

1. IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY / UNDERTAKING

Product Identifier:

Product name: DL-MALIC ACID
Chemical Name: Malic acid
Synonyms: Food additive (E 296)
Chemical formula: C₄H₆O₅
CAS number: 617-48-1
EC number: 210-514-9
UK REACH Registration Number: 01-2119552463-40-XXXX

Relevant identified uses of the substance or mixture and uses advised against:

Relevant identified uses: Industrial use of intermediates. Use in adhesives and sealants. Production of coatings, paints, inks, enamels, varnishes. Fillers, putties, plasters, modelling clay. Fertilizers. Ink and toners. Paper making. Polymer preparations and compounds. Leather treatment products. Paper and board treatment products. Pharmaceutical substance. Washing and cleaning products. Water treatment. Laboratory chemicals. Some grades of this substance are available for feed/food use. Food Additive.

Uses advised against: No specific uses advised against are identified.

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2. HAZARDS IDENTIFICATION

Classification of the substance or mixture:

Classified according to GB-CLP Regulation, UK SI 2019/720 and UK SI 2020/1567 [1]:

H319 - Serious Eye Damage/Eye Irritation Category 2

Legend: 1. Classified by Chemwatch; 2. Classification drawn from GB-CLP Regulation, UK SI 2019/720 and UK SI 2020/1567.

Label elements:

Hazard pictogram(s):



Signal word: Warning.

[cont...]

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Hazard statement(s): H319 Causes serious eye irritation.

Supplementary statement(s): Not Applicable.

Precautionary statement(s) Prevention:

P280 Wear protective gloves, protective clothing, eye protection and face protection.

P264 Wash all exposed external body areas thoroughly after handling.

Precautionary statement(s) Response:

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.

Precautionary statement(s) Storage: Not Applicable.

Precautionary statement(s) Disposal: Not Applicable.

Other hazards: REACH - Art.57-59: The mixture does not contain Substances of Very High Concern (SVHC) at the SDS print date.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Substances:

CAS No: 617-48-1*
EC No: 210-514-9
Index No: Not Available
REACH No: 01-2119552463-40-XXXX

%[weight]	Name	Classified according to GB-CLP Regulation, UK SI 2019/720 and UK SI 2020/1567	SCL/ M-Factor	Nanoform Particle Characteristics
>99	DL-Malic Acid	Serious Eye Damage/Eye Irritation Category 2; H319 [1]	Not Available	Not Available

Legend:

1. Classified by Chemwatch.
2. Classification drawn from GB-CLP Regulation, UK SI 2019/720 and UK SI 2020/1567.
3. Classification drawn from C&L; * EU IOELVs available; [e] Substance identified as having endocrine disrupting properties.

Mixtures: See 'Information on ingredients' in section 3.1

[cont...]

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4. FIRST AID MEASURES

Description of first aid measures:

Eye Contact:

If this product comes in contact with the eyes:

Immediately hold eyelids apart and flush the eye continuously with running water.
Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
Transport to hospital or doctor without delay.
Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact:

If skin or hair contact occurs:

Immediately flush body and clothes with large amounts of water, using safety shower if available.
Quickly remove all contaminated clothing, including footwear.
Wash skin and hair with running water.
Continue flushing with water until advised to stop by the Poisons Information Centre.
Transport to hospital, or doctor.

Inhalation:

If fumes or combustion products are inhaled remove from contaminated area.
Lay patient down. Keep warm and rested.
Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained.
Perform CPR if necessary.
Transport to hospital, or doctor, without delay.

Ingestion:

For advice, contact a Poisons Information Centre or a doctor at once.
Urgent hospital treatment is likely to be needed.
If swallowed do **NOT** induce vomiting.
If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
Observe the patient carefully.
Never give liquid to a person showing signs of being sleepy or with reduced awareness, i.e. becoming unconscious.
Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
Transport to hospital or doctor without delay.

Most important symptoms and effects, both acute and delayed: See Section 11.

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Indication of any immediate medical attention and special treatment needed:

For acute or short-term repeated exposures to strong acids:

Airway problems may arise from laryngeal edema and inhalation exposure. Treat with 100% oxygen initially.

