

ISOPRENE

IPR

CAUTIONARY RESPONSE INFORMATION

Common Synonyms beta-Methylstyrene 2-Methyl-1, 3-butadiene		Watery liquid	Colorless	Mild odor
Floats on water. Flammable, irritating vapor is formed. Boiling point is 93°F.				
<p>Evacuate. Keep people away. Shut off ignition sources and call fire department. Stay upwind and use water spray to "knock down" vapor. Avoid contact with liquid and vapor. Notify local health and pollution control agencies.</p>				
Fire	<p>FLAMMABLE. Flashback along vapor trail may occur. Containers may explode in fire. Vapor may explode if ignited in an enclosed area. Wear self-contained breathing apparatus. Combat fires from behind barrier or protected location. Extinguish with dry chemical, foam, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>			
Exposure	<p>CALL FOR MEDICAL AID.</p> <p>VAPOR Irritating to eyes, nose and throat. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>LIQUID Irritating to skin and eyes. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water.</p>			
Water Pollution	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>			

1. CORRECTIVE RESPONSE ACTIONS

Stop discharge
 Contain
 Collection Systems: Skim
 Salvage waterfowl

2. CHEMICAL DESIGNATIONS

2.1 **CG Compatibility Group:** 30; Olefin
 2.2 **Formula:** CH₂=C(CH₃)CH=CH₂
 2.3 **IMO/IUN Designation:** 3.1/1218
 2.4 **DOT ID No.:** 1218
 2.5 **CAS Registry No.:** 78-79-5
 2.6 **NAERG Guide No.:** 130P
 2.7 **Standard Industrial Trade Classification:** 51119

3. HEALTH HAZARDS

- 3.1 **Personal Protective Equipment:** Vapor-proof goggles; self-contained breathing apparatus; leather or rubber safety shoes; rubber gloves.
- 3.2 **Symptoms Following Exposure:** Vapor produces no effects other than slight irritation of the eyes and upper respiratory tract. Liquid may irritate eyes; like gasoline.
- 3.3 **Treatment of Exposure:** **INHALATION:** remove victim promptly from irritating or asphyxiating atmosphere; if symptoms of asphyxiation persist, administer artificial respiration and oxygen; treat symptomatically thereafter; call a physician. **EYES:** flush with 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:** Currently not available
- 3.8 **Toxicity by Inhalation:** Currently not available.
- 3.9 **Chronic Toxicity:** None
- 3.10 **Vapor (Gas) Irritant Characteristics:** Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. 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:** 0.005 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:** -65°F C.C.
- 4.2 **Flammable Limits in Air:** 2%-9%
- 4.3 **Fire Extinguishing Agents:** Dry chemical, foam, or carbon dioxide
- 4.4 **Fire Extinguishing Agents Not to Be Used:** Water may be ineffective
- 4.5 **Special Hazards of Combustion Products:** Toxic vapors are generated when heated
- 4.6 **Behavior in Fire:** May polymerize in containers and explode
- 4.7 **Auto Ignition Temperature:** 743°F
- 4.8 **Electrical Hazards:** Class I, Group C
- 4.9 **Burning Rate:** 8.6 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):** 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:** No reaction
- 5.3 **Stability During Transport:** Stable
- 5.4 **Neutralizing Agents for Acids and Caustics:** Not pertinent
- 5.5 **Polymerization:** Polymerization is accelerated by heat and by oxygen, even by the presence of rusty iron. Iron surfaces should be treated with a suitable reducing agent, such as sodium nitrite, before they are placed into isoprene service.
- 5.6 **Inhibitor of Polymerization:** Tertiary butyl catechol (0.06%). Di-n-butylamine, phenyl-beta-naphthyl-amine and phenyl-alpha-naphthylamine are also used. IPR must be inhibited when transported interstate

6. WATER POLLUTION

- 6.1 **Aquatic Toxicity:** 75 ppm/96 hr/fathead minnow/TL₅₀/fresh water
- 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: 0
 Damage to living resources: 2
 Human Oral hazard: 0
 Human Contact hazard: 1
 Reduction of amenities: 0

7. SHIPPING INFORMATION

- 7.1 **Grades of Purity:** Research grade: 99.99%; polymerization grade: 99.8%
- 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:** I
- 8.4 **Marine Pollution:** No
- 8.5 **NFPA Hazard Classification:**
- | Category | Classification |
|---------------------------|----------------|
| Health Hazard (Blue)..... | 2 |
| Flammability (Red)..... | 4 |
| Instability (Yellow)..... | 2 |
- 8.6 **EPA Reportable Quantity:** 100 pounds
- 8.7 **EPA Pollution Category:** B
- 8.8 **RCRA Waste Number:** Not listed
- 8.9 **EPA FWPCA List:** Yes

