



FUMARIC ACID (D4, 98%)

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830 and according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 22/02/2011
DLM-7654

Revision date: 10/07/2017

Supersedes: 21/07/2015

Version: 4.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form : Substance
Substance name : FUMARIC ACID (D4, 98%)
EC Index No : 607-146-00-X (Unlabeled)
EC No : 203-743-0 (Unlabeled)
CAS No : 194160-45-7
REACH registration No : 01-2119485492-31
Product code : DLM-7654
Formula : C4D4O4

1.2. Relevant identified uses of the substance or mixture and uses advised against

1.2.1. Relevant identified uses

Main use category : Professional use
Industrial/Professional use spec : For professional use only

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

Cambridge Isotope Laboratories, Inc.
50 Frontage Road
Andover, MA 01810
USA

USA: 1-800-322-1174 Int: 1-978-749-8000
cilsales@isotope.com www.isotope.com

Emergency telephone number

Emergency numbers:

Chemtrec: 1-800-424-9300 (24 hours)
International: 1-703-741-5970 (24 hours)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Eye Irrit. 2 H319

Full text of hazard classes and H-statements : see section 16

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]

Xi; R36

Full text of R-phrases: see section 16

GHS-US classification

Eye Irrit. 2A H319

Full text of H statements : see section 16

Adverse physicochemical, human health and environmental effects

Kidney.

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2.2. Label elements

Labeling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP) :



GHS07

Signal word (CLP) :

Warning

Hazard statements (CLP) :

H319 - Causes serious eye irritation

Precautionary statements (CLP) :

P264 - Wash hands, forearms and face thoroughly after handling
P280 - Wear protective clothing, protective gloves
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337+P313 - If eye irritation persists: Get medical advice/attention

GHS-US labeling

Hazard pictograms (GHS-US) :



GHS07

Signal word (GHS-US) :

Warning

Hazard statements (GHS-US) :

H319 - Causes serious eye irritation

Precautionary statements (GHS-US) :

P264 - Wash hands, forearms and face thoroughly after handling
P280 - Wear protective clothing, protective gloves
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337+P313 - If eye irritation persists: Get medical advice/attention

2.3. Other hazards

No additional information available

SECTION 3: Composition/Information on ingredients

3.1. Substances

Name	Product identifier	%	Classification according to Directive 67/548/EEC
FUMARIC ACID (D4, 98%)	(CAS No) 194160-45-7 (EC No) 203-743-0 (Unlabeled) (EC Index No) 607-146-00-X (Unlabeled) (REACH-no) 01-2119485492-31	100	Xi; R36

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
FUMARIC ACID (D4, 98%)	(CAS No) 194160-45-7 (EC No) 203-743-0 (Unlabeled) (EC Index No) 607-146-00-X (Unlabeled) (REACH-no) 01-2119485492-31	100	Eye Irrit. 2, H319

Full text of R- and H- phrases: see section 16

Name	Product identifier	%	GHS-US classification
FUMARIC ACID (D4, 98%) (Main constituent)	(CAS No) 194160-45-7	100	Eye Irrit. 2A, H319

Full text of H-phrases: see section 16

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : If you feel unwell, seek medical advice (show the label where possible). Evacuate danger area.

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First-aid measures after inhalation	: When symptoms occur: go into open air and ventilate suspected area. If not breathing, give artificial respiration. Get medical advice/attention.
First-aid measures after skin contact	: Wash with plenty of soap and water. Get immediate medical advice/attention.
First-aid measures after eye contact	: Immediately flush eyes thoroughly with water for at least 15 minutes.
First-aid measures after ingestion	: Never give anything by mouth to an unconscious person. Rinse mouth out with water. Get medical advice/attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation	: May be harmful if inhaled. May cause respiratory irritation.
Symptoms/injuries after skin contact	: May be harmful in contact with skin. May cause moderate irritation.
Symptoms/injuries after eye contact	: Causes serious eye irritation.
Symptoms/injuries after ingestion	: May be harmful if swallowed.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Water spray, dry chemical powder, alcohol-resistant foam, carbon dioxide (CO₂).

5.2. Special hazards arising from the substance or mixture

No additional information available

5.3. Advice for firefighters

Firefighting instructions	: Fight fire with normal precautions from a reasonable distance. Wear a self contained breathing apparatus. Do not enter fire area without proper protective equipment, including respiratory protection.
Protection during firefighting	: Do not enter fire area without proper protective equipment, including respiratory protection. Wear recommended personal protective equipment.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Emergency procedures : Avoid breathing vapors, mist, gas. Avoid dust formation.

6.1.2. For emergency responders

No additional information available

6.2. Environmental precautions

Prevent entry to sewers and public waters. Do not allow to enter drains or water courses. Avoid release to the environment.