Respiratory distress may require cricothyroidotomy if endotracheal intubation is contraindicated by excessive swelling.

Intravenous lines should be established immediately in all cases where there is evidence of circulatory compromise.

Strong acids produce a coagulation necrosis characterised by formation of a coagulum (eschar) because of the desiccating action of the acid on proteins in specific tissues.

INGESTION:

Immediate dilution (milk or water) within 30 minutes post ingestion is recommended.

DO NOT attempt to neutralise the acid since exothermic reaction may extend the corrosive injury.

Be careful to avoid further vomit since re-exposure of the mucosa to the acid is harmful. Limit fluids to one or two glasses in an adult.

Charcoal has no place in acid management.

Some authors suggest the use of lavage within 1 hour of ingestion.

SKIN:

Skin lesions require copious saline irrigation. Treat chemical burns as thermal burns with non-adherent gauze and wrapping.

Deep second-degree burns may benefit from topical silver sulfadiazine.

EYE:

Eye injuries require retraction of the eyelids to ensure thorough irrigation of the conjunctival cul-de-sacs. Irrigation should last at least 20-30 minutes.

DO NOT use neutralising agents or any other additives. Several litres of saline are required.

Cycloplegic drops, (1% cyclopentolate for short-term use or 5% homatropine for longer term use) antibiotic drops, vasoconstrictive agents or artificial tears may be indicated dependent on the severity of the injury.

Steroid eye drops should only be administered with the approval of a consulting ophthalmologist).

5. FIRE-FIGHTING MEASURES

Extinguishing media:

There is no restriction on the type of extinguisher which may be used.

Use extinguishing media suitable for surrounding area.

Special hazards arising from the substrate or mixture:

Fire Incompatibility:

Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

[cont...]

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Advice for firefighters:

Fire Fighting:

Alert Fire Brigade and tell them location and nature of hazard.
Wear breathing apparatus plus protective gloves in the event of a fire.
Prevent, by any means available, spillage from entering drains or water courses.
Use firefighting procedures suitable for surrounding area.
DO NOT approach containers suspected to be hot.
Cool fire exposed containers with water spray from a protected location.
If safe to do so, remove containers from path of fire.
Equipment should be thoroughly decontaminated after use.

Fire/Explosion Hazard:

Carbon dioxide (CO₂).
Other pyrolysis products typical of burning organic material.
May emit poisonous fumes.
May emit corrosive fumes.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: See section 8.

Environmental precautions: See section 12.

Methods and material for containment and cleaning up:

Minor Spills:

Clean up all spills immediately.
Avoid breathing dust and contact with skin and eyes.
Wear protective clothing, gloves, safety glasses and dust respirator.
Use dry clean up procedures and avoid generating dust.
Sweep up, shovel up or vacuum up (consider explosion-proof machines designed to be grounded during storage and use).
Place spilled material in clean, dry, sealable, labelled container.

Major Spills:

Moderate hazard.

CAUTION:

Advise personnel in area.
Alert Emergency Services and tell them location and nature of hazard.
Control personal contact by wearing protective clothing.
Prevent, by any means available, spillage from entering drains or water courses.
Recover product wherever possible.

IF DRY:

Use dry clean up procedures and avoid generating dust. Collect residues and place in sealed plastic bags or other containers for disposal.

IF WET:

Vacuum/shovel up and place in labelled containers for disposal.

ALWAYS:

Wash area down with large amounts of water and prevent runoff into drains.
If contamination of drains or waterways occurs, advise Emergency Services.

Reference to other sections:

Personal Protective Equipment advice is contained in Section 8 of the SDS.

[cont...]

