1,4-BUTANEDIOL

BDO

CAUTIONARY RESPONSE INFORMATION

Common Synonyms
1,4-Butylene glycol
1,4-Dihydroxybutane
Tetramethylene glycol

Thick liquid Colorless Odorless

Sinks and mixes with water. Freezing point is 68°F.

Call fire department.
Notify local health and pollution control agencies.
Protect water intakes.

Fire

Combustible.
Extinguish with dry chemical, alcohol foam, or carbon dioxide.
Water may be ineffective on fire.

Exposure

CALL FOR MEDICAL AID.

LIQUID OR SOLID
Irritating to skin or eyes.
Harmful if swallowed.
Flush affected areas with plenty of water.
IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk.

Water Pollution

Effect of low concentrations on aquatic life is unknown.
May be dangerous if it enters water intakes.
Notify local health and pollution control 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: $HOCH_2(CH_2)_2CH_2OH$
2.3 IMO/UN Designation: 3.3/1987
2.4 DOT ID No.: Not listed
2.5 CAS Registry No.: 110-63-4
2.6 NAERG Guide No.: Not listed.
2.7 Standard Industrial Trade Classification: 51299

3. HEALTH HAZARDS

3.1 Personal Protective Equipment: Eye protection; chemical protective gloves and clothing.
3.2 Symptoms Following Exposure: Slight irritation to eyes and skin. Depressant if ingested.
3.3 Treatment of Exposure: EYES: flush with water for 15 minutes. SKIN: wash with soap and 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 2; LD_{50} = 0.5 to 5 g/kg (rat)
3.8 Toxicity by Inhalation: Currently not available.
3.9 Chronic Toxicity: None
3.10 Vapor (Gas) Irritant Characteristics: None
3.11 Liquid or Solid Characteristics: None
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: > 250°F O.C.
4.2 Flammable Limits in Air: Currently not available
4.3 Fire Extinguishing Agents: Alcohol foam, dry chemical or carbon dioxide
4.4 Fire Extinguishing Agents Not to Be Used: Water or foam may cause frothing
4.5 Special Hazards of Combustion Products: Not pertinent
4.6 Behavior in Fire: Not pertinent
4.7 Auto Ignition Temperature: 756°F
4.8 Electrical Hazards: Not pertinent
4.9 Burning Rate: Currently not available
4.10 Adiabatic Flame Temperature: Currently not available
4.11 Stoichometric Air to Fuel Ratio: 26.2 (calc.)
4.12 Flame Temperature: Currently not available
4.13 Combustion Molar Ratio (Reactant to Product): 9.0 (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: Avoid contact with strong oxidizers.
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): Currently not available
6.4 Food Chain Concentration Potential: None
6.5 GESAMP Hazard Profile: Not listed

7. SHIPPING INFORMATION

7.1 Grades of Purity: Regular grade: 99% Anhydrous grade: 99.3%
7.2 Storage Temperature: Ambient.
7.3 Inert Atmosphere: Currently not available
7.4 Venting: Currently not available
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:

Category	Classification
Health Hazard (Blue).....	1
Flammability (Red).....	1
Instability (Yellow).....	0

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: Liquid
9.2 Molecular Weight: 90.12
9.3 Boiling Point at 1 atm: 442°F = 228°C = 501°K
9.4 Freezing Point: 68.2°F = 20.1°C = 293.3°K
9.5 Critical Temperature: 716.0°F = 380°C = 653.2°K
9.6 Critical Pressure: 720 psia = 49 atm = 5.0 MN/m^2
9.7 Specific Gravity: 1.017 at 20°C (liquid)
9.8 Liquid Surface Tension: Not pertinent
9.9 Liquid Water Interfacial Tension: Not pertinent
9.10 Vapor (Gas) Specific Gravity: 3.1
9.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent
9.12 Latent Heat of Vaporization: Not pertinent
9.13 Heat of Combustion: (est.) –11,900 Btu/lb = –6630 cal/g = –277 X 10^5 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
70	63.400	85	0.537	75	1.427		N
75	63.230	90	0.545	80	1.427		O
80	63.060	95	0.552	85	1.428		T
85	62.880	100	0.560	90	1.428		
90	62.710	105	0.567	95	1.429		P
95	62.540	110	0.575	100	1.429		E
100	62.360	115	0.582	105	1.430		R
105	62.190	120	0.590	110	1.430		T
110	62.020	125	0.597	115	1.431		I
115	61.840	130	0.605	120	1.431		N
120	61.670	135	0.612	125	1.432		E
125	61.500	140	0.620	130	1.432		N
130	61.320	145	0.627	135	1.432		T
135	61.150	150	0.635	140	1.433		
140	60.980			145	1.433		
145	60.800			150	1.434		
150	60.630			155	1.434		
155	60.460			160	1.435		
160	60.280			165	1.435		
165	60.110			170	1.436		
170	59.940			175	1.436		
175	59.760			180	1.437		
				185	1.437		
				190	1.438		
				195	1.438		
				200	1.438		

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
	M	75	0.000	75	0.00000		N
	I	80	0.000	80	0.00000		O
	S	85	0.000	85	0.00000		T
	C	90	0.000	90	0.00001		
	I	95	0.000	95	0.00001		P
	B	100	0.001	100	0.00001		E
	L	105	0.001	105	0.00001		R
	E	110	0.001	110	0.00001		T
		115	0.001	115	0.00002		I
		120	0.001	120	0.00002		N
		125	0.002	125	0.00002		E
		130	0.002	130	0.00003		N
		135	0.003	135	0.00004		T
		140	0.003	140	0.00005		
		145	0.004	145	0.00006		
		150	0.005	150	0.00007		