1. IDENTIFICATION

Product Description: EXALTOLIDE® TOTAL
CAS # 106-02-5
FEMA Number 2840

Other means of identification
Vigon Item # 502775

Recommended use: Concentrated aromatic and flavor ingredient which may be used in flavor and fragrance compounds according to legal and IFRA or FEMA GRAS/FDA guidelines.

Recommended restrictions: For Manufacturing Use Only

Company: Vigon International, Inc.
127 Airport Road
E. Stroudsburg, PA 18301
For information call: 570-476-6300
Web Site: www.vigon.com

2. HAZARD(S) IDENTIFICATION

Physical hazards: Not classified.
Health hazards:
- Skin corrosion/irritation Category 3
- Sensitization, skin Category 1

Environmental hazards:
- Hazardous to the aquatic environment, acute hazard Category 1
- Hazardous to the aquatic environment, long-term hazard Category 1

Label elements

Signal word: Warning
Hazard statement:
- H316 Causes mild skin irritation.
- H317 May cause an allergic skin reaction.
- H400 Very toxic to aquatic life.
- H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement
Prevention:
- P261 Avoid breathing dust/fume/gas/mist/vapors/spray.
- P272 Contaminated work clothing should not be allowed out of the workplace.
- P273 Avoid release to the environment.
- P280 Wear protective gloves.
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Response
P302 + P352 IF ON SKIN: Wash with plenty of water.
P333 + P313 If skin irritation or rash occurs: Get medical advice/attention.
P362 + P364 Take off contaminated clothing and wash it before reuse.
P391 Collect spillage.

Storage
Store away from incompatible materials.

Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HINOC)
None known.

Supplemental information
None.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>%</th>
</tr>
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<tbody>
<tr>
<td>16-oxacyclohexadecan-1-one</td>
<td>PENTADECALACTONE Oxacyclohexadecan-2-one Pentadecan-15-olide OMEGA-PENTADECALACTONE</td>
<td>106-02-5</td>
<td>100</td>
</tr>
</tbody>
</table>

4. FIRST-AID MEASURES

Inhalation
If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. For breathing difficulties, oxygen may be necessary. Call a physician if symptoms develop or persist.

Skin contact
Take off immediately all contaminated clothing. Get medical attention if irritation develops and persists. Wash skin thoroughly with soap and water for several minutes.

Eye contact
Remove contact lenses, if present and easy to do. Get medical attention if irritation develops and persists. Promptly wash eyes with plenty of water while lifting the eye lids.

Ingestion
Call a physician or poison control center immediately. If swallowed, rinse mouth with water (only if the person is conscious). Do not induce vomiting. If vomiting occurs, the head should be kept low so that stomach vomit doesn't enter the lungs.

Most important symptoms/effects, acute and delayed
Mild skin irritation. May cause an allergic skin reaction. Dermatitis. Rash.

Indication of immediate medical attention and special treatment needed
Not available.

General information
Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Water spray, fog, CO2, dry chemical, or alcohol resistant foam.

Unsuitable extinguishing media
Do not use a solid water stream as it may scatter and spread fire.
Specific hazards arising from the chemical

Fire may produce irritating, corrosive and/or toxic gases.

Special protective equipment and precautions for firefighters

Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Structural firefighters protective clothing will only provide limited protection. Wear self-contained breathing apparatus with a full facepiece operated in the positive pressure demand mode when fighting fires.

Fire fighting equipment/instructions

In case of fire and/or explosion do not breathe fumes. Use standard firefighting procedures and consider the hazards of other involved materials. Move containers from fire area if you can do so without risk. Water runoff can cause environmental damage. Ventilate closed spaces before entering them. Keep run-off water out of sewers and water sources. Dike for water control.

Specific methods

Use water spray to cool unopened containers.

General fire hazards

Static charges generated by emptying package in or near flammable vapor may cause flash fire.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Keep unnecessary personnel away. Eliminate all sources of ignition. Avoid contact with skin or inhalation of spillage, dust or vapor. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them.

Methods and materials for containment and cleaning up

Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb with inert absorbent such as dry clay, sand or diatomaceous earth, commercial sorbents, or recover using pumps.

The product is immiscible with water and will spread on the water surface.