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7. HANDLING AND STORAGE

Precautions for safe handling:

Safe handling:

Avoid all personal contact, including inhalation.
Wear protective clothing when risk of exposure occurs.
Use in a well-ventilated area.
Prevent concentration in hollows and sumps.
DO NOT enter confined spaces until atmosphere has been checked.
DO NOT allow material to contact humans, exposed food or food utensils.
Avoid contact with incompatible materials.
When handling, **DO NOT** eat, drink or smoke.
Keep containers securely sealed when not in use.
Avoid physical damage to containers.
Always wash hands with soap and water after handling.
Work clothes should be laundered separately. Launder contaminated clothing before re-use.
Use good occupational work practice.
Observe manufacturer's storage and handling recommendations contained within this SDS.
Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Fire and explosion protection: See section 5.

Other information:

Store in original containers.
Keep containers securely sealed.
Store in a cool, dry area protected from environmental extremes.
Store away from incompatible materials and foodstuff containers.
Protect containers against physical damage and check regularly for leaks.
Observe manufacturer's storage and handling recommendations contained within this SDS.

For major quantities:

Consider storage in bunded areas - ensure storage areas are isolated from sources of community water (including stormwater, ground water, lakes and streams).
Ensure that accidental discharge to air or water is the subject of a contingency disaster management plan; this may require consultation with local authorities.

Conditions for safe storage, including any incompatibilities:

Suitable container:

Lined metal can, lined metal pail/ can.
Plastic pail.
Polyliner drum.
Packing as recommended by manufacturer.
Check all containers are clearly labelled and free from leaks.

Storage incompatibility:

Avoid reaction with oxidising agents.

Hazard categories in accordance with Regulation (EC) No 1272/2008: Not Available.

Qualifying quantity (tonnes) of dangerous substances as referred to in Article 3(10) for the application of: Not Available.

Specific end use(s):

See section 1.2.

[cont...]

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8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters:

Ingredient	DNELs Exposure Pattern Worker	PNECs Compartment
Not Available	Dermal 2 mg/kg bw/day (Systemic, Chronic) Inhalation 5.33 mg/m ³ (Systemic, Chronic) Dermal 1 mg/cm ² (Local, Chronic) Inhalation 32 mg/m ³ (Local, Chronic) Dermal 40 mg/kg bw/day (Systemic, Acute) Inhalation 104 mg/m ³ (Systemic, Acute) Dermal 1 mg/cm ² (Local, Acute) Inhalation 104 mg/m ³ (Local, Acute)	0.1 mg/L (Water (Fresh)) 0.01 mg/L (Water - Intermittent release) 1 mg/L (Water (Marine)) 3 mg/L (STP)
DL-MALIC ACID	Dermal 2 mg/kg bw/day (Systemic, Chronic) Inhalation 5.33 mg/m ³ (Systemic, Chronic) Dermal 1 mg/cm ² (Local, Chronic) Inhalation 32 mg/m ³ (Local, Chronic) Dermal 40 mg/kg bw/day (Systemic, Acute) Inhalation 104 mg/m ³ (Systemic, Acute) Dermal 1 mg/cm ² (Local, Acute) Inhalation 104 mg/m ³ (Local, Acute) Dermal 6 mg/kg bw/day (Systemic, Chronic) * Inhalation 1.6 mg/m ³ (Systemic, Chronic) * Oral 6 mg/kg bw/day (Systemic, Chronic) * Dermal 0.5 mg/cm ² (Local, Chronic) * Inhalation 1.6 mg/m ³ (Local, Chronic) * Dermal 20 mg/kg bw/day (Systemic, Acute) * Inhalation 52 mg/m ³ (Systemic, Acute) * Oral 20 mg/kg bw/day (Systemic, Acute) * Dermal 0.4 mg/cm ² (Local, Acute) * Inhalation 52 mg/m ³ (Local, Acute) *	0.1 mg/L (Water (Fresh)) 0.01 mg/L (Water - Intermittent release) 1 mg/L (Water (Marine)) 3 mg/L (STP)

* Values for General Population

[cont...]

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Occupational Exposure Limits (OEL):

INGREDIENT DATA:

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available

Emergency Limits:

Ingredient	TEEL-1	TEEL-2	TEEL-3
DL-MALIC ACID	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH
DL-MALIC ACID	Not Available	Not Available

Occupational Exposure Banding:

Ingredient	Occupational Exposure Band Rating	Occupational Exposure Band Limit
DL-MALIC ACID	E	≤ 0.01 mg/m ³

Notes: Occupational exposure banding is a process of assigning chemicals into specific categories or bands based on a chemical's potency and the adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that are expected to protect worker health.