9. PHYSICAL & CHEMICAL PROPERTIES

- 9.1 **Physical State at 15° C and 1 atm:** Liquid
- 9.2 **Molecular Weight:** 68.12
- 9.3 **Boiling Point at 1 atm:** 93.4°F = 34.1°C = 307.3°K
- 9.4 **Freezing Point:** -230.7°F = -145.9°C = 127.3°K
- 9.5 **Critical Temperature:** 412.0°F = 211.1°C = 484.3°K
- 9.6 **Critical Pressure:** 550 psia = 37.4 atm = 3.79 MN/m²
- 9.7 **Specific Gravity:** 0.681 at 20°C (liquid)
- 9.8 **Liquid Surface Tension:** 16.9 dynes/cm = 0.0169 N/m at 20°C
- 9.9 **Liquid Water Interfacial Tension:** (est.) 40 dynes/cm = 0.04 N/m at 20°C
- 9.10 **Vapor (Gas) Specific Gravity:** 2.3
- 9.11 **Ratio of Specific Heats of Vapor (Gas):** 1.091
- 9.12 **Latent Heat of Vaporization:** 150 Btu/lb = 85 cal/g = 3.6 X 10⁵ J/kg
- 9.13 **Heat of Combustion:** -18,848 Btu/lb = -10,471 cal/g = -438.40 X 10⁵ J/kg
- 9.14 **Heat of Decomposition:** Not pertinent
- 9.15 **Heat of Solution:** Not pertinent
- 9.16 **Heat of Polymerization:** -499 Btu/lb = -277 cal/g = -11.6 X 10⁵ J/kg
- 9.17 **Heat of Fusion:** 16.80 cal/g
- 9.18 **Limiting Value:** Currently not available
- 9.19 **Reid Vapor Pressure:** 15.0 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
0	45.280	0	0.499	-180	1.225	-20	0.370
10	44.860	5	0.501	-170	1.210	-15	0.356
20	44.450	10	0.504	-160	1.195	-10	0.343
30	44.030	15	0.506	-150	1.179	-5	0.331
40	43.610	20	0.509	-140	1.164	0	0.319
50	43.200	25	0.511	-130	1.148	5	0.308
60	42.780	30	0.514	-120	1.133	10	0.298
70	42.360	35	0.516	-110	1.117	15	0.288
80	41.950	40	0.519	-100	1.102	20	0.279
90	41.530	45	0.521	-90	1.087	25	0.270
		50	0.524	-80	1.071	30	0.262
		55	0.526	-70	1.056	35	0.254
		60	0.529	-60	1.040	40	0.246
		65	0.531	-50	1.025	45	0.239
		70	0.534	-40	1.010	50	0.232
		75	0.536	-30	0.994	55	0.226
		80	0.539	-20	0.979	60	0.219
		85	0.541	-10	0.963	65	0.214
		90	0.544	0	0.948	70	0.208
				10	0.933	75	0.202
				20	0.917	80	0.197
				30	0.902	85	0.192
				40	0.886		
				50	0.871		
				60	0.856		
				70	0.840		

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	-70	0.131	-70	0.00213	0	0.313
	N	-60	0.200	-60	0.00317	25	0.327
	S	-50	0.298	-50	0.00461	50	0.341
	O	-40	0.433	-40	0.00655	75	0.354
	L	-30	0.618	-30	0.00913	100	0.367
	U	-20	0.864	-20	0.01247	125	0.380
	B	-10	1.188	-10	0.01676	150	0.393
	L	0	1.606	0	0.02217	175	0.405
	E	10	2.139	10	0.02890	200	0.418
		20	2.809	20	0.03716	225	0.430
		30	3.642	30	0.04720	250	0.441
		40	4.665	40	0.05925	275	0.453
		50	5.909	50	0.07357	300	0.464
		60	7.406	60	0.09044	325	0.475
		70	9.192	70	0.11010	350	0.486
		80	11.300	80	0.13290	375	0.497
						400	0.507
						425	0.517
						450	0.527
						475	0.537
						500	0.547
						525	0.556
						550	0.565
						575	0.574
						600	0.583