

METHANE

MTH

CAUTIONARY RESPONSE INFORMATION

Common Synonyms		Gas	Colorless	Weak odor
Marsh gas Natural gas		Liquid floats and boils on water. Flammable visible vapor cloud is produced.		
<p>Keep people away. Avoid inhalation. Shut off ignition sources and call fire department. Stay upwind and use water spray to "knock down" vapor. Evacuate area in case of large discharge. Avoid contact with liquid and vapor. Notify local health and pollution control agencies.</p>				
Fire	<p>FLAMMABLE. Flashback along vapor trail may occur. May explode if ignited in an enclosed area. Stop discharge if possible. Cool exposed containers and protect men effecting shutoff with water. Let fire burn.</p>			
Exposure	<p>CALL FOR MEDICAL AID.</p> <p>VAPOR Not irritating to eyes, nose or throat. If inhaled, will cause dizziness, difficult breathing, and loss of consciousness. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>LIQUID Will cause frostbite. Flush affected areas with plenty of water. DO NOT RUB AFFECTED AREAS.</p>			
Water Pollution	Not harmful to aquatic life.			

1. CORRECTIVE RESPONSE ACTIONS

Stop discharge
Chemical and Physical Treatment: Burn

2. CHEMICAL DESIGNATIONS

- 2.1 CG Compatibility Group: 31; Paraffin
- 2.2 Formula: CH₄
- 2.3 IMO/UN Designation: 2.0/1971
- 2.4 DOT ID No.: 1971
- 2.5 CAS Registry No.: 74-82-8
- 2.6 NAERG Guide No.: 115
- 2.7 Standard Industrial Trade Classification: 51114

3. HEALTH HAZARDS

- 3.1 **Personal Protective Equipment:** Self-contained breathing apparatus for high concentrations; protective clothing if exposed to liquid.
- 3.2 **Symptoms Following Exposure:** High concentrations may cause asphyxiation. No systemic effects, even at 5% concentration in air.
- 3.3 **Treatment of Exposure:** Remove to fresh air. Support respiration.
- 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 nonirritating to the eyes and throat.
- 3.11 **Liquid or Solid Characteristics:** No appreciable hazard. Practically harmless to the skin, because it evaporates quickly, but may cause some frostbite.
- 3.12 **Odor Threshold:** 200 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:**
Flammable gas
- 4.2 **Flammable Limits in Air:** 5.0%-15.0%
- 4.3 **Fire Extinguishing Agents:** Stop flow of gas
- 4.4 **Fire Extinguishing Agents Not to Be Used:** Water
- 4.5 **Special Hazards of Combustion Products:** None
- 4.6 **Behavior in Fire:** Not pertinent
- 4.7 **Auto Ignition Temperature:** 1004°F
- 4.8 **Electrical Hazards:** Class I, Group D
- 4.9 **Burning Rate:** 12.5 mm/min.
- 4.10 **Adiabatic Flame Temperature:** 2339. (Est.)
- 4.11 **Stoichiometric Air to Fuel Ratio:** 9.5 (calc.)
- 4.12 **Flame Temperature:** Currently not available
- 4.13 **Combustion Molar Ratio (Reactant to Product):** 3.0 (calc.)
- 4.14 **Minimum Oxygen Concentration for Combustion (MOCC):** N₂ diluent: 12.0-12.1%; CO₂ diluent: 14.0-14.5%

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:** Research grade; pure grade
- 7.2 **Storage Temperature:** -260°F
- 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:** 2.1
- 8.3 **49 CFR Package Group:** Not pertinent.
- 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:** 16.04
- 9.3 **Boiling Point at 1 atm:** -258.7°F = -161.5°C = 111.7°K
- 9.4 **Freezing Point:** -296.5°F = -182.5°C = 90.7°K
- 9.5 **Critical Temperature:** -116.5°F = -82.5°C = 190.7°K
- 9.6 **Critical Pressure:** 668 psia = 45.44 atm = 4.60 MN/m²
- 9.7 **Specific Gravity:** 0.422 at -160°C (liquid)
- 9.8 **Liquid Surface Tension:** 14 dynes/cm = 0.014 N/m at -161°C
- 9.9 **Liquid Water Interfacial Tension:** (est.) 50 dynes/cm = 0.050 N/m at -161°C
- 9.10 **Vapor (Gas) Specific Gravity:** 0.55 1.0
- 9.11 **Ratio of Specific Heats of Vapor (Gas):** 1.306
- 9.12 **Latent Heat of Vaporization:** 219.4 Btu/lb = 121.9 cal/g = 5.100 X 10⁵ J/kg
- 9.13 **Heat of Combustion:** -21,517 Btu/lb = -11,954 cal/g = -500.2 X 10⁵ 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:** 13.96 cal/g
- 9.18 **Limiting Value:** Currently not available
- 9.19 **Reid Vapor Pressure:** Very high

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
-290	27.990	-290	0.802		N	-290	0.290
-288	27.900	-285	0.808		O	-285	0.254
-286	27.800	-280	0.815		T	-280	0.225
-284	27.700	-275	0.821			-275	0.200
-282	27.610	-270	0.827		P	-270	0.179
-280	27.510	-265	0.833		E	-265	0.161
-278	27.410	-260	0.839		R	-260	0.146
-276	27.310				T		
-274	27.220				I		
-272	27.120				N		
-270	27.020				E		
-268	26.930				N		
-266	26.830				T		
-264	26.730						
-262	26.630						
-260	26.540						

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	-290	2.640	-290	0.02325	0	0.504
	N	-288	3.006	-288	0.02617	25	0.513
	S	-286	3.412	-286	0.02936	50	0.522
	O	-284	3.861	-284	0.03284	75	0.532
	L	-282	4.355	-282	0.03663	100	0.541
	U	-280	4.898	-280	0.04074	125	0.551
	B	-278	5.494	-278	0.04519	150	0.561
	L	-276	6.146	-276	0.05000	175	0.572
	E	-274	6.858	-274	0.05519	200	0.582
		-272	7.633	-272	0.06077	225	0.593
		-270	8.474	-270	0.06676	250	0.604
		-268	9.387	-268	0.07318	275	0.615
		-266	10.370	-266	0.08004	300	0.626
		-264	11.440	-264	0.08736	325	0.638
		-262	12.590	-262	0.09516	350	0.650
		-260	13.820	-260	0.10350	375	0.662
		-258	15.150	-258	0.11230	400	0.674
		-256	16.570	-256	0.12160	425	0.686
		-254	18.100	-254	0.13150	450	0.699
		-252	19.720	-252	0.14190	475	0.712
		-250	21.460	-250	0.15290	500	0.724
		-248	23.310	-248	0.16450	525	0.738
		-246	25.270	-246	0.17670	550	0.751
		-244	27.360	-244	0.18960	575	0.765
		-242	29.580	-242	0.20300	600	0.778
		-240	31.920	-240	0.21710		