

BUTADIENE

BDI

CAUTIONARY RESPONSE INFORMATION

Common Synonyms Biethylene Bivinyli 1,3-Butadiene Divinyli Vinyl ethylene	Liquefied compressed gas Colorless Gasoline-like odor
Floats and boils on water. Flammable visible vapor cloud is produced.	
<p>Restrict access. Avoid contact with liquid and gas. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Shut off ignition sources and call fire department. Evacuate area in case of large discharge. Stay upwind and use water spray to "knock down" vapor. Notify local health and pollution control agencies. Protect water intakes.</p>	
Fire	<p>FLAMMABLE. Containers may explode in fire. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Stop flow of gas if possible. Cool exposed containers and protect men effecting shut-off with water. Let fire burn.</p>
Exposure	<p>CALL FOR MEDICAL AID.</p> <p>VAPOR Irritating to eyes, nose and throat. Move to fresh air.</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>Not harmful to aquatic life. May be dangerous if it enters water intakes. Notify operators of nearby water intakes.</p>

1. CORRECTIVE RESPONSE ACTIONS

Stop discharge
Collection Systems: Skim; Dredge
Salvage waterfowl
Chemical and Physical Treatment: Burn

2. CHEMICAL DESIGNATIONS

2.1 **CG Compatibility Group:** 30; Olefins
2.2 **Formula:** CH₂ = CHCH = CH₂
2.3 **IMO/UN Designation:** 2.0/1010
2.4 **DOT ID No.:** 1010
2.5 **CAS Registry No.:** 106-99-0
2.6 **NAERG Guide No.:** 116P
2.7 **Standard Industrial Trade Classification:** 51113

3. HEALTH HAZARDS

- 3.1 **Personal Protective Equipment:** Chemical-type safety goggles; rescue harness and life line for those entering a tank or enclosed storage space; hose mask with hose inlet in a vapor-free atmosphere; self-contained breathing apparatus; rubber suit.
- 3.2 **Symptoms Following Exposure:** Slight anesthetic effect at high concentrations; causes "frostbite" from skin contact; slight irritation to eyes and nose at high concentrations.
- 3.3 **Treatment of Exposure:** Remove from exposure immediately. Call a physician. **INHALATION:** if breathing is irregular or stopped, start resuscitation, administer oxygen. **SKIN CONTACT:** remove contaminated clothing and wash affected skin area. **EYE CONTACT:** irrigate with water for 15 min.
- 3.4 **TLV-TWA:** 2 ppm
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 because of frostbite.
3.12 **Odor Threshold:** 4 mg/m³
3.13 **IDLH Value:** 2,000 ppm
3.14 **OSHA PEL-TWA:** 1,000 ppm (Proposed value: 2 ppm)
3.15 **OSHA PEL-STEL:** Not listed.
3.16 **OSHA PEL-Ceiling:** Proposed value: 10 ppm
3.17 **EPA AEGL:** Not listed

4. FIRE HAZARDS

- 4.1 **Flash Point:** 105°F (est.)
4.2 **Flammable Limits in Air:** 2.0%-11.5%
4.3 **Fire Extinguishing Agents:** Stop flow of gas
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 heavier than air and may travel a considerable distance to a source of ignition and flashback. Containers may explode in a fire due to polymerization.
4.7 **Auto Ignition Temperature:** 788°F
4.8 **Electrical Hazards:** Class 1, Group B
4.9 **Burning Rate:** 8.0 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):** 7.0 (calc.)
4.14 **Minimum Oxygen Concentration for Combustion (MOCC):** Not listed

5. CHEMICAL REACTIVITY

- 5.1 **Reactivity with Water:** Not flammable
5.2 **Reactivity with Common Materials:** No reaction
5.3 **Stability During Transport:** Explosive decomposition when contaminated with peroxides formed by reaction with air.
5.4 **Neutralizing Agents for Acids and Caustics:** Not pertinent
5.5 **Polymerization:** Stable when inhibitors present
5.6 **Inhibitor of Polymerization:** tert-Butylcatechol (0.01-0.02%)

6. WATER POLLUTION

- 6.1 **Aquatic Toxicity:** Not pertinent
6.2 **Waterfowl Toxicity:** Not pertinent
6.3 **Biological Oxygen Demand (BOD):** Not pertinent
6.4 **Food Chain Concentration Potential:** Not pertinent
6.5 **GESAMP Hazard Profile:** Not listed

