BUTYLENE

BTN

CAUTIONARY RESPONSE INFORMATION

Common Synonyms			
1-Butene	Liquefied compressed gas	Colorless	Fragrant gasoline-like odor

Floats and boils on water. Flammable, visible vapor cloud is produced.

Restrict access.
Evacuate.
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.

Fire	FLAMMABLE. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Stop flow of gas if possible. Cool exposed containers and protect men effecting the shutoff with water. Let fire burn.
Exposure	CALL FOR MEDICAL AID. VAPOR If inhaled, will cause dizziness and difficult breathing. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. LIQUID Will cause frostbite. Flush affected areas with plenty of water. DO NOT RUB AFFECTED AREAS.
Water Pollution	Not harmful to aquatic life. May be dangerous if it enters water intakes. Notify operators of nearby water intakes.

1. CORRECTIVE RESPONSE ACTIONS

Stop discharge
Chemical and Physical Treatment: Burn

2. CHEMICAL DESIGNATIONS

2.1 CG Compatibility Group: 30; Olefin
2.2 Formula: $CH_3CH_2CH{=}CH_2$
2.3 IMO/UN Designation: 2.0/1012
2.4 DOT ID No.: 1012
2.5 CAS Registry No.: Currently not available
2.6 NAERG Guide No.: 115
2.7 Standard Industrial Trade Classification: 51113

3. HEALTH HAZARDS

3.1 Personal Protective Equipment: Chemical goggles, gloves, self-contained breathing apparatus or organic canister.
3.2 Symptoms Following Exposure: May act as an asphyxiant or slight anesthetic at high vapor concentrations. Vapor concentrations are not usually a hazard at room temperature except in enclosed spaces.
3.3 Treatment of Exposure: INHALATION: remove victim to fresh air and apply resuscitation. Call a doctor. EYES AND SKIN: flush with water for at least 15 minutes.
3.4 TLV-TWA: Not listed.
3.5 TLV-STEL: Not listed.
3.6 TLV-Ceiling: Not listed.
3.7 Toxicity by Ingestion: Not pertinent
3.8 Toxicity by Inhalation: Currently not available.
3.9 Chronic Toxicity: None
3.10 Vapor (Gas) Irritant Characteristics: Vapors are non-irritating to the eyes and throat.
3.11 Liquid or Solid Characteristics: No appreciable hazard. Practically harmless to the skin because it is very volatile and evaporates quickly. May cause frostbite.
3.12 Odor Threshold: Currently not available
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: Not pertinent
4.2 Flammable Limits in Air: 1.6%-10%
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: Containers may explode in fire. Vapor is heavier than air and may travel long distance to a source of ignition and flash back.
4.7 Auto Ignition Temperature: 725°F
4.8 Electrical Hazards: Not pertinent
4.9 Burning Rate: 8.8 mm/min.
4.10 Adiabatic Flame Temperature: 2493. (Est.)
4.11 Stoichometric Air to Fuel Ratio: 28.6 (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: 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

6. WATER POLLUTION

6.1 Aquatic Toxicity: None
6.2 Waterfowl Toxicity: None
6.3 Biological Oxygen Demand (BOD): None
6.4 Food Chain Concentration Potential: None
6.5 GESAMP Hazard Profile: Not listed

7. SHIPPING INFORMATION

7.1 Grades of Purity: Currently not available
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: Currently not available

8. HAZARD CLASSIFICATIONS

8.1 49 CFR Category: Flammable gas
8.2 49 CFR Class: 2
8.3 49 CFR Package Group: Not listed.
8.4 Marine Pollutant: No
8.5 NFPA Hazard Classification:

Category	Classification
Health Hazard (Blue).....	1
Flammability (Red).....	4
Instability (Yellow).....	0

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: Gas
9.2 Molecular Weight: 56.10
9.3 Boiling Point at 1 atm: 20.7°F = –6.3°C = 266.9°K
9.4 Freezing Point: –297°F = –183°C = 90°K
9.5 Critical Temperature: 295.5°F = 146.4°C = 419.6°K
9.6 Critical Pressure: 584 psia = 39.7 atm = 4.02 MN/m^2
9.7 Specific Gravity: 0.595 at 20°C (liquid)
9.8 Liquid Surface Tension: 12.5 dynes/cm = 0.0125 N/m at 20°C
9.9 Liquid Water Interfacial Tension: (est.) 68 dynes/cm = 0.068 N/m at 0°C
9.10 Vapor (Gas) Specific Gravity: 1.9
9.11 Ratio of Specific Heats of Vapor (Gas): 1.104
9.12 Latent Heat of Vaporization: 168 Btu/lb = 93.4 cal/g = 3.91 X 10^5 J/kg
9.13 Heat of Combustion: –19,487 Btu/lb = –10,286 cal/g = –453.26 X 10^5 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: 62.5 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	44.060	-30	0.527		N	-120	0.496
-100	43.680	-20	0.533		O	-110	0.451
-90	43.290	-10	0.539		T	-100	0.412
-80	42.910	0	0.545			-90	0.378
-70	42.530	10	0.551		P	-80	0.348
-60	42.150	20	0.558		E	-70	0.323
-50	41.770				R	-60	0.300
-40	41.390				T	-50	0.280
-30	41.010				I	-40	0.262
-20	40.620				N	-30	0.246
-10	40.240				E	-20	0.231
0	39.860				N	-10	0.218
10	39.480				T	0	0.206
20	39.100					10	0.196
						20	0.186

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	0	9.248	0	0.10510	0	0.334
	N	5	10.390	5	0.11680	25	0.349
	S	10	11.640	10	0.12960	50	0.364
	O	15	13.020	15	0.14330	75	0.379
	L	20	14.520	20	0.15820	100	0.394
	U	25	16.160	25	0.17420	125	0.408
	B	30	17.940	30	0.19150	150	0.422
	L	35	19.880	35	0.21000	175	0.436
	E	40	21.980	40	0.22990	200	0.449
		45	24.260	45	0.25120	225	0.462
		50	26.720	50	0.27400	250	0.475
		55	29.380	55	0.29830	275	0.488
		60	32.240	60	0.32420	300	0.501
		65	35.320	65	0.35180	325	0.513
						350	0.525
						375	0.537
						400	0.548
						425	0.559
						450	0.570
						475	0.581
						500	0.592
						525	0.602
						550	0.612
						575	0.622
						600	0.632