1. IDENTIFICATION

Product Description: EXALTOLIDE®

CAS #: 106-02-5

FEMA Number: 2840

Other means of identification

Vigon Item #: 502774

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.

Address: 127 Airport Road E. Stroudsburg, PA 18301

For information call: 570-476-6300

Web Site: www.vigon.com

24 Hour Emergency Response Information

INFOTRAC (ACCT# 78928);

1-800-535-5053 WITHIN THE U.S.A.

1-352-323-3500 OUTSIDE THE U.S.A.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company name: Vigon International, Inc.

Address: 127 Airport Road E. Stroudsburg, PA 18301 United States

Telephone: For information call: 570-476-6300

Website: www.vigon.com

E-mail: Not available.

Emergency phone number: INFOTRAC (ACCT# 78928);

1-800-535-5053 WITHIN THE U.S.A.

1-352-323-3500 OUTSIDE THE U.S.A.

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

![Safety Symbol]
SAFETY DATA SHEET

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Revision Date: 06-06-2017
Version # 02

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

Precautionary statement
Prevention
Avoid breathing dust/fume/gas/mist/vapors/spray. Contaminated work clothing should not be allowed out of the workplace. Avoid release to the environment. Wear protective gloves.
Response
IF ON SKIN: Wash with plenty of water. If skin irritation or rash occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse. Collect spillage.
Storage
Dispose of contents/container in accordance with local/regional/national/international regulations.
Disposal

Hazard(s) not otherwise classified (HNOC)
None known.
Supplemental information
None.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>16- oxacyclohexadecan-1-one</td>
<td>PENTADECALACTONE</td>
<td>106-02-5</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Oxacyclohexadecan-2-one</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pentadecan-15-olide</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OMEGA-PENTADECALACTONE</td>
<td></td>
<td></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.
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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. 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  This substance has no PEL, TLV, or other recommended exposure limit.

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. Adequate ventilation should be provided so that exposure limits are not exceeded.

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

Hand protection  Chemical resistant gloves.

Other  Use of an impervious apron is recommended.

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
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Vapor density 8.3
Relative density Not available.
Solubility(ies)
   Solubility (water) Insoluble
Partition coefficient (n-octanol/water) Not available.
Auto-ignition temperature Not available.
Decomposition temperature Not available.
Viscosity Not available.
Other information
   Explosive properties Not explosive.
   Flammability class Combustible IIIB estimated
   Molecular formula C15H28O2
   Molecular weight 240.39 g/mol
   Oxidizing properties Not oxidizing.

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 Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible materials Strong oxidizing agents.
Hazardous decomposition products No hazardous decomposition products if stored and handled as indicated.

11. TOXICOLOGICAL INFORMATION
Information on likely routes of exposure
   Inhalation No adverse effects due to inhalation are expected.
   Skin contact Causes mild skin irritation. May cause an allergic skin reaction.
   Eye contact Direct contact with eyes may cause temporary irritation. Causes mild eye irritation.
   Ingestion Expected to be a low ingestion hazard.
Symptoms related to the physical, chemical and toxicological characteristics Mild skin irritation. May cause an allergic skin reaction. Dermatitis. Rash. Not available.
Information on toxicological effects
   Acute toxicity
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>16-oxacyclohexadecan-1-one (CAS 106-02-5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acute</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dermal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD50</td>
<td>Rabbit</td>
<td>&gt; 5000 mg/kg</td>
</tr>
<tr>
<td><strong>Oral</strong></td>
<td></td>
<td></td>
</tr>
<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**
Causes mild skin irritation.
Irritation (dermal, rabbit)(LD50 study): slight irritant @ 100%
Irritation (dermal, mouse)(photoxicity study): Non irritant @ 100%
Irritation (dermal, pig)(photoxicity 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 (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**
IARC Monographs. Overall Evaluation of Carcinogenicity
Not listed.

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

US. National Toxicology Program (NTP) Report on Carcinogens
Not listed.

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

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

**Specific target organ toxicity - single exposure**
Not classified.
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Specific target organ toxicity - repeated exposure
Not classified.

Aspiration hazard
Not an aspiration hazard.

12. ECOLOGICAL INFORMATION

Ecotoxicity
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>
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</tr>
<tr>
<td>Aquatic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crustacea</td>
<td>EC50</td>
<td>Daphnia magna</td>
</tr>
<tr>
<td>Fish</td>
<td>LC50</td>
<td>Fish</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
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

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 |
| Special precautions for user | Read safety instructions, SDS and emergency procedures before handling. |

## 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 | Yes |
| Marine pollutant | |
| Packaging exceptions | 155 |
| Packaging bulk | 240 |
| Labels required | 9 |

## 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.

ADN; ADR; DOT BULK; IMDG; RID

15. REGULATORY INFORMATION

US federal regulations

- This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
- SARA 304 Emergency release notification: Not regulated.
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Superfund Amendments and Reauthorization Act of 1986 (SARA)

<table>
<thead>
<tr>
<th>Hazard categories</th>
<th>Immediate Hazard</th>
<th>Delayed Hazard</th>
<th>Fire Hazard</th>
<th>Pressure Hazard</th>
<th>Reactivity Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>SARA 302 Extremely hazardous substance</td>
<td>Not listed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SARA 311/312 Hazardous chemical</td>
<td>No</td>
<td></td>
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</tr>
<tr>
<td>SARA 313 (TRI reporting)</td>
<td>Not regulated.</td>
<td></td>
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</tr>
</tbody>
</table>

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.

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>Yes</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>Yes</td>
</tr>
<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>Yes</td>
</tr>
<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
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</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

<table>
<thead>
<tr>
<th>Issue date</th>
<th>05-31-2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revision date</td>
<td>06-06-2017</td>
</tr>
<tr>
<td>Version #</td>
<td>02</td>
</tr>
</tbody>
</table>

Print Date: 06-06-2017
HMIS® ratings

Health: 2
Flammability: 1
Physical hazard: 1

Disclaimer

Vigon International, Inc. 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.