6.3. Methods and material for containment and cleaning up

For containment	: Avoid dust formation. Take up mechanically (sweeping, shoveling) and collect in suitable container for disposal.
Methods for cleaning up	: This material and its container must be disposed of in a safe way, and as per local legislation.

6.4. Reference to other sections

No additional information available

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling	: Provide adequate ventilation to minimize dust and/or vapor concentrations. Avoid contact with eyes. May form combustible dust concentrations in air. Combustible Dust.
Hygiene measures	: Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures	: Store in a well-ventilated place. Keep container tightly closed.
Storage conditions	: Store at room temperature away from light and moisture.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

FUMARIC ACID (D4, 98%) (194160-45-7)

DNEL/DMEL (Workers)

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FUMARIC ACID (D4, 98%) (194160-45-7)	
Acute - systemic effects, dermal	50 mg/kg bodyweight/day
Acute - systemic effects, inhalation	175 mg/m ³
Long-term - systemic effects, dermal	50 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	175 mg/m ³
DNEL/DMEL (General population)	
Acute - systemic effects, dermal	30 mg/kg body weight
Acute - systemic effects, inhalation	53 mg/m ³
Acute - systemic effects, oral	30 mg/kg body weight
Long-term - systemic effects, oral	30 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	53 mg/m ³
PNEC (Water)	
PNEC aqua (freshwater)	0.1 mg/l
PNEC aqua (marine water)	0.01 mg/l
PNEC aqua (intermittent, freshwater)	1 mg/l
PNEC (STP)	
PNEC sewage treatment plant	3 mg/l

8.2. Exposure controls

Appropriate engineering controls : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.

Personal protective equipment : Gloves. Protective clothing. Protective goggles. Self-contained breathing apparatus.



Materials for protective clothing : Wear suitable protective clothing and gloves.

Hand protection : Wear suitable protective clothing and gloves.

Eye protection : Wear eye protection. Chemical goggles or face shield with safety glasses.

Skin and body protection : Wear suitable protective clothing, gloves and eye/face protection.

Respiratory protection : In case of inadequate ventilation wear respiratory protection. Approved supplied air respirator.

Environmental exposure controls : Avoid release to the environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Solid
Appearance	: Solid.
Molecular mass	: 120.1 g/mol (Labeled)
Color	: white.
Odor	: No data available
Odor threshold	: No data available
pH	: 2.1 at 4.9 g/l at 20 °C (68 °F)
Relative evaporation rate (butyl acetate=1)	: No data available
Melting point	: 298 - 300 °C (568 - 572 °F)
Freezing point	: No data available
Boiling point	: No data available
Flash point	: 230 °C (446 °F) - closed cup - DIN 51755 Part 1
Auto-ignition temperature	: ca.399 °C (750 °F) at 1,013 hPa (759.8 mmHg)
Decomposition temperature	: No data available
Flammability (solid, gas)	: No data available
Vapor pressure	: 2.2 hPa (1.7 mmHg) at 165 °C (329 °F)
Relative vapor density at 20 °C	: No data available
Relative density	: 1.635 at 20 °C (68 °F)
Solubility	: Water: 7 g/l at 25 °C (77 °F) - soluble
Log Pow	: 0.46 at 20 °C (68 °F)
Log Kow	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: No data available

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Explosive properties	: No data available
Oxidizing properties	: No data available
Explosion limits	: 3 - 40 % (V)

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

Stable if stored under recommended conditions.

10.3. Possibility of hazardous reactions

No dangerous reactions known under normal conditions of use.

10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7).

10.5. Incompatible materials

Oxidizing agent. amines. Strong bases.

10.6. Hazardous decomposition products

Carbon oxides (CO, CO2).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

FUMARIC ACID (D4, 98%) (194160-45-7)	
LD50 oral rat	9300 mg/kg female (OECD Test Guideline 401)
LD50 dermal rabbit	20000 mg/kg (OECD Test Guideline 402)
ATE CLP (oral)	9300.000 mg/kg body weight
ATE CLP (dermal)	20000.000 mg/kg body weight
LD50, intraperitoneal, mouse	100 mg/kg

Skin corrosion/irritation	: Skin. rabbit. Result: mild skin irritation. -4 h (OECD Test Guideline 404) pH: 2.1 at 4.9 g/l at 20 °C (68 °F)
Serious eye damage/irritation	: Eyes. rabbit. Result: Irritating to eyes. (OECD 405 method) pH: 2.1 at 4.9 g/l at 20 °C (68 °F)
Respiratory or skin sensitization	: Maximisation Test . Guinea pig. Result: Does not cause skin sensitisation. (OECD Test Guideline 406)
Germ cell mutagenicity	: mouse. lymphocytes. Result: Negative
Carcinogenicity	: Not classified
Reproductive toxicity	: Not available
Specific target organ toxicity – single exposure	: Not classified No data available
Specific target organ toxicity – repeated exposure	: Not classified No data available

