1. Identification

Product identifier     cis-6-NONENAL
Other means of identification
   BRI Product Code  380
   CAS number        2277-19-2
   FEMA number       3580
   Synonyms          6-Nonenal, (6Z)- * z-6-Nonenal * cis-6-Nonen-1-al

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: 6 Commerce 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     Flammable liquids     Category 4
Health hazards       Not classified.
Environmental hazards Not classified.
OSHA defined hazards Not classified.

Label elements
   Hazard symbol: None.
   Signal word: Warning
   Hazard statement: Combustible liquid.
   Precautionary statement
      Prevention: Keep away from flames and hot surfaces-No smoking. Wear protective gloves/eye protection/face protection.
      Response: In case of fire: Use appropriate media to extinguish.
      Storage: Store in a well-ventilated place. Keep cool.
      Disposal: Dispose of contents/container in accordance with local/regional/national/international regulations.
   Hazard(s) not otherwise classified (HNOC): None known.
   Supplemental information
      100% of the mixture consists of component(s) of unknown acute inhalation toxicity. 100% of the mixture consists of component(s) of unknown acute hazards to the aquatic environment. 100% of the mixture consists of component(s) of unknown long-term hazards to the aquatic environment.

3. Composition/information on ingredients

Substances
### Stabilizers

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>synthetic alpha tocopherol</td>
<td></td>
<td>10191-41-0</td>
<td>0.5</td>
</tr>
</tbody>
</table>

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

**Composition comments**

Occupational Exposure Limits for stabilizers are listed in Section 8.

### 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**

Provide general supportive measures and 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**

The product is combustible, and heating may generate vapors which may form explosive vapor/air mixtures. 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**

In case of fire and/or explosion do not breathe fumes. 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**

Combustible liquid.

### 6. Accidental release measures

**Personal precautions, protective equipment and emergency procedures**

Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Wear appropriate protective equipment and clothing during clean-up. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS. For personal protection, see section 8 of the SDS.

**Methods and materials for containment and cleaning up**

Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Keep combustibles (wood, paper, oil, etc.) away from spilled material.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Following product recovery, flush area with water.

Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. 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. For waste disposal, see section 13 of the SDS.

**Environmental precautions**

Avoid discharge into drains, water courses or onto the ground.
7. Handling and storage

Precautions for safe handling
Keep away from open flames, hot surfaces and sources of ignition. When using do not smoke. Provide adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities
Keep away from heat, sparks and open flame. Store in a cool, dry place out of direct sunlight. Store in original tightly closed container. Store in a well-ventilated place. Keep in an area equipped with sprinklers. Store away from incompatible materials (see Section 10 of the SDS). Store away from incompatible materials (see Section 10 of the SDS). Recommended Packaging: Glass, 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
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
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.

Other
Wear suitable protective clothing.

Respiratory protection
If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn.

Thermal hazards
Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations
When using do not smoke. 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 to pale yellow

Odor
extremely powerful, fresh, melon odor.

Odor threshold
Not available.

pH
Not available.

Melting point/freezing point
Not available.

Initial boiling point and boiling range

Flash point
159 °F (71 °C) Closed Cup

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

Vapor density
4.8 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:** 0.842 - 0.852 g/cm³
- **Explosive properties:** Not explosive.
- **Flammability class:** Combustible IIIA estimated
- **Molecular formula:** C₉H₁₆O
- **Molecular weight:** 140.22
- **Oxidizing properties:** Not oxidizing.
- **Specific gravity:** 0.842 - 0.852 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**
Avoid heat, sparks, open flames and other ignition sources. Avoid temperatures exceeding the flash point. Contact with incompatible materials.

