

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 Revision date: 14/06/2017 Supersedes: 16/02/2012 Version: 5.0

DLM-1539

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

1.1. Product identifier

Product form : Substance

Substance name : FUMARIC ACID (2,3-D2, 98%)

EC Index No : 607-146-00-X

EC No : 203-743-0 (Unlabeled)

CAS No : 24461-32-3

REACH registration No : 01-2119485492-31

Product code : DLM-1539

Formula : HOOCCD=CDCOOH

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. 2 H319

Full text of H statements : see section 16

Adverse physicochemical, human health and environmental effects

No additional information available

19/06/2017 EN (English) 1/9

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

Label elements

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

Hazard pictograms (CLP)



Signal word (CLP) : Warning

: H319 - Causes serious eye irritation Hazard statements (CLP)

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 labelling

Hazard pictograms (GHS-US)



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

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 (2,3-D2, 98%)	(CAS No) 24461-32-3 (EC No) 203-743-0 (Unlabeled) (EC Index No) 607-146-00-X (REACH-no) 01-2119485492-31	100	Xi; R36
Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
FUMARIC ACID (2,3-D2, 98%)	(CAS No) 24461-32-3 (EC No) 203-743-0 (Unlabeled) (EC Index No) 607-146-00-X (REACH-no) 01-2119485492-31	100	Eye Irrit. 2, H319

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

Name	Product identifier	%	GHS-US classification
FUMARIC ACID (2,3-D2, 98%) (Main constituent)	(CAS No) 24461-32-3	100	Eye Irrit. 2, H319

Full text of H-statements: see section 16

Mixtures

Not applicable

19/06/2017 EN (English) 2/9

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

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.

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 : Rinse cautiously with water for several 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: Fire-fighting 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 : Use personal protective equipment as required. Avoid breathing dust, vapours, mist, gas. Avoid

dust formation. Ensure adequate air ventilation.

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 : Take up mechanically (sweeping, shovelling) 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 vapour concentrations.

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.

19/06/2017 EN (English) 3/9

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

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

FUMARIC ACID (2,3-D2, 98%) (24461-32-3)	
DNEL/DMEL (Workers)	
Acute - systemic effects, dermal	50 mg/kg bodyweight/day Skin contact - Acute
Acute - systemic effects, inhalation	175 mg/m³
Long-term - systemic effects, dermal	50 mg/kg bodyweight/day -Skin contact - Long-term
Long-term - systemic effects, inhalation	175 mg/m³
DNEL/DMEL (General population)	
Acute - systemic effects, dermal	30 mg/kg bodyweight
Acute - systemic effects, inhalation	53 mg/m³
Acute - systemic effects, oral	30 mg/kg bodyweight
Long-term - systemic effects,oral	30 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	53 mg/m³
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 : 118.08 g/mol (Labeled)

Colour : white.

Odour : No data available.
Odour threshold : No data available

pH : 2.1 at 4.9 g/l at 20 °C (68 °F)

Relative evaporation rate (butylacetate=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 1,013.0 hPa (759.8 mmHg)

Decomposition temperature : No data available Flammability (solid, gas) : No data available

Vapour pressure : 2.2 hPa (1.7 mmHg) at 165 °C (329 °F)

19/06/2017 EN (English) 4/9

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

Relative vapour density at 20 °C : No data available

Relative density : 1.635 g/cm3 at 20 °C (68 °F) Solubility : Water: 7 g/l g/cm3 at 20 °C (68 °F)

Log Pow : 0.46 at 20 °C (68 °F) : No data available Log Kow Viscosity, kinematic : No data available Viscosity, dynamic : No data available : No data available Explosive properties : No data available Oxidising properties : 3 - 40 vol % Explosive limits

Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

Chemical stability

Stable if stored under recommended conditions.

Possibility of hazardous reactions 10.3.

No additional information available

Conditions to avoid 10.4.

No additional information available

Incompatible materials

Strong oxidizing agents. amines. Strong bases.

