SAFETY DATA SHEET

1. Identification
Product identifier  2-METHYL-4-PENTENOIC ACID
Other means of identification
BRI Product Code  443
CAS number  1575-74-2
FEMA number  3511
Synonyms  4-Pentenoic acid, 2-methyl-
Recommended use  For Manufacturing Use Only
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  Not classified.
Health hazards
Skin corrosion/irritation  Category 1C
Serious eye damage/eye irritation  Category 1
Environmental hazards  Not classified.
OSHA defined hazards  Not classified.

Label elements

Signal word  Danger
Hazard statement  Causes severe skin burns and eye damage. Causes serious eye damage.
Precautionary statement
Prevention  Do not breathe mist or vapor. Wash thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection.
Response  If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor. Wash contaminated clothing before reuse.
Storage  Store locked up.
Disposal  Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)  None known.
Supplemental information  None.
3. Composition/information on ingredients

<table>
<thead>
<tr>
<th>Substances</th>
<th>Chemical name</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>%</th>
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</thead>
<tbody>
<tr>
<td>2-METHYL-4-PENTENOIC ACID</td>
<td>4-Pentenoic acid, 2-methyl-</td>
<td>1575-74-2</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stabilizers</th>
<th>Chemical name</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>%</th>
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</thead>
<tbody>
<tr>
<td>synthetic alpha tocopherol</td>
<td></td>
<td>10191-41-0</td>
<td>0.1</td>
<td></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**
Take off immediately all contaminated clothing. Rinse skin with water/shower. Call a physician or poison control center immediately. Chemical burns must be treated by a physician. Wash contaminated clothing before reuse.

**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. Call a physician or poison control center immediately. Chemical burns must be treated by a physician. Wash contaminated clothing before reuse.

**Ingestion**
Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

**Most important symptoms/effects, acute and delayed**
Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.

**Indication of immediate medical attention and special treatment needed**
Provide general supportive measures and treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. 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.

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

Precautions for safe handling
Do not breathe mist or vapor. Do not get in eyes, on skin, or on clothing. Provide adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities
Store locked up. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Recommended Packaging: Glass or Plastic. 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. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection
Wear safety glasses with side shields (or goggles) and a face shield.

Skin protection

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

Other
Wear appropriate chemical resistant 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 to pale yellow

Odor
cheese-like aroma.

Odor threshold
Not available.

pH
Not available.

Melting point/freezing point
Not available.

Initial boiling point and boiling range

Flash point
200 °F (93 °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
0.33 mmHg at 20°C; US EPA. 2014. Estimation Programs Interface Suite™ for Microsoft® Windows, v 4.11. US EPA, Washington, DC, USA.

Vapor density
3.9 Relative to air; air = 1

Relative density
Not available.

Solubility(ies)
Solubility (water)
Not available.

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

Other information
- Density 0.944 - 0.956 g/cm³
- Flammability class Combustible IIIB estimated
- Molecular formula C₆H₁₀O₂
- Molecular weight 114.14
- Specific gravity 0.944 - 0.956 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 Hazardous polymerization does not occur.
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 are known.

11. Toxicological information
Information on likely routes of exposure
- Inhalation May cause irritation to the respiratory system.
- Skin contact Causes severe skin burns.
- Eye contact Causes serious eye damage.
- Ingestion Causes digestive tract burns.

Symptoms related to the physical, chemical and toxicological characteristics
- Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.

Information on toxicological effects
Acute toxicity

<table>
<thead>
<tr>
<th>Product</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-METHYL-4-PENTENOIC ACID (CAS 1575-74-2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dermal Liquid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD₅₀</td>
<td>Rabbit</td>
<td>5000 mg/kg Result for similar material 2-Methyl-2-pentenoic acid.</td>
</tr>
</tbody>
</table>

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

Skin corrosion/irritation Causes severe skin burns and eye damage.

Irritation Corrosion - Skin 2-METHYL-4-PENTENOIC ACID 1.2 % Patch test, Vehicle Ethanol:Diethyl phthalate (1:3). Result for similar material 2-Methyl-2-pentenoic acid. Result: No irritation observed. Species: Human Organ: Skin Notes: RIFM

Serious eye damage/eye irritation Causes serious eye damage.

Respiratory or skin sensitization
Respiratory sensitization Not a respiratory sensitizer.
Skin sensitization This product is not expected to cause skin sensitization.
Skin sensitization
2-METHYL-4-PENTENOIC ACID

1.2 % Patch test, Vehicle Ethanol:Diethyl phthalate (1:3).
Result for similar material 2-Methyl-2-pentenoic acid.
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.

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

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.

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)

2-METHYL-4-PENTENOIC ACID

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

UN number
UN3265

UN proper shipping name
Corrosive liquid, acidic, organic, n.o.s. (2-METHYL-4-PENTENOIC ACID)

Transport hazard class(es)

Class 8
Subsidiary risk -
Label(s) 8

Packing group III

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

Special provisions
IB3, T7, TP1, TP28

Material name: 2-METHYL-4-PENTENOIC ACID
443 Version #: 02 Revision date: 14-May-2019 Issue date: 24-May-2015
SDS US
5 / 7
### Packaging exceptions
- Non bulk: 203
- Bulk: 241

### IATA
- **UN number**: UN3265
- **UN proper shipping name**: Corrosive liquid, acidic, organic, n.o.s. (2-METHYL-4-PENTENOIC ACID)
- **Class**: 8
- **Subsidiary risk**: -
- **Packing group**: III
- **Environmental hazards**: No.
- **ERG Code**: 8L

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

### Other information
- **Passenger and cargo aircraft**: Allowed with restrictions.
- **Cargo aircraft only**: Allowed with restrictions.

### IMDG
- **UN number**: UN3265
- **UN proper shipping name**: CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (2-METHYL-4-PENTENOIC ACID)
- **Class**: 8
- **Subsidiary risk**: -
- **Packing group**: III
- **Environmental hazards**: No.
- **Marine pollutant**: No.
- **EmS**: F-A, S-B

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

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

### DOT

### 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 - 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.

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>
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<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>
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<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>Yes</td>
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<tr>
<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>
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<tr>
<td>Taiwan</td>
<td>Taiwan Toxic Chemical Substances (TCS)</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>

*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: 24-May-2015
Revision date: 14-May-2019
Version #: 02

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.

Revision information
Identification: Recommended restrictions