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. Prevent product from entering drains. Do not allow material to contaminate ground water system. Absorb in vermiculite, dry sand or earth and place into containers.

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

Never return spills in original containers for re-use. This material and its container must be disposed of as hazardous waste. Collect and dispose of spillage as indicated in section 13 of the SDS.

Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not contaminate water. Avoid release to the environment. Retain and dispose of contaminated wash water. Contact local authorities in case of spillage to drain/aquatic environment.

7. HANDLING AND STORAGE

Precautions for safe handling

Do not handle or store near an open flame, heat or other sources of ignition. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Avoid breathing vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. Wash thoroughly after handling.

Conditions for safe storage, including any incompatibilities

Keep container closed. Handle containers with care. Open slowly in order to control possible pressure release. Store 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
Use explosion-proof ventilation equipment to stay below exposure limits.

Individual protection measures, such as personal protective equipment

Eye/face protection
Wear safety glasses with side shields (or goggles). Face shield is recommended.

Skin protection
Chemical resistant gloves.

Hand protection
Use of an impervious apron is recommended.

Other

Respiratory protection
Respiratory protection not required. If ventilation is insufficient, suitable respiratory protection must be provided.

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. Contaminated work clothing should not be allowed out of the workplace.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
Refer to Spec Sheet

Physical state
Solid.

Form
Solid.

Color
Refer to Spec Sheet

Odor
Characteristic.

Odor threshold
Not available.

pH
Not available.

Melting point/freezing point
93.2 - 100.4 °F (34 - 38 °C)

Initial boiling point and boiling range
278.6 °F (137 °C) at 2 mmHg

Flash point
> 200.0 °F (> 93.3 °C) Closed Cup

Evaporation rate
Not available.

Flammability (solid, gas)
Not available.

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
1 mm Hg at 20 °C

Vapor density
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Relative density
Solubility(ies)
Solubility (water)
Partition coefficient
(n-octanol/water)
Auto-ignition temperature
Decomposition temperature
Viscosity
Other information
  Flammability class
  Molecular formula
  Molecular weight

10. STABILITY AND REACTIVITY

Reactivity
Chemical stability
Possibility of hazardous reactions
Conditions to avoid
Incompatible materials
Hazardous decomposition products

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
  Inhalation
  Skin contact
  Eye contact
  Ingestion

Symptoms related to the physical, chemical and toxicological characteristics

Information on toxicological effects

Acute toxicity

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>16- oxacyclohexadecan-1-one (CAS 106-02-5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dermal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD50</td>
<td>Rabbit</td>
<td>&gt; 5000 mg/kg</td>
</tr>
</tbody>
</table>
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Not an aspiration hazard.
Not a respiratory sensitizer.

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<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
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<tbody>
<tr>
<td>Oral</td>
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</tr>
<tr>
<td>LD50</td>
<td>Rat</td>
<td>&gt; 5000 mg/kg</td>
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</tbody>
</table>

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

**Skin corrosion/irritation**
- Causes mild skin irritation.
- Irritation (dermal, rabbit)(LD50 study): slight irritant @ 100%
- Irritation (dermal, mouse)(phototoxicity study): Non irritant @ 100%
- Irritation (dermal, pig)(phototoxicity study): Non irritant @ 100%
- Irritation (dermal)(Human max.): Non irritant @ 4%
- Irritation (dermal, human)(single patch): Non irritant @ 10%

**Serious eye damage/eye irritation**
- Direct contact with eyes may cause temporary irritation.
- Irritation (ocular, rabbit) (OECD 405): Non irritant @ 0.5%

**Respiratory or skin sensitization**
- Respiratory sensitization: Not a respiratory sensitizer.
- Skin sensitization: May cause an allergic skin reaction.
  - Sensitization (HRIPT): Non sensitizing @ 2%
  - Sensitization (Human max.): Non sensitizing @ 10%

**Photo-toxicity**
- Photo-toxicity (rabbit): Effects@ 10%, no effects @ %5
- Photo-toxicity (guinea pig): Effects @ 50%, no effects @ 10%
- Photo-toxicity (guinea pig): No effects @ 20%
- Photo-toxicity (mouse): No effects @ 100%
- Photo-toxicity (pig): No effects @ 100%