Hazardous decomposition products

Carbon oxides (CO, CO2).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

FUMARIC ACID (2,3-D2, 98%) (24461-32-3)	
LD50 oral rat	9300 mg/kg - Rat - female - (OECD Test Guideline 401)
LD50 dermal rabbit	20000 mg/kg - female - (OECD Test Guideline 402)
Additional information	LD50 Intraperitoneal - Mouse - 100 mg/kg

Skin corrosion/irritation : Skin. rabbit. Result: mild skin irritation. 4 Hours. (OECD 404 method)

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 sensitisation : Maximisation Test - Guinea pig. Result: Does not cause skin sensitisation. (OECD Test

Guideline 406)

Germ cell mutagenicity : mouse lymphocyte Result: negative

Carcinogenicity : Not classified Reproductive toxicity : Not classified STOT-single exposure : Not classified STOT-repeated exposure : Not classified : Not classified Aspiration hazard

19/06/2017 EN (English) 5/9

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

Potential adverse human health effects and symptoms

: Repeated dose toxicity. 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 Symptoms/injuries after ingestion : Causes serious eye irritation.: May be harmful if swallowed.

SECTION 12: Ecological information

12.1. Toxicity

FUMARIC ACID (2,3-D2, 98%) (24461-32-3)		
LC50 fish 1	> 100 mg/l semi-static test LC50 - 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 Respiration inhibition EC50 - activated sludge - 3 h (OECD Test Guideline 209)	
ErC50 (algae)	> 100 mg/l Growth inhibition EC50 - Pseudokirchneriella subcapitata - 72 h (OECD Test Guideline 201)	

12.2. Persistence and degradability

FUMARIC ACID (2,3-D2, 98%) (24461-32-3)		
	Biodegradation	67.5 % - Readily biodegradable (OECD Test Guideline 301B); aerobic - Exposure time 28 d

12.3. Bioaccumulative potential

FUMARIC ACID (2,3-D2, 98%) (24461-32-3)	
Log Pow	0.46 at 20 °C (68 °F)

12.4. Mobility in soil

No additional information available

12.5. Results of PBT and vPvB assessment

No additional information available

12.6. Other adverse effects

No additional information 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

19/06/2017 EN (English) 6/9

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

Packing group (DOT)

DOT Special Provisions (49 CFR 172.102)

: III - Minor Danger

: 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 leakproof 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) DOT Packaging Non Bulk (49 CFR 173.xxx) : 213 DOT Packaging Bulk (49 CFR 173.xxx) : 240

Additional information

Emergency Response Guide (ERG) Number : 171

Other information : No supplementary information available.

Special transport precautions : Not classified as dangerous in the meaning of transport regulations.

Overland transport

Packing group (ADR) : 111

Class (ADR) : 9 - Miscellaneous dangerous substances and articles

Hazard identification number (Kemler No.) : 90 Classification code (ADR)

Danger labels (ADR) : 9 - Miscellaneous dangerous substances and articles



19/06/2017 EN (English) 7/9

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

Orange plates :

90 3077

Tunnel restriction code (ADR) : E
Limited quantities (ADR) 5kg
EAC code : 2Z
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 : No limit

(49 CFR 173.27)

DOT Quantity Limitations Cargo aircraft only (49 : No limit

CFR 175.75)

Civil Aeronautics Law : Miscellaneous dangerous substances & articles(Hazardous materials notice Appended Table 1

Article 194 of the Enforcement Regulations)

14.4. Environmental hazards

Other information : No supplementary information available.

14.5. Special precautions for user

Special transport precautions : Not classified as dangerous in the meaning of transport regulations.

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 (2,3-D2, 98%) (24461-32-3)	
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 (2,3-D2, 98%) (24461-32-3)

Listed on the Canadian DSL (Domestic Substances List)

15.2.1. National regulations

No additional information available

15.3. US State regulations

FUMARIC ACID (2,3-D2, 98%)(24461-32-3)	
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 New Jersey - Right to Know Hazardous Substance List U.S Pennsylvania - RTK (Right to Know) List

19/06/2017 EN (English) 8/9

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

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-statements:

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

19/06/2017 EN (English) 9/9