Exposure controls:

Appropriate engineering controls: Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are:

Process controls which involve changing the way a job activity or process is done to reduce the risk.

Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.

Employers may need to use multiple types of controls to prevent employee overexposure.

Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection. An approved self-contained breathing apparatus (SCBA) may be required in some situations.

Provide adequate ventilation in warehouse or closed storage area. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

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Type of Contaminant:

Solvent, vapours, degreasing etc., evaporating from tank (in still air).

Air Speed:

0.25-0.5 m/s
(50-100 f/min.)

Aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)

0.5-1 m/s
(100-200 f/min.)

Direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)

1-2.5 m/s
(200-500 f/min.)

Grinding, abrasive blasting, tumbling, high speed wheel generated dusts.
(released at high initial velocity into zone of very high rapid air motion).

2.5-10 m/s
(500-2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range

- 1: Room air currents minimal or favourable to capture.
- 2: Contaminants of low toxicity or of nuisance value only.
- 3: Intermittent, low production.
- 4: Large hood or large air mass in motion.

Upper end of the range

- 1: Disturbing room air currents.
- 2: Contaminants of high toxicity.
- 3: High production, heavy use.
- 4: Small hood-local control only.

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore, the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Individual protection measures, such as personal protective equipment:



Eye and face protection:

Safety glasses with unperforated side shields may be used where continuous eye protection is desirable, as in laboratories; spectacles are not sufficient where complete eye protection is needed such as when handling bulk-quantities, where there is a danger of splashing, or if the material may be under pressure.

Chemical goggles. whenever there is a danger of the material coming in contact with the eyes; goggles must be properly fitted.

Full face shield (20 cm, 8 in minimum) may be required for supplementary but never for primary protection of eyes; these afford face protection.

Alternatively, a gas mask may replace splash goggles and face shields.

[cont...]

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Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent].

Skin protection: See Hand protection below.

Hands/feet protection: Elbow length PVC gloves.

Body protection: See Other protection below.

Other protection: Overalls.
P.V.C apron.
Barrier cream.
Skin cleansing cream.
Eye wash unit.

Respiratory protection: Type -P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent).

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	P1 Air-line*	- -	PAPR-P1
up to 50 x ES	Air-line**	P2	PAPR-P2
up to 100 x ES	-	P3 Air-line*	-
100+ x ES	-	Air-line**	PAPR-P3

* - Negative pressure demand

** - Continuous flow

A(All classes) = Organic vapours

B AUS or B1 = Acid gasses

B2 = Acid gas or hydrogen cyanide(HCN)

B3 = Acid gas or hydrogen cyanide(HCN)

E = Sulphur dioxide(SO₂)

G = Agricultural chemicals

K = Ammonia(NH₃)

Hg = Mercury

NO = Oxides of nitrogen

MB = Methyl bromide

AX = Low boiling point organic compounds (below 65°C)

Environmental exposure controls: See section 12.

[cont...]

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9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties:

Appearance:	White		
Physical state:	Solid	Relative density (Water = 1):	1.6
Odour:	No Odour	Partition coefficient n-octanol/water:	-1.27
Odour threshold:	Not Available	Auto-ignition temperature (°C):	349
pH (as supplied):	Not Applicable	Decomposition temperature (°C):	>225-235
Melting point / freezing point (°C):	129	Viscosity (cSt):	Not Available
Initial boiling point and boiling range (°C):	150	Molecular weight (g/mol):	Not Available
Flash point (°C):	Not Applicable	Taste:	Not Available
Evaporation rate:	Not Available	Explosive properties:	Not Available
Flammability:	Not Applicable	Oxidising properties:	Not Available
Upper Explosive Limit (%):	Not Available	Surface Tension (dyn/cm or mN/m):	Not Applicable
Lower Explosive Limit (%):	Not Available	Volatile Component (%vol):	Not Available
Vapour pressure (kPa):	Not Available	Gas group:	Not Available
Solubility in water:	Miscible	pH as a solution (5%):	1.95
Vapour density (Air = 1):	4.6	VOC g/L:	Not Available
Nanoform Solubility:	Not Available	Nanoform Particle Characteristics:	Not Available
Particle Size:	Not Available		
Other information:	Not Available		