FUMARIC ACID (D4, 98%) (194160-45-7)	
NOAEL (oral,rat,90 days)	600 mg/kg bodyweight/day male

Aspiration hazard	: Not classified
Potential Adverse human health effects and symptoms	: Gastrointestinal disturbance. This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product. Stomach - Irregularities - Based on Human Evidence.
Symptoms/injuries after inhalation	: May be harmful if inhaled. May cause respiratory irritation.
Symptoms/injuries after skin contact	: May be harmful in contact with skin. May cause moderate irritation.
Symptoms/injuries after eye contact	: Causes serious eye irritation.
Symptoms/injuries after ingestion	: May be harmful if swallowed.

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SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : The product is not considered harmful to aquatic organisms or to cause long-term adverse effects in the environment.

FUMARIC ACID (D4, 98%) (194160-45-7)	
LC50 fish 1	> 100 mg/l Danio rerio (Zebra fish) - 96 h (OECD Test Guideline 203)
EC50 Daphnia 1	212 mg/l Immobilization - Daphnia magna (Water flea) - 48 h (OECD Test Guideline 202)
EC50 other aquatic organisms 1	> 300 mg/l Growth inhibition - activated sludge - 3 h (OECD Test Guideline 209)
ErC50 (algae)	> 100 mg/l Pseudokirchneriella subcapitata - 72 h (OECD Test Guideline 201)

12.2. Persistence and degradability

FUMARIC ACID (D4, 98%) (194160-45-7)	
Persistence and degradability	Aerobic - exposure time: 28 d.
Biodegradation	67.5 % Readily biodegradable

12.3. Bioaccumulative potential

FUMARIC ACID (D4, 98%) (194160-45-7)	
Log Pow	0.46 at 20 °C (68 °F)
Bioaccumulative potential	Not available.

12.4. Mobility in soil

FUMARIC ACID (D4, 98%) (194160-45-7)	
Ecology - soil	Not available.

12.5. Results of PBT and vPvB assessment

No additional information available

12.6. Other adverse effects

Other adverse effects : Not available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Regional legislation (waste) : Waste materials should be disposed of under conditions which meet Federal, State, and Local environmental control regulations.

Product/Packaging disposal recommendations: : Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Ecology - waste materials : Dispose of as unused product.

SECTION 14: Transport information

In accordance with ADR / RID / IMDG / IATA / ADN

14.1. UN number

UN-No.(DOT) : 3077
DOT NA no. UN3077

14.2. UN proper shipping name

Proper Shipping Name (DOT) : Environmentally hazardous substances, solid, n.o.s.
Class (DOT) : 9 - Class 9 - Miscellaneous hazardous material 49 CFR 173.140
Hazard labels (DOT) : 9 - Class 9 (Miscellaneous dangerous materials)



DOT Symbols : G - Identifies PSN requiring a technical name
Packing group (DOT) : III - Minor Danger

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DOT Special Provisions (49 CFR 172.102)	: 8 - A hazardous substance that is not a hazardous waste may be shipped under the shipping description "Other regulated substances, liquid or solid, n.o.s.", as appropriate. In addition, for solid materials, special provision B54 applies. 146 - This description may be used for a material that poses a hazard to the environment but does not meet the definition for a hazardous waste or a hazardous substance, as defined in 171.8 of this subchapter, or any hazard class as defined in Part 173 of this subchapter, if it is designated as environmentally hazardous by the Competent Authority of the country of origin, transit or destination. 335 - Mixtures of solids that are not subject to this subchapter and environmentally hazardous liquids or solids may be classified as "Environmentally hazardous substances, solid, n.o.s." UN3077 and may be transported under this entry, provided there is no free liquid visible at the time the material is loaded or at the time the packaging or transport unit is closed. Each transport unit must be leak-proof when used as bulk packaging. A112 - Notwithstanding the quantity limits shown in Column (9A) and (9B) for this entry, the following IBCs are authorized for transportation aboard passenger and cargo-only aircraft. Each IBC may not exceed a maximum net quantity of 1,000 kg: a. Metal: 11A, 11B, 11N, 21A, 21B and 21N b. Rigid plastics: 11H1, 11H2, 21H1 and 21H2 c. Composite with plastic inner receptacle: 11HZ1, 11HZ2, 21HZ1 and 21HZ2 d. Fiberboard: 11G e. Wooden: 11C, 11D and 11F (with inner liners) f. Flexible: 13H2, 13H3, 13H4, 13H5, 13L2, 13L3, 13L4, 13M1 and 13M2 (flexible IBCs must be sift-proof and water resistant or must be fitted with a sift-proof and water resistant liner). B54 - Open-top, sift-proof rail cars are also authorized. IB8 - Authorized IBCs: Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N); Rigid plastics (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2); Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2, 31HZ1 and 31HZ2); Fiberboard (11G); Wooden (11C, 11D and 11F); Flexible (13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, 13M1 or 13M2). IP3 - Flexible IBCs must be sift-proof and water-resistant or must be fitted with a sift-proof and water-resistant liner. N20 - A 5M1 multi-wall paper bag is authorized if transported in a closed transport vehicle. T1 - 1.5 178.274(d)(2) Normal..... 178.275(d)(2) TP33 - The portable tank instruction assigned for this substance applies for granular and powdered solids and for solids which are filled and discharged at temperatures above their melting point which are cooled and transported as a solid mass. Solid substances transported or offered for transport above their melting point are authorized for transportation in portable tanks conforming to the provisions of portable tank instruction T4 for solid substances of packing group III or T7 for solid substances of packing group II, unless a tank with more stringent requirements for minimum shell thickness, maximum allowable working pressure, pressure-relief devices or bottom outlets are assigned in which case the more stringent tank instruction and special provisions shall apply. Filling limits must be in accordance with portable tank special provision TP3. Solids meeting the definition of an elevated temperature material must be transported in accordance with the applicable requirements of this subchapter.
DOT Packaging Exceptions (49 CFR 173.xxx)	: 155
DOT Packaging Non Bulk (49 CFR 173.xxx)	: 213
DOT Packaging Bulk (49 CFR 173.xxx)	: 240
DOT RQ	: 5000 lbs
Marine pollutant	: No