**Germ cell mutagenicity**
- Mutagenicity (OECD 471): Non mutagenic (5 tests)
- Genotoxicity (micronucleus test)(OECD 474): No effects

**Carcinogenicity**
  - Not listed.

**Reproductive toxicity**
- This product is not expected to cause reproductive or developmental effects.

**Specific target organ toxicity**
- Not classified.

**12. ECOLOGICAL INFORMATION**
- Very toxic to aquatic life with long lasting effects.

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>16- oxacyclohexadecan-1-one (CAS 106-02-5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic Crustacea</td>
<td>EC50</td>
<td>Daphnia magna</td>
</tr>
<tr>
<td></td>
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<td>&gt; 1.27 mg/l, 48 hours</td>
</tr>
</tbody>
</table>
SAFETY DATA SHEET

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<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td>LC50</td>
<td>Fish</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 0.11 mg/l, 96 hours</td>
</tr>
</tbody>
</table>

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

Persistence and degradability
- Readily biodegradability (OECD 301 F): readily biodegradable
- Readily biodegradability (OECD 301 D): readily biodegradable
- Readily biodegradability (OECD 301 B): readily biodegradable

Bioaccumulative potential
No data available.

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
Do not discharge into drains, water courses or onto the ground. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. 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
Not established.

Waste from residues / unused products
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
Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. TRANSPORT INFORMATION

ADN
- UN number: 3077
- UN proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (16-oxacyclohexadecan-1-one)
- Transport hazard class(es): 9
- Subsidiary class(es): -
- Packing group: III
- Environmental hazards: Yes
- Labels required: 9

ADR
- UN number: 3077
- UN proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (16-oxacyclohexadecan-1-one)
- Transport hazard class(es): 9
- Subsidiary class(es): -
- Packing group: III
- Environmental hazards: Yes
- Labels required: 9
RID
- UN number: 3077
- UN proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (16-oxacyclohexadecan-1-one)
- Transport hazard class(es): 9
- Subsidiary class(es): -
- Packing group: III
- Environmental hazards: Yes
- Labels required: 9

DOT BULK
- UN number: 3077
- Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (16-oxacyclohexadecan-1-one)
- Hazard class: 9
- Packing group: III
- Environmental hazards:
  - Marine pollutant: Yes
- Packaging exceptions: 155
- Packaging bulk: 240
- Labels required: 9

DOT NON-BULK
- Not regulated as dangerous goods.

IATA
- Not regulated as dangerous goods.

IMDG
- UN number: 3077
- UN proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (16-oxacyclohexadecan-1-one)
- Transport hazard class(es): 9
- Subsidiary class(es): -
- Packing group: III
- Environmental hazards:
  - Marine pollutant: Yes
- Labels required: 9
- Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not applicable.
15. REGULATORY INFORMATION

US federal regulations

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

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

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

SARA 304 Emergency release notification
Not regulated.

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

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
Not regulated.

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
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. 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  
US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance  
Not listed.

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>
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<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>No</td>
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<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>Yes</td>
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<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>Yes</td>
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<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
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<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>Yes</td>
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<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>Yes</td>
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<td>New Zealand</td>
<td>New Zealand Inventory</td>
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<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>Yes</td>
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<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
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</table>

*"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

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
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<tbody>
<tr>
<td>Issue date</td>
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<td>03-31-2015</td>
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<td>Version #</td>
<td>02</td>
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<td>HMIS® ratings</td>
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<td></td>
<td>Flammability: 1</td>
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<td>Physical hazard: 1</td>
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</table>

**Disclaimer**

Vigon 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. The above information relates only to this product and not to its use in combination with any other material or any particular process and is designed only as guidance for the safe handling, use, processing, storage, transportation, disposal, and should not be considered as a guarantee or quality specification. The above information is based on data provided by and collected from recognized sources such as distributors, manufacturers, and technical groups and is considered to be accurate to the best of Vigon’s knowledge as of the date of this document. It is the responsibility of the user to review all safety information about this product and determine its safety and suitability in their own processes and operations. Appropriate warnings and safe handling procedures should be provided to all handlers and users, taking into account the intended use and the specific conditions and factors relating to such use in accordance with all applicable laws and regulations.

**Revision Information**

This document has undergone significant changes and should be reviewed in its entirety.