

ISOVALERALDEHYDE

IVA

CAUTIONARY RESPONSE INFORMATION				4. FIRE HAZARDS	7. SHIPPING INFORMATION
Common Synonyms Isovaleral Isovaleric aldehyde 3-Methylbutanal 3-Methylbutyraldehyde	Liquid Floats on water. Flammable, irritating vapor is produced.	Colorless 	Weak suffocating odor 	4.1 Flash Point: (est.) 55°F O.C. 4.2 Flammable Limits in Air: Currently not available 4.3 Fire Extinguishing Agents: Dry chemical, foam, carbon dioxide 4.4 Fire Extinguishing Agents Not to Be Used: Water may be ineffective. 4.5 Special Hazards of Combustion Products: Not pertinent 4.6 Behavior in Fire: Not pertinent 4.7 Auto Ignition Temperature: Currently not available 4.8 Electrical Hazards: Currently not available 4.9 Burning Rate: 5.3 mm/min. 4.10 Adiabatic Flame Temperature: Currently not available 4.11 Stoichiometric Air to Fuel Ratio: 33.3 (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	7.1 Grades of Purity: Commercial 7.2 Storage Temperature: Ambient 7.3 Inert Atmosphere: No requirement 7.4 Venting: Open (flame arrester) 7.5 IMO Pollution Category: C 7.6 Ship Type: 3 7.7 Barge Hull Type: 3
Fire Exposure Water Pollution	FLAMMABLE. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Extinguish with dry chemicals, foam or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water. Call for medical aid. VAPOR Irritating to eyes, nose and throat. If inhaled will cause headache, nausea, vomiting or difficult breathing. Move victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. LIQUID Irritating to skin and eyes. Harmful if swallowed. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. Effect of low concentrations on aquatic life is unknown. Fouling to shoreline. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.	4.6 Behavior in Fire: Not pertinent 4.7 Auto Ignition Temperature: Currently not available 4.8 Electrical Hazards: Currently not available 4.9 Burning Rate: 5.3 mm/min. 4.10 Adiabatic Flame Temperature: Currently not available 4.11 Stoichiometric Air to Fuel Ratio: 33.3 (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	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: 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	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: 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	
1. CORRECTIVE RESPONSE ACTIONS Stop discharge Contain Collection Systems: Skim Chemical and Physical Treatment: Burn; Absorb Clean shore line Salvage waterfowl	2. CHEMICAL DESIGNATIONS 2.1 CG Compatibility Group: 19; Aldehyde 2.2 Formula: $(\text{CH}_3)_2\text{CHCH}_2\text{CHO}$ 2.3 IMO/UN Designation: 3.2/1989 2.4 DOT ID No.: 1989 2.5 CAS Registry No.: Currently not available 2.6 NAERG Guide No.: 129 2.7 Standard Industrial Trade Classification: 51621	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	9. PHYSICAL & CHEMICAL PROPERTIES 9.1 Physical State at 15°C and 1 atm: Liquid 9.2 Molecular Weight: 86.1 9.3 Boiling Point at 1 atm: 198.5°F = 92.5°C = 365.7°K 9.4 Freezing Point: -60°F = -51°C = 222°K 9.5 Critical Temperature: Not pertinent 9.6 Critical Pressure: Not pertinent 9.7 Specific Gravity: 0.785 at 20°C (liquid) 9.8 Liquid Surface Tension: 23.7 dynes/cm = 0.0237 N/m at 20°C 9.9 Liquid Water Interfacial Tension: (est.) 30 dynes/cm = 0.030 N/m at 20°C 9.10 Vapor (Gas) Specific Gravity: 3 9.11 Ratio of Specific Heats of Vapor (Gas): (est.) 1.0736 9.12 Latent Heat of Vaporization: (est.) 167 Btu/lb = 93 cal/g = 3.9 X 10³ J/kg 9.13 Heat of Combustion: -15,500 Btu/lb = -8,620 cal/g = -360 X 10³ 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	9. PHYSICAL & CHEMICAL PROPERTIES 9.1 Physical State at 15°C and 1 atm: Liquid 9.2 Molecular Weight: 86.1 9.3 Boiling Point at 1 atm: 198.5°F = 92.5°C = 365.7°K 9.4 Freezing Point: -60°F = -51°C = 222°K 9.5 Critical Temperature: Not pertinent 9.6 Critical Pressure: Not pertinent 9.7 Specific Gravity: 0.785 at 20°C (liquid) 9.8 Liquid Surface Tension: 23.7 dynes/cm = 0.0237 N/m at 20°C 9.9 Liquid Water Interfacial Tension: (est.) 30 dynes/cm = 0.030 N/m at 20°C 9.10 Vapor (Gas) Specific Gravity: 3 9.11 Ratio of Specific Heats of Vapor (Gas): (est.) 1.0736 9.12 Latent Heat of Vaporization: (est.) 167 Btu/lb = 93 cal/g = 3.9 X 10³ J/kg 9.13 Heat of Combustion: -15,500 Btu/lb = -8,620 cal/g = -360 X 10³ 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	
3. HEALTH HAZARDS 3.1 Personal Protective Equipment: Goggles or face shield; rubber gloves; air mask or self-contained breathing apparatus for high vapor concentrations. 3.2 Symptoms Following Exposure: Inhalation causes chest discomfort, nausea, vomiting, and headache. Contact of liquid with eyes or skin causes irritation. Ingestion causes irritation of mouth and stomach. 3.3 Treatment of Exposure: INHALATION: remove victim to fresh air; apply artificial respiration if required; get medical attention. EYES: flush with water for at least 15 min. SKIN: wipe off, wash well with soap and water. INGESTION: induce vomiting; get medical attention. 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; oral LD ₅₀ > 3,200 mg/kg (rat) 3.8 Toxicity by Inhalation: Currently not available. 3.9 Chronic Toxicity: Currently not available 3.10 Vapor (Gas) Irritant Characteristics: Currently not available 3.11 Liquid or Solid Characteristics: Currently not available 3.12 Odor Threshold: Currently not available 3.13IDLH 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	3. HEAT HAZARDS 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: Bioaccumulation: 7 Damage to living resources: 2 Human Oral hazard: I Human Contact hazard: II Reduction of amenities: XX	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	51.060	34	0.431	52	1.048	40	0.687
40	50.750	36	0.432	54	1.048	50	0.635
45	50.440	38	0.433	56	1.048	60	0.589
50	50.130	40	0.434	58	1.048	70	0.547
55	49.810	42	0.436	60	1.048	80	0.510
60	49.500	44	0.437	62	1.048	90	0.477
65	49.190	46	0.438	64	1.048	100	0.447
70	48.880	48	0.439	66	1.048	110	0.419
75	48.560	50	0.440	68	1.048	120	0.395
80	48.250	52	0.441	70	1.048	130	0.372
85	47.940	54	0.442	72	1.048	140	0.352
90	47.630	56	0.443	74	1.048	150	0.333
95	47.320	58	0.444	76	1.048	160	0.316
100	47.000	60	0.446	78	1.048	170	0.300
		62	0.447	80	1.048	180	0.285
		64	0.448	82	1.048	190	0.272
		66	0.449	84	1.048		
		68	0.450	86	1.048		
		70	0.451				
		72	0.452				
		74	0.453				
		76	0.454				
		78	0.456				
		80	0.457				
		82	0.458				
		84	0.459				

