SAFETY DATA SHEET

BEDOUKIAN®

1. Identification

Product identifier **ETHYL 2,4-DECADIENOATE**

Other means of identification

BRI Product Code 433

FEMA number 3148

Synonyms 2,4-Decadienoic acid, ethyl ester, (2E,4Z)- * ethyl (2E,4Z)-decadienoate * Ethyl e-2,z-4-decadienoate * Ethyl trans-2,cis-4-decadienoate * Pear ester * Ethyl (2E,4Z)-2,4-decadienoate

Recommended use flavors and fragrances

For Manufacturing Use Only

Recommended restrictions BRI's Products are not for use in tobacco products, e cigarettes, or any other nicotine delivery devices; nor for use in non-tobacco delivery mechanisms such as vaping devices.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company name Bedoukian Research US

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 2

Environmental hazards Hazardous to the aquatic environment, acute hazard Category 1

Hazardous to the aquatic environment, long-term hazard Category 1

OSHA defined hazards Not classified.

Label elements

Signal word Warning

Hazard statement Causes skin irritation. Very toxic to aquatic life. Very toxic to aquatic life with long lasting effects. Contains D,L-alpha tocopherol. May produce an allergic reaction.

Precautionary statement

Prevention Wash thoroughly after handling. Avoid release to the environment. Wear protective gloves.

Response If on skin: Wash with plenty of water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse. Collect spillage.

Storage Not applicable.

Disposal Dispose of contents/container in accordance with relevant area regulations.

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

Supplemental information Contains Dl-.alpha.-tocopherol. May produce an allergic reaction.

3. Composition/information on ingredients

Substances

Chemical name	Common name and synonyms	CAS number	%
Ethyl (2E,4Z)-2,4-decadienoate	2,4-Decadienoic acid, ethyl ester, (2E,4Z) - ethyl (2E,4Z)-decadienoate Ethyl e-2,z-4-decadienoate Ethyl trans-2,cis-4-decadienoate Pear ester Ethyl (2E,4Z)-2,4-decadienoate	3025-30-7	99.9
Dl-.alpha.-tocopherol		10191-41-0	0.1

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

Composition comments See Section 11 below for testing of the substance as a whole for skin sensitization.

4. First-aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.

Skin contact Remove contaminated clothing. Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Wash contaminated clothing before reuse.

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 Skin irritation. May cause redness and pain.

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 This product is miscible in water. Prevent entry into waterways, sewer, basements or confined areas.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. 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.

Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.

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Environmental precautions	Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Avoid contact with eyes, skin, and clothing. Provide adequate ventilation. Wear appropriate personal protective equipment. Avoid release to the environment. 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, Aluminum or Phenolic Lined Steel. Store tightly sealed under inert gas below 0 deg. C

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 fountain and emergency showers are recommended.

Individual protection measures, such as personal protective equipment

Eye/face protection	Face shield is recommended. Wear safety glasses with side shields (or goggles).
Skin protection	
Hand protection	Wear appropriate chemical resistant gloves. Select suitable chemical resistant protective gloves (EN 374) with a protective index 6 (>480min permeation time).
Other	Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.
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 slightly yellow
Odor	responsible for bartlett pear odor.
Odor threshold	Not available.
pH	Not available.
Melting point/freezing point	-76.54 °F (-60.3 °C) OECD 102
Initial boiling point and boiling range	479.84 °F (248.8 °C) OECD 103
Flash point	> 212 °F (> 100 °C) EPA OPPTS 830.6315 The flash point was tested using the Pensky-Martens Closed Cup technique. The temperature of the substance exceeded 100 degrees C, so testing was stopped. The flash point was greater than 100 degrees C. The substance is therefore not flammable. 243 °F (117 °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	160.0 Pa OECD 104 at 21.1°C

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Vapor density	6.8 Relative to air; air = 1
Relative density	Not available.
Solubility(ies)	
Solubility (water)	7.12 mg/l OECD 105 at 19°C
Partition coefficient (n-octanol/water)	4.4 OECD 117 4.1 - 4.7 was the range.
Auto-ignition temperature	512.6 °F (267 °C) ASTM E659
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Density	0.905 g/ml OECD 109
Explosive properties	Not explosive.
Flammability class	Combustible IIIB estimated
Molecular formula	C12H20O2
Molecular weight	196.28
Oxidizing properties	Not oxidizing.
Specific gravity	0.9 - 0.905 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	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 allergy or asthma symptoms or breathing difficulties if inhaled.
Skin contact	Causes skin irritation. May cause an allergic skin reaction.
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	Skin irritation. May cause redness and pain.