7. SHIPPING INFORMATION

- 7.1 **Grades of Purity:** Research grade: 99.86 mole% Special purity: 99.5 mole% Rubber grade: 99.0mole% Commercial: 98%
7.2 **Storage Temperature:** Ambient
7.3 **Inert Atmosphere:** No requirement
7.4 **Venting:** Safety relief
7.5 **IMO Pollution Category:** Currently not available
7.6 **Ship Type:** 2
7.7 **Barge Hull Type:** 2

8. HAZARD CLASSIFICATIONS

- 8.1 **49 CFR Category:** Flammable gas
8.2 **49 CFR Class:** 2.1
8.3 **49 CFR Package Group:** Not listed.
8.4 **Marine Pollutant:** No
8.5 **NFPA Hazard Classification:**
- | Category | Classification |
|----------------------|----------------|
| Health Hazard (Blue) | 2 |
| Flammability (Red) | 4 |
| Instability (Yellow) | 2 |
- 8.6 **EPA Reportable Quantity:** 10 pounds
8.7 **EPA Pollution Category:** A
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:** Gas
9.2 **Molecular Weight:** Currently not available
9.3 **Boiling Point at 1 atm:** 24.1°F = -4.4°C = 268.8°K
9.4 **Freezing Point:** -164°F = -108.9°C = 164.3°K
9.5 **Critical Temperature:** 305.6°F = 152°C = 425.2°K
9.6 **Critical Pressure:** 628 psia = 42.7 atm = 4.32 MN/m²
9.7 **Specific Gravity:** 0.621 at 20°C (liquid)
9.8 **Liquid Surface Tension:** 13.4 dynes/cm = 0.0134 N/m at 22°C
9.9 **Liquid Water Interfacial Tension:** (est.) 67 dynes/cm = 0.067 N/m at 22°C
9.10 **Vapor (Gas) Specific Gravity:** 1.9 at 20°C
9.11 **Ratio of Specific Heats of Vapor (Gas):** 1.1
9.12 **Latent Heat of Vaporization:** 180 Btu/lb = 100 cal/g = 4.19 X 10⁵ J/kg
9.13 **Heat of Combustion:** -19,008 Btu/lb = -10,560 cal/g = -442.13 X 10⁵ J/kg
9.14 **Heat of Decomposition:** Not pertinent
9.15 **Heat of Solution:** Not pertinent
9.16 **Heat of Polymerization:** -549 Btu/lb = -305 cal/g = -12.8 X 10⁵ J/kg
9.17 **Heat of Fusion:** 35.28 cal/g
9.18 **Limiting Value:** Currently not available
9.19 **Reid Vapor Pressure:** 61 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
-110	45.610	-110	0.453		N	-110	0.437
-100	45.220	-100	0.459		O	-100	0.404
-90	44.840	-90	0.465		T	-90	0.375
-80	44.460	-80	0.471			-80	0.349
-70	44.080	-70	0.478		P	-70	0.326
-60	43.700	-60	0.484		E	-60	0.306
-50	43.320	-50	0.490		R	-50	0.288
-40	42.940	-40	0.496		T	-40	0.272
-30	42.550	-30	0.502		I	-30	0.258
-20	42.170	-20	0.508		N	-20	0.245
-10	41.790	-10	0.514		E	-10	0.233
0	41.410	0	0.520		N	0	0.222
10	41.030	10	0.526		T	10	0.212
20	40.650	20	0.533			20	0.203

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	-55	1.795	-55	0.02235	0	0.307
	N	-50	2.109	-50	0.02594	25	0.322
	S	-45	2.466	-45	0.02997	50	0.336
	O	-40	2.872	-40	0.03448	75	0.350
	L	-35	3.331	-35	0.03952	100	0.364
	U	-30	3.847	-30	0.04512	125	0.377
	B	-25	4.426	-25	0.05131	150	0.390
	L	-20	5.074	-20	0.05815	175	0.403
	E	-15	5.796	-15	0.06568	200	0.416
		-10	6.598	-10	0.07394	225	0.428
		-5	7.487	-5	0.08297	250	0.440
		0	8.468	0	0.09283	275	0.451
		5	9.549	5	0.10350	300	0.463
		10	10.740	10	0.11520	325	0.474
		15	12.040	15	0.12780	350	0.485
		20	13.460	20	0.14140	375	0.495
		25	15.010	25	0.15600	400	0.505
		30	16.690	30	0.17180	425	0.515
		35	18.520	35	0.18870	450	0.525
		40	20.500	40	0.20680	475	0.535
		45	22.650	45	0.22610	500	0.544
		50	24.960	50	0.24670	525	0.553
		55	27.440	55	0.26870	550	0.562
		60	30.120	60	0.29200	575	0.571
		65	32.980	65	0.31680	600	0.579
		70	36.050	70	0.34300		