPORT (US DOT):

DOT Proper Shipping Name: Methanol Solution
DOT Hazard Class: 3 (6.1) FLAMMABLE LIQUID, POISON
UN/NA Number: 1230 Packing Group: II

14.1 LAND TRANSPORT (European ADR/RID):

ADR/RID Shipping Name: Methanol Solution
UN Number: 1230 Packing Group: II
Hazard Class: 3 (6.1) - FLAMMABLE LIQUID, POISON

14.3 AIR TRANSPORT (ICAO/IATA):

ICAO/IATA Shipping Name: Methanol Solution
UN Number: 1230 Packing Group: II
Hazard Class: 3 (6.1) - FLAMMABLE LIQUID, POISON
IATA Classification: 3, 6.1

Additional Transport Information:
Transport in accordance with local, state, and federal regulations. When sold in quantities of less than or equal to 1 mL, or 1 g, with an Excepted Quantity Code of E1, E2, E4, or E5, this item meets the De Minimis Quantities exemption, per IATA 2.6.10. Therefore packaging does not have to be labeled as Dangerous Goods/Excepted Quantity.
Geranylgeranyl Pyrophosphate (ammonium salt)

SAFETY DATA SHEET

Section 15. Regulatory Information

EPA SARA (Superfund Amendments and Reauthorization Act of 1986) Lists

<table>
<thead>
<tr>
<th>CAS #</th>
<th>Hazardous Components (Chemical Name)</th>
<th>S. 302 (EHS)</th>
<th>S. 304 RQ</th>
<th>S. 313 (TRI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>313263-08-0</td>
<td>Geranylgeranyl Pyrophosphate (ammonium salt)</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>67-56-1</td>
<td>Methanol</td>
<td>No</td>
<td>Yes 5000 LB</td>
<td>Yes</td>
</tr>
<tr>
<td>1336-21-6</td>
<td>Ammonium hydroxide</td>
<td>No</td>
<td>Yes 1000 LB</td>
<td>No</td>
</tr>
</tbody>
</table>

Other US EPA or State Lists

<table>
<thead>
<tr>
<th>CAS #</th>
<th>Hazardous Components (Chemical Name)</th>
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</thead>
<tbody>
<tr>
<td>313263-08-0</td>
<td>Geranylgeranyl Pyrophosphate (ammonium salt)</td>
<td>CAA HAP, ODC: No; CWA NPDES: No; TSCA: No; CA PROP.65: No</td>
</tr>
<tr>
<td>67-56-1</td>
<td>Methanol</td>
<td>CAA HAP, ODC: HAP; CWA NPDES: No; TSCA: Yes - Inventory; CA PROP.65: Yes: RDTox.</td>
</tr>
<tr>
<td>1336-21-6</td>
<td>Ammonium hydroxide</td>
<td>CAA HAP, ODC: No; CWA NPDES: No; TSCA: Yes - Inventory; CA PROP.65: No</td>
</tr>
</tbody>
</table>

Regulatory Information

Statement: This SDS was prepared in accordance with 29 CFR 1910.1200 and Regulation (EC) No.1272/2008.

Section 16. Other Information

Revision Date: 09/21/2017

Additional Information About This Product: No data available.

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