Information on toxicological effects

Acute toxicity

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Components	Species	Test Results
Ethyl (2E,4Z)-2,4-decadienoate (CAS 3025-30-7)		
Acute		
Dermal		
Liquid		
LD50	Rabbit	> 5000 mg/kg Guideline: FHSA, 16 CFR 1500.3(c)(2)(i). The acute dermal toxicity of ethyl decedienoate was determined. Two animals were dosed at 5.0 g/ kg dermally. If either of these animals die, then three additional groups are given various doses to determine the LD50. If neither animal in the initial dose group die, then an additional eight animals are dosed at 5.0 g/kg. As the two initial animals did not die, an additional 8 animals were dosed at 5.0 g/kg. Dermal exposure was for 24 hrs with occlusive covering. Animals were observed for mortality, toxicity, pharmacological effect, body weight, dermal irriation and gross pathology. No animals died during the study.
Oral		
Liquid		
LD50	Rat	> 5000 mg/kg Guideline: FHSA, 16 CFR 1500.3(c)(2)(i). The oral toxicity of ethyl decadienoate was tested in 10 rats. The 10 male rats were given doses of 5 g/kg of the test substance. They were then monitored for 14 days. No animals died during the study. Some minor clinical signs were noted, and only one abnormality was noted during the necropsies.

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

Skin corrosion/irritation Causes skin irritation.

Irritation Corrosion - Skin

Ethyl (2E,4Z)-2,4-decadienoate	3 % Patch test, Vehicle Petrolatum. Result: No irritation observed. Species: Human Organ: Skin Notes: RIFM 5000 mg/kg LD50, Evaluated on days 1, 7, and 14 of an LD50 study, 10 animals evaluated. moderate redness in 8, slight redness in 2; moderate edema in 2, slight edema in 8. Day 14, severe redness in 4 with flaking & eschar formation. Result: Irritation noted. Species: Rabbit Organ: Skin Notes: RIFM OECD 404, 3 male rabbits were exposed to 0.5 cc of test substance for 4 hrs. The test substance was then removed, and observations made at 1, 24, 48, and 72 hrs after removal, and also at 6, 9, 12, and 14 days after removal. All animals showed evidence of irritation that was not fully resolved by Day 14. The test substance is moderately irritating to skin. Result: Irritation noted. Species: Rabbit Organ: Skin

Serious eye damage/eye irritation Direct contact with eyes may cause temporary irritation.

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Irritation Corrosion - Eye

Ethyl (2E,4Z)-2,4-decadienoate	OECD 405, Three rabbits were exposed to 0.1 cc of test substance. The other eye remained untreated as a control. Some redness and discharge was seen at the 1 hr and 24 hr observations, but there were no signs of irritation at the 48 hr observation. The irritation index was 1.83/110. The test substance is therefore not irritating to the eye. Result: Not irritating. Species: Rabbit Organ: Eye

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Skin sensitization

Ethyl (2E,4Z)-2,4-decadienoate	3 % Patch test, Vehicle Petrolatum. 30 volunteers, 27 completed the study. Result: Not sensitizing. Species: Human Organ: Skin Notes: RIFM OECD 422E, In theory, the test item is considered to be no skin sensitiser. However, since the log KOW is higher than 3.5, the results must be considered as inconclusive. The controls confirmed the validity of the study for all experiments. In this study under the given conditions the test item did not upregulate the expression of the cell surface markers in at least two independent experiment runs. However, since the log KOW is higher than 3.5, the results must be considered as inconclusive. Result: inconclusive. Organ: In vitro human cell line activation test (h-CLAT) OECD 442C, The skin sensitization potential of the test substance was determine in a peptide reactivity assay. The test evaluates the reactivity of the test sustance to peptides containing lysine and cysteine. Although the control show the test to be valid, phase seperation of the test substance means a prediction of sensitivity cannot be made. Result: not determinable. Species: In chemico OECD 442D, In this study under the given conditions the test item did not induce the luciferase activity in the transgenic KeratinoSens™ cell line in at least two independent experiment runs. Therefore, the test item can be considered as nonsensitiser. The data generated with this method may not be sufficient to conclude on the absence of skin sensitisation potential of chemicals and should be considered in the context of integrated approach such as IATA. Result: Not sensitizing. Organ: In vitro KeratinoSens™ assay

