

FUMARIC ACID

FUM

CAUTIONARY RESPONSE INFORMATION

Common Synonyms Allomaleic acid Boletic acid trans-Butenedioic acid trans-1,2-Ethylenedicarboxylic acid Lichenic acid	Solid White Odorless Sinks and mixes with water.
<p>Keep people away. Avoid inhalation. Shut off ignition sources. Call fire department. Avoid contact with solid and dust. Notify local health and pollution control agencies. Protect water intakes.</p>	
Fire	Combustible. Dust cloud may explode if ignited in an enclosed area. Irritating gases may be produced when heated. Extinguish with water, dry chemical, foam, or carbon dioxide.
Exposure	CALL FOR MEDICAL AID. DUST Irritating to eyes, nose and throat. If inhaled will cause coughing or difficult breathing. If in eyes, hold eyelids open and flush with plenty of water. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. SOLID Irritating to skin and eyes. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water.
Water Pollution	Effect of low concentrations on aquatic life is unknown. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.

1. CORRECTIVE RESPONSE ACTIONS

Dilute and disperse
Stop discharge
Chemical and Physical Treatment:
Neutralize

2. CHEMICAL DESIGNATIONS

2.1 **CG Compatibility Group:** Not listed.
2.2 **Formula:** HO₂CCH = CHCO₂H
2.3 **IMO/UN Designation:** Not listed
2.4 **DOT ID No.:** 9126
2.5 **CAS Registry No.:** 110-17-8
2.6 **NAERG Guide No.:** 171
2.7 **Standard Industrial Trade Classification:** 51385

3. HEALTH HAZARDS

3.1 **Personal Protective Equipment:** Dust mask; gloves; safety glasses; dust cap
3.2 **Symptoms Following Exposure:** Inhalation of dust may cause respiratory irritation. Compound is non-toxic when ingested. Prolonged contact with eyes or skin may cause irritation.
3.3 **Treatment of Exposure:** INHALATION: move to fresh air. EYES: flush with water; get medical attention if irritation persists. SKIN: flush with water.
3.4 **TLV-TWA:** Not listed.
3.5 **TLV-STEL:** Not listed.
3.6 **TLV-Ceiling:** Not listed.
3.7 **Toxicity by Ingestion:** Currently not available
3.8 **Toxicity by Inhalation:** Currently not available.
3.9 **Chronic Toxicity:** Currently not available
3.10 **Vapor (Gas) Irritant Characteristics:** Currently not available
3.11 **Liquid or Solid Characteristics:** Currently not available
3.12 **Odor Threshold:** Odorless
3.13 **IDLH Value:** Not listed.
3.14 **OSHA PEL-TWA:** Not listed.
3.15 **OSHA PEL-STEL:** Not listed.
3.16 **OSHA PEL-Ceiling:** Not listed.
3.17 **EPA AEGL:** Not listed

4. FIRE HAZARDS

4.1 **Flash Point:** Not pertinent
4.2 **Flammable Limits in Air:** Not pertinent
4.3 **Fire Extinguishing Agents:** Water spray, dry chemical, foam, carbon dioxide
4.4 **Fire Extinguishing Agents Not to Be Used:** Currently not available
4.5 **Special Hazards of Combustion Products:** Irritating fumes of maleic anhydride may form in fires.
4.6 **Behavior in Fire:** Dust presents explosion hazard; knock down dust with water fog.
4.7 **Auto Ignition Temperature:** 1364°F (powder)
4.8 **Electrical Hazards:** Not pertinent
4.9 **Burning Rate:** Not pertinent
4.10 **Adiabatic Flame Temperature:** Currently not available
4.11 **Stoichiometric Air to Fuel Ratio:** 14.3 (calc.)
4.12 **Flame Temperature:** Currently not available
4.13 **Combustion Molar Ratio (Reactant to Product):** 6.0 (calc.)
4.14 **Minimum Oxygen Concentration for Combustion (MOCC):** Not listed

5. CHEMICAL REACTIVITY

5.1 **Reactivity with Water:** No reaction
5.2 **Reactivity with Common Materials:** Currently not available
5.3 **Stability During Transport:** Stable
5.4 **Neutralizing Agents for Acids and Caustics:** Not pertinent
5.5 **Polymerization:** Not pertinent
5.6 **Inhibitor of Polymerization:** Not pertinent

6. WATER POLLUTION

6.1 **Aquatic Toxicity:** Currently not available
6.2 **Waterfowl Toxicity:** Currently not available
6.3 **Biological Oxygen Demand (BOD):** 61%, 5 days
6.4 **Food Chain Concentration Potential:** None
6.5 **GESAMP Hazard Profile:** Not listed

7. SHIPPING INFORMATION

7.1 **Grades of Purity:** Technical; Purified food grade
7.2 **Storage Temperature:** Ambient
7.3 **Inert Atmosphere:** No requirement
7.4 **Venting:** Open
7.5 **IMO Pollution Category:** Currently not available
7.6 **Ship Type:** Currently not available
7.7 **Barge Hull Type:** Currently not available

8. HAZARD CLASSIFICATIONS

8.1 **49 CFR Category:** Not listed.
8.2 **49 CFR Class:** Not pertinent
8.3 **49 CFR Package Group:** Not listed.
8.4 **Marine Pollutant:** No
8.5 **NFPA Hazard Classification:** Not listed
8.6 **EPA Reportable Quantity:** 5000 pounds
8.7 **EPA Pollution Category:** D
8.8 **RCRA Waste Number:** Not listed
8.9 **EPA FWPCA List:** Yes

9. PHYSICAL & CHEMICAL PROPERTIES

9.1 **Physical State at 15° C and 1 atm:** Solid
9.2 **Molecular Weight:** 116.07
9.3 **Boiling Point at 1 atm:** Very high
9.4 **Freezing Point:** Not pertinent
9.5 **Critical Temperature:** Not pertinent
9.6 **Critical Pressure:** Not pertinent
9.7 **Specific Gravity:** 1.635 at 20°C (solid)
9.8 **Liquid Surface Tension:** Not pertinent
9.9 **Liquid Water Interfacial Tension:** Not pertinent
9.10 **Vapor (Gas) Specific Gravity:** Not pertinent
9.11 **Ratio of Specific Heats of Vapor (Gas):** Not pertinent
9.12 **Latent Heat of Vaporization:** Not pertinent
9.13 **Heat of Combustion:** -4,970 Btu/lb = -2,760 cal/g = -116 X 10⁵ J/kg
9.14 **Heat of Decomposition:** Not pertinent
9.15 **Heat of Solution:** Not pertinent
9.16 **Heat of Polymerization:** Not pertinent
9.17 **Heat of Fusion:** Currently not available
9.18 **Limiting Value:** Currently not available
9.19 **Reid Vapor Pressure:** Currently not available

NOTES

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9.20 SATURATED LIQUID DENSITY		9.21 LIQUID HEAT CAPACITY		9.22 LIQUID THERMAL CONDUCTIVITY		9.23 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit inch per hour-square foot-F	Temperature (degrees F)	Centipoise
	N O T P E R T I N E N T		N O T P E R T I N E N T		N O T P E R T I N E N T		N O T P E R T I N E N T

9.24 SOLUBILITY IN WATER		9.25 SATURATED VAPOR PRESSURE		9.26 SATURATED VAPOR DENSITY		9.27 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
77	0.700		N O T P E R T I N E N T		N O T P E R T I N E N T		N O T P E R T I N E N T