1. Identification

Product identifier: VANILLIN PROPYLENE GLYCOL ACETAL 75-85%

Other means of identification:
- BRI Product Code: 832
- FEMA number: APPR
- Synonyms: Contains 75+% FEMA/GRAS # 3905 * Phenol, 2-methoxy-4-(4-methyl-1,3-dioxolan-2-yl)- contains 15-25% Vanillin [121-33-5] * Vanillin PGA 75-85%

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

Physical hazards: Not classified.

Health hazards: Serious eye damage/eye irritation Category 2A

Environmental hazards: Not classified.

OSHA defined hazards: Not classified.

Label elements

Signal word: Warning

Hazard statement: Causes serious eye irritation.

Precautionary statement:
- Prevention: Wash thoroughly after handling. Wear eye/face protection.
- Response: If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
- 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

Mixtures
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
Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

Ingestion
Rinse mouth. Get medical attention if symptoms occur.

Most important symptoms/effects, acute and delayed
Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision.

Indication of immediate medical attention and special treatment needed
Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.

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. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. 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.

Environmental precautions
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.

7. Handling and storage

Precautions for safe handling
Avoid contact with eyes. Provide adequate ventilation. Wear appropriate personal protective equipment. 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 or Phenolic Lined Steel. Store tightly sealed under inert gas in a cool, well-ventilated area.
8. Exposure controls/personal protection

Occupational exposure limits

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propylene Glycol (CAS 57-55-6)</td>
<td>TWA</td>
<td>10 mg/m3</td>
<td>Aerosol.</td>
</tr>
<tr>
<td>VANILLIN (CAS 121-33-5)</td>
<td>TWA</td>
<td>10 mg/m3</td>
<td></td>
</tr>
</tbody>
</table>

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. Provide eyewash station.

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**
light yellow

**Odor**
sweet vanilla aroma.

**Odor threshold**
Not available.

**pH**
Not available.

**Melting point/freezing point**
176 °F (80 °C) estimated

**Initial boiling point and boiling range**
543.2 °F (284 °C) estimated

**Flash point**
230 °F (110 °C) Pensky-Martens or Grabner Miniflash

**Evaporation rate**
Not available.

**Flammability (solid, gas)**
Not applicable.

**Upper/lower flammability or explosive limits**

**Flammability limit - lower (%)**
Not available.

**Flammability limit - upper (%)**
Not available.

**Explosive limit - lower (%)**
Not available.

**Explosive limit - upper (%)**
Not available.

**Vapor pressure**
0.00004732 hPa estimated

**Vapor density**
Not available.

**Relative density**
Not available.

**Solubility(ies)**

**Solubility (water)**
Not available.

**Partition coefficient (n-octanol/water)**
Not available.

**Auto-ignition temperature**
Not available.
Decomposition temperature  Not available.
Viscosity  Not available.

Other information
- **Density**: 1.175 - 1.22 g/cm³
- **Flammability class**: Combustible IIIB estimated
- **Percent volatile**: 0.5 % estimated
- **Specific gravity**: 1.175 - 1.22 at 25 deg C
- **VOC (Weight %)**: 0.5 % estimated

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**: Causes serious eye irritation.
- **Ingestion**: Expected to be a low ingestion hazard.

**Symptoms related to the physical, chemical and toxicological characteristics**
Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision.

**Information on toxicological effects**

**Acute toxicity**

<table>
<thead>
<tr>
<th>Components</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propylene Glycol (CAS 57-55-6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acute</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral</td>
<td>Guinea pig</td>
<td>18.4 g/kg</td>
</tr>
<tr>
<td>LD50</td>
<td>Mouse</td>
<td>23.9 g/kg</td>
</tr>
<tr>
<td></td>
<td>Rabbit</td>
<td>18 g/kg</td>
</tr>
<tr>
<td></td>
<td>Rat</td>
<td>30 g/kg</td>
</tr>
</tbody>
</table>

| VANILLIN (CAS 121-33-5)                 |              |                       |
| **Acute**                               |              |                       |
| Oral                                    | Guinea pig   | 1400 mg/kg            |
| LD50                                    | Rat          | 1580 mg/kg            |

| VANILLIN PROPYLENE GLYCOL ACETAL (CAS 68527-74-2) | |                       |
| **Acute**                                      |              |                       |
| Dermal                                          |              |                       |
| Liquid                                          |              |                       |
| LD50                                            | Rabbit       | > 5000 mg/kg Result for similar material Benzaldehyde propylene glycol acetal. |
Components | Species | Test Results
--- | --- | ---
Oral | Rat | 3000 mg/kg Result for similar material

**LD50** Rat 3000 mg/kg Result for similar material

Benzaldehyde propylene glycol acetal.

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

**Skin corrosion/irritation**
Prolonged skin contact may cause temporary irritation.

**Serious eye damage/eye irritation**
Causes serious eye irritation.

**Respiratory or skin sensitization**
- **Respiratory sensitization** Not a respiratory sensitizer.
- **Skin sensitization** This product is not expected to cause skin sensitization.
- **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**
VANILLIN PROPYLENE GLYCOL ACETAL < 5000 µg/plate, Strains TA 1535, TA 1537, TA 98 and TA 100 with and without metabolic activation. For similar material 2-(2,4-Dimethyl-3-cyclohexen-1-yl)-5-methyl-5-(1-methylpropyl)-1,3-dioxane. Result: Not mutagenic.

Species: Salmonella typhimurium
Notes: RIFM

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

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.

<table>
<thead>
<tr>
<th>Components</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propylene Glycol (CAS 57-55-6)</td>
<td>Water flea (Daphnia magna)</td>
<td>&gt; 10000 mg/l, 48 hours</td>
</tr>
<tr>
<td><strong>Aquatic</strong></td>
<td>Fathead minnow (Pimephales promelas)</td>
<td>710 mg/l, 96 hours</td>
</tr>
<tr>
<td>Crustacea</td>
<td>LC50</td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VANILLIN (CAS 121-33-5)</td>
<td>Fathead minnow (Pimephales promelas)</td>
<td>53 - 61.3 mg/l, 96 hours</td>
</tr>
<tr>
<td><strong>Aquatic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LC50</td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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

**Bioaccumulative potential**

**Partition coefficient n-octanol / water (log Kow)**
- Propylene Glycol -0.92
- VANILLIN 1.37

**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. Dispose of contents/container in accordance with local/regional/national/international regulations.

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 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.

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 - Yes
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance
Not listed.

SARA 311/312 Hazardous chemical
Yes

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
Propylene Glycol (CAS 57-55-6)

US. Pennsylvania Worker and Community Right-to-Know Law
Propylene Glycol (CAS 57-55-6)

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

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>No</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>No</td>
</tr>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
</tr>
<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>No</td>
</tr>
<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>No</td>
</tr>
<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
<td>Yes</td>
</tr>
<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*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 06-03-2015
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.