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

Ethyl (2E,4Z)-2,4-decadienoate	OECD 471, E. coli WP2 uvrA. The mutagenicity was tested both in the presence and absence of S9 using DMSO as a solvent. Doses of 5.00, 15.0, 50.0, 150, 500, 1500, and 5000 ug/plate were tested. Toxicity was seen at doses of 500 ug/plate or higher. The test substance was not mutagenic either in the presence or absence of S9. Result: Not mutagenic. Species: Escherichia coli

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Germ cell mutagenicity: Ames test

Ethyl (2E,4Z)-2,4-decadienoate	OECD 471, S. typhimurium TA 1535, TA 1537, TA 98, TA 100. The mutagenicity was tested both in the presence and absence of S9 using DMSO as a solvent. Doses of 5.00, 15.0, 50.0, 150, 500, 1500, and 5000 ug/plate were tested. Toxicity was seen at doses of 500 ug/ plate or higher. The test substance was not mutagenic either in the presence or absence of S9. Result: Not mutagenic. Species: Salmonella typhimurium

Carcinogenicity Not classifiable as to carcinogenicity to humans.

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.

Further information May cause allergic respiratory and skin reactions.

12. Ecological information

Ecotoxicity Very toxic to aquatic life with long lasting effects.

Components		Species	Test Results
Ethyl (2E,4Z)-2,4-decadienoate (CAS 3025-30-7)			
Aquatic			
Acute			
Algae	EC50	Algae	0.13 mg/l, 72 hr OECD 201
	NOEC	Algae	0.074 mg/l, 96 hr OECD 201
Crustacea	EC50	Daphnia	1.4 mg/l, 48 hr OECD 202. Groups of Daphnia magna were exposed to concentrations of 0.18 mg a.i./L, 0.34 mg a.i./L, 0.66 mg a.i./L, 1.5 mg a.i./L, or 2.6 mg a.i./L (measured), for 48 hrs. 60% immobility was seen in the 1.5 mg a.i./L group, and 100% immobility in the 2.6 mg a.i./L group. No immobility was seen in other groups.

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

Persistence and degradability The product is readily biodegradable.

Biodegradability

Percent degradation (Aerobic biodegradation-ready)

Ethyl (2E,4Z)-2,4-decadienoate	OECD 301F, 30 mg/L of test substance was monitored for biodegradation by activated sludge for 34 days. Sodium benzoate was used as a reference substance. The oxygen consumption was monitored during this time. The reference substance results met the validity criteria. The test substance biodegraded 72% in 28 days, and met the 10-day window requirement. It is therefore readily biodegradable. Result: Readily biodegradable. Species: activated sludge, domestic (adaptation not specified)

Bioaccumulative potential

Partition coefficient n-octanol / water (log Kow)

ETHYL 2,4-DECADIENOATE	4.4 OECD 117, 4.1 - 4.7 was the range.

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Partition coefficient n-octanol / water (log Kow)

Ethyl (2E,4Z)-2,4-decadienoate	4.1 - 4.7 OECD 117

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. 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 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

UN number	UN3082
UN proper shipping name	Environmentally hazardous substance, liquid, n.o.s. (ETHYL 2,4-DECADIENOATE)
Transport hazard class(es)	
Class	9
Subsidiary risk	-
Packing group	III
Environmental hazards	Yes
ERG Code	9L
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	UN3082
UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (ETHYL 2,4-DECADIENOATE), MARINE POLLUTANT
Transport hazard class(es)	
Class	9
Subsidiary risk	-
Packing group	III
Environmental hazards	
Marine pollutant	Yes
EmS	F-A, S-F
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.

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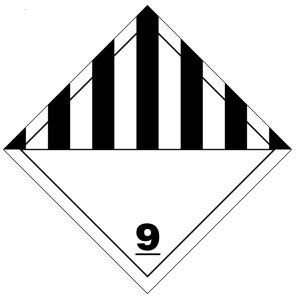
IATA; IMDG



Marine pollutant

General information IMDG Regulated Marine Pollutant.

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 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 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.

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International Inventories

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

*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 16-May-2015

Revision date 17-April-2025

Version # 23

Disclaimer Bedoukian Research US 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 Physical & Chemical Properties: Multiple Properties

BEDOUKIAN®