14.3. Additional information

Emergency Response Guide (ERG) Number	: 171
Other information	: No supplementary information available.
Special transport precautions	: IMDG/IATA - Not dangerous goods.

Overland transport

Packing group (ADR)	: III
Class (ADR)	: 9 - Miscellaneous dangerous substances and articles
Hazard identification number (Kemler No.)	: 90
Classification code (ADR)	: M7
Hazard labels (ADR)	: 9 - Miscellaneous dangerous substances and articles



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Orange plates

:



Tunnel restriction code (ADR)

: E

Limited quantities (ADR)

5kg

EAC

: Z2

Excepted quantities (ADR)

: E1

Transport by sea

DOT Vessel Stowage Location

: A - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel.

MFAG-No

: 171

Air transport

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)

: No limit

DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)

: No limit

Civil Aeronautics Law

: Miscellaneous dangerous substances & articles

14.4. Environmental hazards

Other information

: No supplementary information available.

14.5. Special precautions for user

Special transport precautions

: IMDG/IATA - Not dangerous goods.

14.6. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

SECTION 15: Regulatory information

15.1. US Federal regulations

FUMARIC ACID (D4, 98%) (194160-45-7)	
SARA Section 302 Threshold Planning Quantity (TPQ)	Not subject to reporting requirements of the United States SARA Section 302.
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard Delayed (chronic) health hazard
SARA Section 313 - Emission Reporting	Not subject to reporting requirements of the United States SARA Section 313.

15.2. International regulations

CANADA

FUMARIC ACID (D4, 98%) (194160-45-7)	
Listed on the Canadian DSL (Domestic Substances List)	

15.2.1. National regulations

No additional information available

15.3. US State regulations

FUMARIC ACID (D4, 98%)(194160-45-7)	
U.S. - California - Proposition 65 - Carcinogens List	No
U.S. - California - Proposition 65 - Developmental Toxicity	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No
State or local regulations	U.S. - Massachusetts - Right To Know List U.S. - Pennsylvania - RTK (Right to Know) List

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U.S. - New Jersey - Right to Know Hazardous Substance List

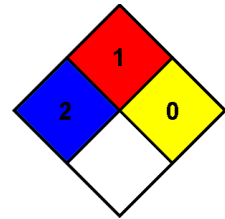
SECTION 16: Other information

Other information : This product is not radioactive. The data given for this product are those of the corresponding unlabeled compound, unless specifically indicated otherwise. Health and safety data for labeled compounds are generally not available, but are assumed to be similar or identical to the corresponding unlabeled compound.

Full text of R-, H- and EUH-phrases:

Eye Irrit. 2	Serious eye damage/eye irritation Category 2
H319	Causes serious eye irritation
R36	Irritating to eyes
Xi	Irritant

NFPA health hazard : 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.
NFPA fire hazard : 1 - Materials that must be preheated before ignition can occur.
NFPA reactivity : 0 - Material that in themselves are normally stable, even under fire conditions.



HMIS III Rating

Health : 2 Moderate Hazard - Temporary or minor injury may occur
Flammability : 1 Slight Hazard
Physical : 0 Minimal Hazard

CIL Multi-Solvent Mixture SDS

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product