10. STABILITY AND REACTIVITY

Reactivity:	See section 7.2
Chemical stability:	Unstable in the presence of incompatible materials. Product is considered stable. Hazardous polymerisation will not occur.
Possibility of hazardous reactions:	See section 7.2.
Conditions to avoid:	See section 7.2.
Incompatible materials:	See section 7.2.
Hazardous decomposition products:	See section 5.3.

[cont...]

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11. TOXICOLOGICAL INFORMATION

Information on toxicological effects:

- Inhaled:** The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.
Corrosive acids can cause irritation of the respiratory tract, with coughing, choking and mucous membrane damage. There may be dizziness, headache, nausea and weakness.
- Ingestion:** Ingestion of acidic corrosives may produce burns around and in the mouth, the throat and oesophagus. Immediate pain and difficulties in swallowing and speaking may also be evident. The material has **NOT** been classified by EC Directives or other classification systems as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence.
- Skin Contact:** Skin contact with acidic corrosives may result in pain and burns; these may be deep with distinct edges and may heal slowly with the formation of scar tissue.
Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions.
Open cuts, abraded or irritated skin should not be exposed to this material.
Entry into the blood-stream, though, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.
- Eye:** If applied to the eyes, this material causes severe eye damage.
Direct eye contact with acid corrosives may produce pain, tears, sensitivity to light and burns. Mild burns of the epithelia generally recover rapidly and completely.
- Chronic:** Repeated or prolonged exposure to acids may result in the erosion of teeth, swelling and/or ulceration of mouth lining. Irritation of airways to lung, with cough, and inflammation of lung tissue often occurs.
Long-term exposure to respiratory irritants may result in airways disease, involving difficulty breathing and related whole-body problems.
Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.

DL-MALIC ACID

TOXICITY

Inhalation(Rat) LC50: >1.306 mg/l4h[1]

Oral (Mouse) LD50; ~50 mg/kg[1]

IRRITATION

Not Available

DL-MALIC ACID

TOXICITY

Intraperitoneal (Mouse) LD50: 50 mg/kg[2]

Intraperitoneal (Rat) LD50: 100 mg/kg[2]

Oral (Mouse) LD50; 1600 mg/kg[2]

IRRITATION

Eye (rabbit): 0.75 mg/24h SEVERE

Skin (rabbit): 20 mg/24h moderate

Legend:

1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances.

[cont...]

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DL-MALIC ACID:

* [DOSE Vol 5]

The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

DL-MALIC ACID:

Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. On the other hand, industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and is completely reversible after exposure ceases. The disorder is characterized by difficulty breathing, cough and mucus production.

For simple alpha-hydroxy carboxylic acids and their salts:

Experimental data available for members of this group shows that they have low acute, repeat-dose, reproductive and developmental toxicity.

They are eye and skin irritants but are not expected to be skin sensitizers. Testing shows they have little or no potential to cause mutations or cancer.

Acute Toxicity:	X	Carcinogenicity:	X
Skin Irritation/Corrosion:	X	Reproductivity:	X
Serious Eye Damage/Irritation:	✓	STOT - Single Exposure:	X
Respiratory or Skin sensitisation:	X	STOT - Repeated Exposure:	X
Mutagenicity:	X	Aspiration Hazard:	X

Legend:

Data either not available or does not fill the criteria for classification.

Data available to make classification.

Information on other hazards:

Endocrine disrupting properties: No evidence of endocrine disrupting properties were found in the current literature.

Other information: See Section 11.1

[cont...]

