SAFETY DATA SHEET

1. Identification

Product identifier gamma-HEPTALACTONE FCC

Other means of identification

- BRI Product Code: 450
- FEMA number: 2539
- Synonyms: 2(3H)-Furanone, dihydro-5-propyl- * 4-Heptanolide * 4-Hydroxyheptanoic acid, gamma-lactone * 5-Propyldihydrofuran-2(3H)-one * gamma-Propiobutyrolactone * gamma-Propylbutyrolactone * Heptan-4-olide

Recommended use: flavors and fragrances

Recommended restrictions: Not for use in Tobacco or Nicotine delivery device applications and/or products.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

- Company name: Bedoukian Research
- Address: 21 Finance Drive, Danbury, CT 06810, United States
- Telephone: 1-203-830-4000
- Website: www.bedoukian.com
- E-mail: customerservice@bedoukian.com
- Contact person: Joseph Bania
- Emergency phone number: Chemtrec (North America) 1-800-424-9300, Chemtrec (International) 1-703-527-3887

2. Hazard(s) identification

- Not classified.
- Physical hazards: Not classified.
- Health hazards: Not classified.
- Environmental hazards: Not classified.
- OSHA defined hazards: Not classified.

Label elements

- Hazard symbol: None.
- Signal word: None.
- Hazard statement: The substance does not meet the criteria for classification.

Precautionary statement

- Prevention: Observe good industrial hygiene practices.
- Response: Wash hands after handling.
- Storage: Store away from incompatible materials.
- Disposal: Dispose of waste and residues in accordance with local authority requirements.

Hazard(s) not otherwise classified (HNOC): None known.

Supplemental information: None.

3. Composition/information on ingredients

Substances

Material name: gamma-HEPTALACTONE FCC
4. First-aid measures

**Inhalation**
Move to fresh air. Call a physician if symptoms develop or persist.

**Skin contact**
Wash off with soap and water. Get medical attention if irritation develops and persists.

**Eye contact**
Rinse with water. Get medical attention if irritation develops and persists.

**Ingestion**
Rinse mouth. Get medical attention if symptoms occur.

**Most important symptoms/effects, acute and delayed**
Direct contact with eyes may cause temporary irritation.

**Indication of immediate medical attention and special treatment needed**
Treat symptomatically.

**General information**
Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

**Suitable extinguishing media**
Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).

**Unsuitable extinguishing media**
Do not use water jet as an extinguisher, as this will spread the fire.

**Specific hazards arising from the chemical**
During fire, gases hazardous to health may be formed.

**Special protective equipment and precautions for firefighters**
Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

**Fire fighting equipment/instructions**
Move containers from fire area if you can do so without risk.

**Specific methods**
Use standard firefighting procedures and consider the hazards of other involved materials.

**General fire hazards**
No unusual fire or explosion hazards noted.

6. Accidental release measures

**Personal precautions, protective equipment and emergency procedures**
Keep unnecessary personnel away. For personal protection, see section 8 of the SDS.

**Methods and materials for containment and cleaning up**
Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS. Avoid discharge into drains, water courses or onto the ground.

**Environmental precautions**

7. Handling and storage

**Precautions for safe handling**
Observe good industrial hygiene practices.

**Conditions for safe storage, including any incompatibilities**
Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Recommended Packaging: Glass, Plastic, Aluminum or Phenolic Lined Steel. Store tightly sealed under inert gas in a cool, well-ventilated area.

8. Exposure controls/personal protection

**Occupational exposure limits**
No exposure limits noted for ingredient(s).

**Biological limit values**
No biological exposure limits noted for the ingredient(s).
Appropriate engineering controls

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

**Eye/face protection**

Wear safety glasses with side shields (or goggles).

**Skin protection**

**Hand protection**

Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.

**Other**

Wear suitable protective clothing.

**Respiratory protection**

In case of insufficient ventilation, wear suitable respiratory equipment.

**Thermal hazards**

Wear appropriate thermal protective clothing, when necessary.

**General hygiene considerations**

Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

**Appearance**

- **Physical state:** Liquid.
- **Color:** Colorless

**Odor**

coconut, hay, coumarinic odor.

**Odor threshold**

Not available.

**pH**

Not available.

**Melting point/freezing point**

Not available.

**Initial boiling point and boiling range**


**Flash point**

221 °F (105 °C) Pensky-Martens or Grabner Miniflash

**Evaporation rate**

Not available.

**Flammability (solid, gas)**

Not applicable.

**Upper/lower flammability or explosive limits**

<table>
<thead>
<tr>
<th>Flammability limit - lower (%)</th>
<th>Not available.</th>
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<tbody>
<tr>
<td>Flammability limit - upper (%)</td>
<td>Not available.</td>
</tr>
<tr>
<td>Explosive limit - lower (%)</td>
<td>Not available.</td>
</tr>
<tr>
<td>Explosive limit - upper (%)</td>
<td>Not available.</td>
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</tbody>
</table>

**Vapor pressure**

0.0499 mmHg at 20°C; US EPA. 2014. Estimation Programs Interface Suite™ for Microsoft® Windows, v 4.11. US EPA, Washington, DC, USA.

**Vapor density**

4.4 Relative to air; air = 1

**Relative density**

Not available.

**Solubility(ies)**

| Solubility (water) | Not available. |

**Partition coefficient (n-octanol/water)**


**Auto-ignition temperature**

Not available.

**Decomposition temperature**

Not available.

**Viscosity**

Not available.

**Other information**

- **Density:** 0.989 - 0.996 g/cm3
- **Flammability class:** Combustible IIIB estimated
- **Molecular formula:** C7H12O2
- **Molecular weight:** 128.17
- **Specific gravity:** 0.989 - 0.996 at 25°C
10. Stability and reactivity

Reactivity

The product is stable and non-reactive under normal conditions of use, storage and transport.