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
I		177	10.060	177	0.12670	0	0.301
N		178	10.240	178	0.12880	20	0.311
S		179	10.420	179	0.13090	40	0.322
O		180	10.610	180	0.13310	60	0.332
L		181	10.800	181	0.13520	80	0.343
U		182	10.990	182	0.13740	100	0.353
B		183	11.190	183	0.13960	120	0.363
L		184	11.390	184	0.14190	140	0.372
E		185	11.590	185	0.14420	160	0.382
		186	11.790	186	0.14650	180	0.392
		187	12.000	187	0.14880	200	0.401
		188	12.210	188	0.15120	220	0.411
		189	12.420	189	0.15360	240	0.420
		190	12.640	190	0.15600	260	0.429
		191	12.860	191	0.15850	280	0.438
		192	13.080	192	0.16100	300	0.447
		193	13.300	193	0.16350	320	0.455
		194	13.530	194	0.16600	340	0.464
		195	13.760	195	0.16860	360	0.472
		196	14.000	196	0.17120	380	0.481
		197	14.240	197	0.17390	400	0.489
		198	14.480	198	0.17660	420	0.497
		199	14.720	199	0.17930	440	0.505
		200	14.970	200	0.18200		
		201	15.220	201	0.18480		
		202	15.480	202	0.18760		