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12. ECOLOGICAL INFORMATION

Toxicity:

DL-MALIC ACID:

Endpoint	Test Duration (hr)	Species	Value	Source
NOEC(ECx)	72h	Algae or other aquatic plants	100mg/l	2
EC50	72h	Algae or other aquatic plants	>100mg/l	2
LC50	96h	Fish	>100mg/l	2

Legend:

Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data.
DO NOT discharge into sewer or waterways.

Persistence and degradability:

Ingredient	Persistence: Water/Soil	Persistence: Air
DL-MALIC ACID	LOW	LOW

Bioaccumulative potential:

Ingredient	Bioaccumulation
DL-MALIC ACID	LOW (LogKOW = -1.6812)

Mobility in soil:

Ingredient	Mobility
DL-MALIC ACID	HIGH (KOC = 1)

Results of PBT and vPvB assessment:

	P	B	T
Relevant available data	Yes	Yes	Yes
PBT	X	X	X
vPvB	X	X	X
PBT Criteria fulfilled	No		
vPvB	No		

Endocrine disrupting properties: No evidence of endocrine disrupting properties were found in the current literature.

Other adverse effects: No evidence of ozone depleting properties were found in the current literature.

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13. DISPOSAL CONSIDERATIONS

Waste treatment methods:

Product / Packaging disposal: Recycle wherever possible.
Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
Treat and neutralise at an approved treatment plant. Treatment should involve: Mixing or slurring in water; Neutralisation with soda-lime or soda-ash followed by burial in a land-fill specifically licensed to accept chemical and / or pharmaceutical wastes or Incineration in a licensed apparatus (after admixture with suitable combustible material).
Decontaminate empty containers with 5% aqueous sodium hydroxide or soda ash, followed by water. Observe all label safeguards until containers are cleaned and destroyed.

Waste treatment options: Not Available.

Sewage disposal options: Not Available.

14. TRANSPORT INFORMATION

Labels Required:

Marine Pollutant: No.
HAZCHEM: Not Applicable

Land transport (ADR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

UN number: Not Applicable

UN proper shipping name: Not Applicable

Transport hazard class(es):

Class: Not Applicable

Subsidiary risk: Not Applicable

Packing group: Not Applicable

Environmental hazard: Not Applicable

Special precautions for user:

Hazard identification (Kemler): Not Applicable

Classification code: Not Applicable

Hazard Label: Not Applicable

Special provisions: Not Applicable

Limited quantity: Not Applicable

Tunnel Restriction Code: Not Applicable

[cont...]

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Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

UN number: Not Applicable
UN proper shipping name: Not Applicable
Transport hazard class(es):
ICAO/IATA Class: Not Applicable
ICAO / IATA Subrisk: Not Applicable
ERG Code: Not Applicable
Packing group: Not Applicable
Environmental hazard: Not Applicable
Special precautions for user:
Special provisions: Not Applicable
Cargo Only Packing Instructions: Not Applicable
Cargo Only Maximum Qty/Pack: Not Applicable
Passenger and Cargo Packing Instructions: Not Applicable
Passenger and Cargo Maximum Qty/Pack: Not Applicable
Passenger and Cargo Limited Quantity Packing Instructions: Not Applicable
Passenger and Cargo Limited Maximum Qty/Pack: Not Applicable

Sea transport (IMDG-Code/GGVSee): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

UN number: Not Applicable
UN proper shipping name: Not Applicable
Transport hazard class(es):
IMDG Class: Not Applicable
IMDG Subrisk: Not Applicable
Packing group: Not Applicable
Environmental hazard: Not Applicable
Special precautions for user:
EMS Number: Not Applicable
Special provisions: Not Applicable
Limited Quantities: Not Applicable

Inland waterways transport (ADN): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

UN number: Not Applicable
UN proper shipping name: Not Applicable
Transport hazard class(es): Not Applicable
Packing group: Not Applicable
Environmental hazard: Not Applicable
Special precautions for user:
Classification code: Not Applicable
Special provisions: Not Applicable
Limited quantity: Not Applicable
Equipment required: Not Applicable
Fire cones number: Not Applicable

[cont...]