Chemical stability

Material is stable under normal conditions.

Possibility of hazardous reactions

No dangerous reaction known under conditions of normal use.

Conditions to avoid

Contact with incompatible materials.

Incompatible materials

Strong oxidizing agents.

Hazardous decomposition products

No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation

No adverse effects due to inhalation are expected.

Skin contact

No adverse effects due to skin contact are expected.

Eye contact

Direct contact with eyes may cause temporary irritation.

Ingestion

Expected to be a low ingestion hazard.

Symptoms related to the physical, chemical and toxicological characteristics

Direct contact with eyes may cause temporary irritation.

Information on toxicological effects

Acute toxicity

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
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</thead>
<tbody>
<tr>
<td>gamma-HEPTALACTONE FCC (CAS 105-21-5)</td>
<td></td>
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</tr>
<tr>
<td>Acute</td>
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<tr>
<td>Dermal</td>
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<tr>
<td>Liquid</td>
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<tr>
<td>LD50</td>
<td>Rabbit</td>
<td>&gt; 5000 mg/kg</td>
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<tr>
<td>Oral</td>
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<tr>
<td>Liquid</td>
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<tr>
<td>LD50</td>
<td>Rat</td>
<td>&gt; 5000 mg/kg</td>
</tr>
</tbody>
</table>

* Estimates for product may be based on additional component data not shown.

Skin corrosion/irritation

Prolonged skin contact may cause temporary irritation.

Irritation Corrosion - Skin

4 % Patch test, Vehicle Petrolatum.
Result: No irritation observed.
Species: Human
Organ: Skin
Notes: RIFM

Serious eye damage/eye irritation

Direct contact with eyes may cause temporary irritation.

Respiratory or skin sensitization

Respiratory sensitization

Not a respiratory sensitizer.

Skin sensitization

This product is not expected to cause skin sensitization.

Skin sensitization

4 % Patch test, Vehicle Petrolatum.
Result: Not sensitizing.
Species: Human
Organ: Skin
Notes: RIFM

Germ cell mutagenicity

No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Germ cell mutagenicity: Ames test
< 100000 µg/plate, Strains TA 1535, TA 1537, TA 1538, TA 98 and TA 100 with and without metabolic activation. Vehicle unknown.
Result: Not mutagenic.
Species: Salmonella typhimurium
Notes: RIFM

Carcinogenicity
This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
Not listed.

Reproductive toxicity
This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure
Not classified.
Specific target organ toxicity - repeated exposure
Not classified.
Aspiration hazard
Not an aspiration hazard.

12. Ecological information

Ecotoxicity
The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Persistence and degradability
No data is available on the degradability of this product.

Bioaccumulative potential

Partition coefficient n-octanol / water (log Kow)

Mobility in soil
No data available.

Other adverse effects
No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions
Collect and reclaim or dispose in sealed containers at licensed waste disposal site.

Local disposal regulations
Dispose in accordance with all applicable regulations.

Hazardous waste code
The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products
Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging
Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT
Not regulated as dangerous goods.

IATA
Not regulated as dangerous goods.

IMDG
Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not established.

15. Regulatory information

US federal regulations
This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
Not regulated.
Material name: gamma-HEPTALACTONE FCC

CERCLA Hazardous Substance List (40 CFR 302.4)
Not listed.

SARA 304 Emergency release notification
Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
- Immediate Hazard - No
- Delayed Hazard - No
- Fire Hazard - No
- Pressure Hazard - No
- Reactivity Hazard - No

SARA 302 Extremely hazardous substance
Not listed.

SARA 311/312 Hazardous chemical
No

SARA 313 (TRI reporting)
Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)
Not regulated.

Safe Drinking Water Act (SDWA)
Not regulated.

US state regulations

US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)
Not listed.

US. Massachusetts RTK - Substance List
Not regulated.

US. New Jersey Worker and Community Right-to-Know Act
Not listed.

US. Pennsylvania Worker and Community Right-to-Know Law
Not listed.

US. Rhode Island RTK
Not regulated.

US. California Proposition 65
California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

Country(s) or region | Inventory name                                                                 | On inventory (yes/no)*
---------------------|-------------------------------------------------------------------------------|---------------------
Australia            | Australian Inventory of Chemical Substances (AICS)                           | Yes                 
Canada               | Domestic Substances List (DSL)                                               | Yes                 
Canada               | Non-Domestic Substances List (NDSL)                                          | No                  
China                | Inventory of Existing Chemical Substances in China (IECSC)                   | Yes                 
Europe               | European Inventory of Existing Commercial Chemical Substances (EINECS)       | Yes                 
Europe               | European List of Notified Chemical Substances (ELINCS)                       | No                  
Japan                | Inventory of Existing and New Chemical Substances (ENCS)                     | Yes                 
Korea                | Existing Chemicals List (ECL)                                                | Yes                 
New Zealand          | New Zealand Inventory                                                        | Yes                 
Philippines          | Philippine Inventory of Chemicals and Chemical Substances (PICCS)            | Yes                 

Material name: gamma-HEPTALACTONE FCC

450 Version #: 01 Issue date: 05-17-2015 SDS US
Country(s) or region: United States & Puerto Rico
Inventory name: Toxic Substances Control Act (TSCA) Inventory
On inventory (yes/no)*: Yes

*A “Yes” indicates that all components of this product comply with the inventory requirements administered by the governing country(s).
A “No” indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date: 05-17-2015
Version #: 01

Disclaimer:
BRI cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user’s responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.