

# ISO-BUTYRALDEHYDE

BAD

CAUTIONARY RESPONSE INFORMATION				4. FIRE HAZARDS	7. SHIPPING INFORMATION							
<b>Common Synonyms</b> Isobutylaldehyde Isobutyraldehyde Isobutyric aldehyde 2-Methylpropanal	Watery liquid  Colorless  Pleasant gasoline-like odor  Floats and mixes slowly with water. Flammable, irritating vapor is produced.	Restrict access. Avoid contact with liquid and vapor. Wear goggles and self-contained breathing apparatus. Shut off ignition sources and call fire department. Stay upwind and use water spray to "knock down" vapor. Notify local health and pollution control agencies. Protect water intakes.	<b>4. FIRE HAZARDS</b> 4.1 Flash Point: 13°F O.C. -40°F C.C. 4.2 Flammable Limits in Air: 2.0%-10.0% 4.3 Fire Extinguishing Agents: Foam, dry chemical or carbon dioxide 4.4 Fire Extinguishing Agents Not to Be Used: Currently not available 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: 385°F 4.8 Electrical Hazards: Not pertinent 4.9 Burning Rate: 4.8 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	<b>7. SHIPPING INFORMATION</b> 7.1 Grades of Purity: Dry grade: 98.0% wet grade: 96.0%; commercial: 97% 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								
<b>Fire</b>  FLAMMABLE. 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.	<b>Exposure</b>  CALL FOR MEDICAL AID.  <b>VAPOR</b> Irritating to eyes, nose and throat. If inhaled, will cause difficult breathing. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.  <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.	<b>8. HAZARD CLASSIFICATIONS</b> 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: <table> <thead> <tr> <th>Category</th> <th>Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue)</td> <td>2</td> </tr> <tr> <td>Flammability (Red)</td> <td>3</td> </tr> <tr> <td>Instability (Yellow)</td> <td>1</td> </tr> </tbody> </table> 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	Category	Classification	Health Hazard (Blue)	2	Flammability (Red)	3	Instability (Yellow)	1	<b>5. CHEMICAL REACTIVITY</b> 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: Not pertinent 5.6 Inhibitor of Polymerization: Not pertinent	<b>9. PHYSICAL &amp; CHEMICAL PROPERTIES</b> 9.1 Physical State at 15° C and 1 atm: Liquid 9.2 Molecular Weight: 72.11 9.3 Boiling Point at 1 atm: 147°F = 64.1°C = 337.3°K 9.4 Freezing Point: -112°F = -80°C = 193°K 9.5 Critical Temperature: 464.0°F = 240°C = 513.2°K 9.6 Critical Pressure: 600 psia = 41 atm = 4.2 MN/m² 9.7 Specific Gravity: 0.791 at 20°C (liquid) 9.8 Liquid Surface Tension: 22.0 dynes/cm = 0.0220 N/m at 24°C 9.9 Liquid Water Interfacial Tension: 7.2 dynes/cm = 0.0072 N/m at 22.7°C 9.10 Vapor (Gas) Specific Gravity: 2.5 9.11 Ratio of Specific Heats of Vapor (Gas): 1.093 9.12 Latent Heat of Vaporization: 180 Btu/lb = 98 cal/g = 4.1 X 10³ J/kg 9.13 Heat of Combustion: -13,850 Btu/lb = -7693 cal/g = -322.1 X 10⁶ 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: 5.0 psia
Category	Classification											
Health Hazard (Blue)	2											
Flammability (Red)	3											
Instability (Yellow)	1											
<b>1. CORRECTIVE RESPONSE ACTIONS</b> Dilute and disperse Stop discharge Contain Collection Systems: Skim Salvage waterfowl	<b>2. CHEMICAL DESIGNATIONS</b> 2.1 CG Compatibility Group: 19; Aldehydes 2.2 Formula: (CH <sub>3</sub> ) <sub>2</sub> CHCHO 2.3 IMO/UN Designation: 3.2/2045 2.4 DOT ID No.: 1129 2.5 CAS Registry No.: 78-84-2 2.6 NAERG Guide No.: 129 2.7 Standard Industrial Trade Classification: 51621	<b>3. HEALTH HAZARDS</b> 3.1 Personal Protective Equipment: Appropriate protective clothing, including rubber gloves, rubber shoes and protective eyewear. 3.2 Symptoms Following Exposure: Vapor is irritating to the eyes and mucous membranes. 3.3 Treatment of Exposure: EYES: immediately flush with plenty of water for at least 15 min. 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 <sub>50</sub> = 0.5 to 5 mg/kg 3.8 Toxicity by Inhalation: Currently not available. 3.9 Chronic Toxicity: Currently not available 3.10 Vapor (Gas) Irritant Characteristics: Vapors cause a 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: 0.047 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 A EGL: Not listed	<b>6. WATER POLLUTION</b> 6.1 Aquatic Toxicity: Currently not available 6.2 Waterfowl Toxicity: Currently not available 6.3 Biological Oxygen Demand (BOD): 162 lb/lb in 5 days 6.4 Food Chain Concentration Potential: None 6.5 GESAMP Hazard Profile: Bioaccumulation: T Damage to living resources: 2 Human Oral hazard: Human Contact hazard: Reduction of amenities: I	<b>NOTES</b>								