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Maritime transport in bulk according to IMO instruments:

Transport in bulk according to Annex II of MARPOL and the IBC code:

Product name	Pollution Category	Ship Type
Oxygenated aliphatic hydrocarbon mixture	Z	3

Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code:

Product name	Group
DL-MALIC ACID	Not Available

Transport in bulk in accordance with the IGC Code:

Product name	Ship Type
DL-MALIC ACID	Not Available

15. REGULATORY INFORMATION

Safety, health and environmental regulations / legislation specific for the substance or mixture:

DL-MALIC ACID is found on the following regulatory lists:

UK REACH grandfathered registrations notified substances list.

This safety data sheet is in compliance with the following EU legislation and its adaptations – as far as applicable - Directives 98/24/EC, 92/85/EEC, 94/33/EC, 2008/98/EC, 2010/75/EU. Commission Regulation (EU) 2020/878; Regulation (EC) No 1272/2008 as updated through ATPs.

Information according to 2012/18/EU (Seveso III):

Seveso Category: Not Available.

Chemical safety assessment: For further information please look at the Chemical Safety Assessment and Exposure Scenarios prepared by your Supply Chain if available.

National Inventory Status:

National Inventory	Status
Australia - AIIC / Australia Non-Industrial Use	No (DL-MALIC ACID)
Canada - DSL	Yes
Canada - NDSL	No (DL-MALIC ACID)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	Yes
Korea - KECI	Yes
New Zealand - NZIoC	No (DL-MALIC ACID)
Philippines - PICCS	No (DL-MALIC ACID)
USA - TSCA	No (DL-MALIC ACID)
Taiwan – TCSI	Yes
Mexico - INSQ	No (DL-MALIC ACID)
Vietnam - NCI	Yes
Russia - FBEPH	No (DL-MALIC ACID)

[cont...]

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Legend:

Yes = All CAS declared ingredients are on the inventory.

No = One or more of the CAS listed ingredients are not on the inventory.

These ingredients may be exempt or will require registration.

Note:

The regulatory information given above only indicates the principal regulations specifically applicable to the product described in the safety data sheet. The user's attention is drawn to the possible existence of additional provisions which complete these regulations. Refer to all applicable national, international and local regulations or provisions.

16. OTHER INFORMATION

Definitions and abbreviations:

PC-TWA: Permissible Concentration-Time Weighted Average

PC-STEL: Permissible Concentration-Short Term Exposure Limit

IARC: International Agency for Research on Cancer

ACGIH: American Conference of Governmental Industrial Hygienists

STEL: Short Term Exposure Limit

TEEL: Temporary Emergency Exposure Limit.

IDLH: Immediately Dangerous to Life or Health Concentrations

ES: Exposure Standard

OSF: Odour Safety Factor

NOAEL :No Observed Adverse Effect Level

LOAEL: Lowest Observed Adverse Effect Level

TLV: Threshold Limit Value

LOD: Limit Of Detection

OTV: Odour Threshold Value

BCF: BioConcentration Factors

BEI: Biological Exposure Index

AIIIC: Australian Inventory of Industrial Chemicals

DSL: Domestic Substances List

NDSL: Non-Domestic Substances List

IECSC: Inventory of Existing Chemical Substance in China

EINECS: European Inventory of Existing Commercial chemical Substances

ELINCS: European List of Notified Chemical Substances

NLP: No-Longer Polymers

ENCS: Existing and New Chemical Substances Inventory

KECI: Korea Existing Chemicals Inventory

NZIoC: New Zealand Inventory of Chemicals

PICCS: Philippine Inventory of Chemicals and Chemical Substances

TSCA: Toxic Substances Control Act

TCSI: Taiwan Chemical Substance Inventory

INSQ: Inventario Nacional de Sustancias Químicas

NCI: National Chemical Inventory

FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

[cont...]

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Legal disclaimer:

The information contained in this SDS does not constitute a risk assessment, and should not replace the user's own assessment of risks as required by other health and safety legislation. This advice is given by Nexchem Ltd who accept no legal liability for it except otherwise provided by law. The information contained herein is based on the present state of our knowledge and is intended to describe our products from the point of view of safety requirements. It should not therefore be construed as guaranteeing specific properties.