1,4-BUTENEDIOL

BUD

CAUTIONARY RESPONSE INFORMATION

Common Synonyms	Thick liquid	Light yellow	Odorless
2-Butene-1, 4-diol cis-2-Butene-1, 4-diol 1,4-Dihydroxy-2-butene	Sinks and mixes with water. Freezing point is 45°F.		

Call fire department.
avoid contact with liquid.
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 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.
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: $HOCH_2CH=CHCH_2OH$
2.3 IMO/UN Designation: 3.3/1987
2.4 DOT ID No.: Not listed
2.5 CAS Registry No.: 110-64-5
2.6 NAERG Guide No.: Not listed.
2.7 Standard Industrial Trade Classification: 51229

3. HEALTH HAZARDS

3.1 Personal Protective Equipment: Eye protection
3.2 Symptoms Following Exposure: Currently not available
3.3 Treatment of Exposure: SKIN OR EYE CONTACT: flush well with water. Consult physician in cases of skin irritation, eye contact, or accidental ingestion.
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
3.8 Toxicity by Inhalation: Currently not available.
3.9 Chronic Toxicity: Currently not available
3.10 Vapor (Gas) Irritant Characteristics: Not pertinent
3.11 Liquid or Solid Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin.
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: 263°F O.C.
4.2 Flammable Limits in Air: Not pertinent
4.3 Fire Extinguishing Agents: Alcohol foam, dry chemical or carbon dioxide
4.4 Fire Extinguishing Agents Not to Be Used: Foam or water may cause frothing.
4.5 Special Hazards of Combustion Products: Not pertinent
4.6 Behavior in Fire: Not pertinent
4.7 Auto Ignition Temperature: Not pertinent
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: 23.8 (calc.)
4.12 Flame Temperature: Currently not available
4.13 Combustion Molar Ratio (Reactant to Product): 8.0 (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: No reaction
5.3 Stability During Transport: Stable
5.4 Neutralizing Agents for Acids and Caustics: Not pertinent
5.5 Polymerization: Stable
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: 95%
7.2 Storage Temperature: Above 45°F
7.3 Inert Atmosphere: Inerted
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: 88.11
9.3 Boiling Point at 1 atm: 453°F = 234°C = 507°K
9.4 Freezing Point: 45°F = 7°C = 280°K
9.5 Critical Temperature: Not pertinent
9.6 Critical Pressure: Not pertinent
9.7 Specific Gravity: 1.07 at 25°C (liquid)
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: (est.) –10,8000 Btu/lb = –5980 cal/g = -250×10^5 J/kg
9.14 Heat of Decomposition: Not pertinent
9.15 Heat of Solution: (est.) 9 Btu/lb = 5 cal/g = 0.2×10^5 J/kg
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
60	67.379	85	0.565		N		N
61	67.349	90	0.570		O		O
62	67.309	95	0.574		T		T
63	67.280	100	0.579				
64	67.240	105	0.584		P		P
65	67.209	110	0.589		E		E
66	67.169	115	0.594		R		R
67	67.139	120	0.599		T		T
68	67.099	125	0.604		I		I
69	67.070	130	0.608		N		N
70	67.030	135	0.613		E		E
71	67.000	140	0.618		N		N
72	66.969	145	0.623		T		T
73	66.929	150	0.628				
74	66.900						
75	66.860						
76	66.830						
77	66.790						
78	66.759						
79	66.719						
80	66.690						
81	66.650						
82	66.620						
83	66.580						
84	66.549						
85	66.509						

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	0.00000		
	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	0.00004		
		145	0.004	145	0.00005		
		150	0.005	150	0.00007		