

CITRIC ACID

CIT

CAUTIONARY RESPONSE INFORMATION

Common Synonyms 2-Hydroxy-1,2,3-propane-tricarboxylic acid beta-Hydroxytricarballic acid beta-Hydroxy-tricarboxylic acid		Solid	White	Odorless
Sinks and mixes in water.				
Keep people away. Avoid contact with solid and dust. Call fire department. Notify local health and pollution control agencies.				
Fire	Combustible. Extinguish with dry chemicals, water, 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. Harmful if swallowed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.			
Water Pollution	Dangerous to aquatic life in high concentrations. 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

2. CHEMICAL DESIGNATIONS

- 2.1 CG Compatibility Group: Not listed.
- 2.2 Formula: $\text{HOC}(\text{CH}_2\text{CO}_2\text{H})_2\text{CO}_2\text{H}$
- 2.3 IMO/UN Designation: Not listed
- 2.4 DOT ID No.: Not listed
- 2.5 CAS Registry No.: 77-92-9
- 2.6 NAERG Guide No.: Not listed
- 2.7 Standard Industrial Trade Classification: 51391

3. HEALTH HAZARDS

- 3.1 Personal Protective Equipment: Dust mask; goggles or face shield; protective gloves
- 3.2 Symptoms Following Exposure: Inhalation of dust irritates nose and throat. Contact with eyes causes irritation.
- 3.3 Treatment of Exposure: INHALATION: move to fresh air. EYES: flush immediately with physiological saline or water; get medical care 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: Grade 1; oral $\text{LD}_{50} = 11.7 \text{ g/kg}$ (rat)
- 3.8 Toxicity by Inhalation: Currently not available.
- 3.9 Chronic Toxicity: Chronic effects in humans are unknown
- 3.10 Vapor (Gas) Irritant Characteristics: Not pertinent
- 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 (combustible solid)
- 4.2 Flammable Limits in Air: 0.28-2.29 kg/m³ (dust)
- 4.3 Fire Extinguishing Agents: Water, foam, dry chemical, carbon dioxide
- 4.4 Fire Extinguishing Agents Not to Be Used: Currently not available
- 4.5 Special Hazards of Combustion Products: Currently not available
- 4.6 Behavior in Fire: Melts and decomposes. The reaction is not hazardous.
- 4.7 Auto Ignition Temperature: 1,850°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: 21.4 (calc.)
- 4.12 Flame Temperature: Currently not available
- 4.13 Combustion Molar Ratio (Reactant to Product): 10.0 (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: Will corrode copper, zinc, aluminum and their alloys.
- 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: 894 ppm/4 hr/goldfish/killed/fresh water
160 ppm/48 hr/shore crab/TL₅₀/salt water
- 6.2 Waterfowl Toxicity: Currently not available
- 6.3 Biological Oxygen Demand (BOD): 40%, 5 days; 60%, 10-20 days
- 6.4 Food Chain Concentration Potential: None
- 6.5 GESAMP Hazard Profile:
 Bioaccumulation: 0
 Damage to living resources: 1/BOD
 Human Oral hazard: 0
 Human Contact hazard: 0
 Reduction of amenities: 0

7. SHIPPING INFORMATION

- 7.1 Grades of Purity: USP; Reagent; Monohydrate 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: Not listed.
- 8.7 EPA Pollution Category: Not listed.
- 8.8 RCRA Waste Number: Not listed
- 8.9 EPA FWPCA List: Not listed

9. PHYSICAL & CHEMICAL PROPERTIES

- 9.1 Physical State at 15° C and 1 atm: Solid
- 9.2 Molecular Weight: 192.1
- 9.3 Boiling Point at 1 atm: Not pertinent (decomposes)
- 9.4 Freezing Point: 307°F = 153°C = 426°K
- 9.5 Critical Temperature: Not pertinent
- 9.6 Critical Pressure: Not pertinent
- 9.7 Specific Gravity: 1.54 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: -4,000 Btu/lb = -2,220 cal/g = -93.0 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
34	98.370		N O T		N O T		N O T
36	101.099		P E R T I N E N T		P E R T I N E N T		P E R T I N E N T
38	103.900						
40	106.700						
42	109.500						
44	112.299						
46	115.000						
48	117.799						
50	120.599						
52	123.400						
54	126.099						
56	128.900						
58	131.699						
60	134.500						
62	137.299						
64	140.000						
66	142.799						
68	145.599						
70	148.400						
72	151.099						
74	153.900						
76	156.699						
78	159.500						
80	162.299						
82	165.000						
84	167.799						