**Incompatible materials**
Strong oxidizing agents.

**Hazardous decomposition products**
No hazardous decomposition products are known.

11. Toxicological information

**Toxicological information**
**cis-6-NONENAL**

500 - 2000 mg/kg OECD 474, In vivo Mouse Micronucleus Test. Vehicle Corn oil. Dose orally administered. Result for similar material trans-4-Decenal.
Result: Not mutagenic.
Species: Mouse
Notes: RIFM

**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**
Not known.

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>cis-6-NONENAL (CAS 2277-19-2)</td>
<td>Guinea pig</td>
<td>&gt; 5000 mg/kg</td>
</tr>
<tr>
<td>Product</td>
<td>Species</td>
<td>Test Results</td>
</tr>
<tr>
<td>---------</td>
<td>---------</td>
<td>--------------</td>
</tr>
<tr>
<td>Oral Liquid</td>
<td>Mouse</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

**Irritation Corrosion - Skin**

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>cis-6-NONENAL</td>
<td>1 % Patch test, Vehicle Petrolatum.</td>
<td>Result: No irritation observed.</td>
</tr>
<tr>
<td></td>
<td>Species: Human</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organ: Skin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Notes: RIFM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5000 mg/kg LD50, Irritation evaluated on day 1 of an LD50 study, 6 animals evaluated. Slight erythema in 4, moderate erythema in 2; slight edema in 1, moderate edema in 1.</td>
<td>Result: Irritation noted.</td>
</tr>
<tr>
<td></td>
<td>Species: Guinea pig</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organ: Skin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Notes: RIFM</td>
<td></td>
</tr>
</tbody>
</table>

Serious eye damage/eye irritation

**Respiratory or skin sensitization**

**Respiratory sensitization**

Not a respiratory sensitizer.

**Skin sensitization**

This product is not expected to cause skin sensitization.

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>cis-6-NONENAL</td>
<td>1 % Patch test, Vehicle Petrolatum.</td>
<td>Result: Not sensitizing.</td>
</tr>
<tr>
<td></td>
<td>Species: Human</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organ: Skin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Notes: RIFM</td>
<td></td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>cis-6-NONENAL</td>
<td>&lt; 1000 µg/plate, Strains TA 1535, TA 1537, TA 98 and TA 100 with metabolic activation. Vehicle DMSO. Result for similar material cis-5-Octenal.</td>
<td>Result: Not mutagenic.</td>
</tr>
<tr>
<td></td>
<td>Species: Salmonella typhimurium</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Notes: RIFM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 200 µg/plate, Strains TA 1535, TA 1537, TA 98 and TA 100 without metabolic activation. Vehicle DMSO. Result for similar material cis-5-Octenal.</td>
<td>Result: Not mutagenic.</td>
</tr>
<tr>
<td></td>
<td>Species: Salmonella typhimurium</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Notes: RIFM</td>
<td></td>
</tr>
</tbody>
</table>

Carcinogenicity

Not classifiable as to carcinogenicity to humans.

**IARC Monographs. Overall Evaluation of Carcinogenicity**

Not listed.


Not regulated.

**US. National Toxicology Program (NTP) Report on Carcinogens**

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
The product is readily biodegradable.

**Biodegradability**

<table>
<thead>
<tr>
<th>Percent degradation (Aerobic biodegradation)</th>
<th>cis-6-NONENAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>72 % OECD 301F, 30 mg/L, 10-day criteria fulfilled.</td>
<td>Species: Activated sludge of a predominantly domestic sewage</td>
</tr>
<tr>
<td>Test Duration: 10 days</td>
<td>Species: Activated sludge of a predominantly domestic sewage</td>
</tr>
<tr>
<td>83 % OECD 301F, 30 mg/L.</td>
<td>Test Duration: 28 days</td>
</tr>
</tbody>
</table>

**Bioaccumulative potential**

<table>
<thead>
<tr>
<th>Partition coefficient n-octanol / water (log Kow)</th>
<th>cis-6-NONENAL</th>
</tr>
</thead>
</table>

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 regulated.
Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
Immediate Hazard - No
Delayed Hazard - No
Fire Hazard - Yes
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
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>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>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>Taiwan</td>
<td>Taiwan Toxic Chemical Substances (TCS)</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 03-May-2017
Revision date 05-June-2019
Version # 05

Disclaimer
Bedoukian Research 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.

Material name: cis-6-NONENAL
Version #: 05  Revision date: 05-June-2019  Issue date: 03-May-2017

SDS US 380 7 / 7