

# N-BUTYRALDEHYDE

BTR

## CAUTIONARY RESPONSE INFORMATION

<b>Common Synonyms</b> Butaldehyde Butanal Butylaldehyde Butyl aldehyde Butyraldehyde Butyric aldehyde	Watery liquid Colorless Pungent odor  Floats and mixes slowly with water. Flammable, irritating vapor is produced.
<p><b>Restrict access.</b>  <b>Avoid contact with liquid and vapor.</b>  <b>Wear goggles and self-contained breathing apparatus.</b>  <b>Shut off ignition sources and call fire department.</b>  <b>Stay upwind and use water spray to "knock down" vapor.</b>  <b>Notify local health and pollution control agencies.</b>  <b>Protect water intakes.</b></p>	
<b>Fire</b>	<p><b>FLAMMABLE.</b>  Flashback along vapor trail may occur.  Vapor may explode if ignited in an enclosed area.  Wear goggles and self-contained breathing apparatus.  Extinguish with dry chemical, foam or carbon dioxide.  Water may be ineffective on fire.  Cool exposed containers with water.</p>
<b>Exposure</b>	<p>CALL FOR MEDICAL AID.</p> <p><b>VAPOR</b>  Irritating to eyes, nose and throat.  If inhaled, will cause nausea, vomiting, headache or loss of consciousness.  Move to fresh air.  If breathing has stopped, give artificial respiration.  If breathing is difficult, give oxygen.</p> <p><b>LIQUID</b>  Irritating to skin.  Will burn 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.</p>
<b>Water Pollution</b>	<p>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.</p>

### 1. CORRECTIVE RESPONSE ACTIONS

- Dilute and disperse
- Stop discharge
- Contain
- Collection Systems: Skim
- Salvage waterfowl

### 2. CHEMICAL DESIGNATIONS

- 2.1 **CG Compatibility Group:** 19; Aldehyde
- 2.2 **Formula:** CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CHO
- 2.3 **IMO/UN Designation:** 3.2/1129
- 2.4 **DOT ID No.:** 1129
- 2.5 **CAS Registry No.:** 123-72-8
- 2.6 **NAERG Guide No.:** 129
- 2.7 **Standard Industrial Trade Classification:** 51621

### 3. HEALTH HAZARDS

- 3.1 **Personal Protective Equipment:** Protective goggles, gloves, and organic canister gas mask.
- 3.2 **Symptoms Following Exposure:** Inhalation will cause irritation and possibly nausea, vomiting, headache, and loss of consciousness. Contact with eyes causes burns. Skin contact may be irritating.
- 3.3 **Treatment of Exposure:** INHALATION: remove victim to fresh air; if breathing has stopped, give artificial respiration; if breathing is difficult, give oxygen; call a doctor at once. SKIN AND EYES: immediately flush with water for at least 15 min.; get medical care for eyes; remove contaminated clothing and wash underlying skin.
- 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; LD<sub>50</sub> = 5-15 g/kg (rat)
- 3.8 **Toxicity by Inhalation:** Currently not available.
- 3.9 **Chronic Toxicity:** Currently not available
- 3.10 **Vapor (Gas) Irritant Characteristics:** Vapors cause moderate irritation such that personnel will find high concentrations unpleasant. The effect is temporary.
- 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:** 0.0046 ppm
- 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:** 15°F O.C. 20°F C.C.
- 4.2 **Flammable Limits in Air:** 2.5%-10.6%
- 4.3 **Fire Extinguishing Agents:** Dry chemical, carbon dioxide, foam
- 4.4 **Fire Extinguishing Agents Not to Be Used:** Not pertinent
- 4.5 **Special Hazards of Combustion Products:** Not pertinent
- 4.6 **Behavior in Fire:** Vapors are heavier than air and may travel considerable distance to a source of ignition and flash back. Fires are difficult to control due to ease of reignition.
- 4.7 **Auto Ignition Temperature:** 446°F
- 4.8 **Electrical Hazards:** Not pertinent
- 4.9 **Burning Rate:** 4.4 mm/min.
- 4.10 **Adiabatic Flame Temperature:** Currently not available
- 4.11 **Stoichiometric Air to Fuel Ratio:** 26.2 (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:** None
- 5.2 **Reactivity with Common Materials:** None
- 5.3 **Stability During Transport:** Stable
- 5.4 **Neutralizing Agents for Acids and Caustics:** Not pertinent
- 5.5 **Polymerization:** May occur in presence of heat, acids, or alkalis
- 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):** 1.62 lb/lb, 5 days; 106%, 5 days (theor.)
- 6.4 **Food Chain Concentration Potential:** Currently not available
- 6.5 **GESAMP Hazard Profile:**  
Bioaccumulation: T  
Damage to living resources: 2  
Human Oral hazard: 1  
Human Contact hazard: 1  
Reduction of amenities: XX