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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	50.570	-55	0.486	99	0.879	45	0.563
40	50.380	-50	0.487	100	0.878	50	0.542
45	50.190	-45	0.489	101	0.877	55	0.522
50	50.000	-40	0.490	102	0.876	60	0.504
55	49.810	-35	0.491	103	0.875	65	0.486
60	49.620	-30	0.493	104	0.874	70	0.469
65	49.430	-25	0.494	105	0.873	75	0.454
70	49.240	-20	0.495	106	0.872	80	0.439
75	49.050	-15	0.497	107	0.871	85	0.425
80	48.860	-10	0.498	108	0.870	90	0.411
85	48.670	-5	0.500	109	0.869	95	0.398
90	48.470	0	0.501	110	0.868	100	0.386
95	48.280	5	0.502	111	0.867	105	0.374
100	48.090	10	0.504	112	0.866	110	0.363
105	47.900	15	0.505	113	0.865	115	0.353
110	47.710	20	0.507	114	0.864		
115	47.520	25	0.508	115	0.863		
120	47.330	30	0.509	116	0.862		
125	47.140	35	0.511	117	0.861		
130	46.950	40	0.512	118	0.860		
135	46.760	45	0.513	119	0.859		
140	46.570	50	0.515	120	0.858		
		55	0.516	121	0.857		
		60	0.518	122	0.856		
		65	0.519	123	0.855		
		70	0.520	124	0.854		

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
68	6.500	40	1.242	40	0.01670	0	0.288
		50	1.649	50	0.02173	25	0.301
		60	2.160	60	0.02792	50	0.314
		70	2.794	70	0.03544	75	0.326
		80	3.574	80	0.04449	100	0.339
		90	4.523	90	0.05527	125	0.351
		100	5.666	100	0.06800	150	0.363
		110	7.031	110	0.08291	175	0.374
		120	8.648	120	0.10020	200	0.386
		130	10.550	130	0.12020	225	0.397
		140	12.770	140	0.14300	250	0.408
		150	15.340	150	0.16900	275	0.419
		160	18.300	160	0.19840	300	0.430
		170	21.690	170	0.23140	325	0.441
		180	25.550	180	0.26830	350	0.451
		190	29.920	190	0.30930	375	0.461
		200	34.840	200	0.35480	400	0.471
		210	40.360	210	0.40480	425	0.481
						450	0.491
						475	0.500
						500	0.509
						525	0.518
						550	0.527
						575	0.536
						600	0.545