### 7. SHIPPING INFORMATION

- 7.1 **Grades of Purity:** Water saturated: 97%; dry: 99.5%
- 7.2 **Storage Temperature:** Ambient
- 7.3 **Inert Atmosphere:** No requirement
- 7.4 **Venting:** Pressure-vacuum
- 7.5 **IMO Pollution Category:** C
- 7.6 **Ship Type:** 3
- 7.7 **Barge Hull Type:** 3

### 8. HAZARD CLASSIFICATIONS

- 8.1 **49 CFR Category:** Flammable liquid
- 8.2 **49 CFR Class:** 3
- 8.3 **49 CFR Package Group:** II
- 8.4 **Marine Pollutant:** No
- 8.5 **NFPA Hazard Classification:**  

Category	Classification
Health Hazard (Blue)	2
Flammability (Red)	3
Instability (Yellow)	1
- 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:** 72.11
- 9.3 **Boiling Point at 1 atm:** 167°F = 74.8°C = 348.0°K
- 9.4 **Freezing Point:** -142°F = -96.4°C = 176.8°K
- 9.5 **Critical Temperature:** 483.8°F = 251°C = 524.2°K
- 9.6 **Critical Pressure:** 590 psia = 40 atm = 4.1 MN/m<sup>2</sup>
- 9.7 **Specific Gravity:** 0.803 at 20°C (liquid)
- 9.8 **Liquid Surface Tension:** 24.6 dynes/cm = 0.0246 N/m at 20°C
- 9.9 **Liquid Water Interfacial Tension:** 5.7 dynes/cm = 0.0057 N/m at 22.3°C
- 9.10 **Vapor (Gas) Specific Gravity:** 2.5
- 9.11 **Ratio of Specific Heats of Vapor (Gas):** 1.089
- 9.12 **Latent Heat of Vaporization:** 184 Btu/lb = 102 cal/g = 4.27 X 10<sup>5</sup> J/kg
- 9.13 **Heat of Combustion:** -15,210 Btu/lb = -8450 cal/g = -353.8 X 10<sup>6</sup> 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:** 4.8 psia

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
35	51.320	-55	0.486	30	1.077	-35	0.839
40	51.130	-50	0.487	35	1.072	-30	0.805
45	50.940	-45	0.489	40	1.066	-25	0.773
50	50.750	-40	0.490	45	1.060	-20	0.743
55	50.560	-35	0.491	50	1.054	-15	0.715
60	50.370	-30	0.493	55	1.048	-10	0.688
65	50.180	-25	0.494	60	1.042	-5	0.663
70	49.990	-20	0.495	65	1.036	0	0.640
75	49.800	-15	0.497	70	1.031	5	0.618
80	49.610	-10	0.498	75	1.025	10	0.597
85	49.410	-5	0.500	80	1.019	15	0.577
90	49.220	0	0.501	85	1.013	20	0.558
95	49.030	5	0.502	90	1.007	25	0.540
100	48.840	10	0.504	95	1.001	30	0.523
105	48.650	15	0.505	100	0.995	35	0.507
110	48.460	20	0.507	105	0.989	40	0.492
115	48.270	25	0.508	110	0.983	45	0.478
120	48.080	30	0.509	115	0.978	50	0.464
125	47.890	35	0.511	120	0.972	55	0.451
130	47.700	40	0.512	125	0.966	60	0.438
135	47.510	45	0.514	130	0.960	65	0.426
140	47.320	50	0.515	135	0.954	70	0.415
		55	0.516	140	0.948	75	0.404
		60	0.518			80	0.393
		65	0.519			85	0.383
		70	0.520			90	0.374

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	7.100	0	0.378	0	0.00553	0	0.304
		10	0.527	10	0.00754	25	0.316
		20	0.723	20	0.01013	50	0.328
		30	0.977	30	0.01340	75	0.340
		40	1.301	40	0.01749	100	0.351
		50	1.710	50	0.02254	125	0.362
		60	2.221	60	0.02870	150	0.374
		70	2.851	70	0.03615	175	0.384
		80	3.620	80	0.04506	200	0.395
		90	4.552	90	0.05563	225	0.406
		100	5.670	100	0.06806	250	0.416
		110	7.001	110	0.08256	275	0.426
		120	8.573	120	0.09935	300	0.436
		130	10.420	130	0.11860	325	0.446
		140	12.560	140	0.14070	350	0.456
		150	15.040	150	0.16570	375	0.466
		160	17.900	160	0.19400	400	0.475
		170	21.160	170	0.22570	425	0.484
		180	24.870	180	0.26120	450	0.493
		190	29.070	190	0.30060	475	0.502
		200	33.800	200	0.34420	500	0.511
		210	39.100	210	0.39220	525	0.519
						550	0.528
						575	0.536
						600	0.544