

PENTABORANE

PTB

CAUTIONARY RESPONSE INFORMATION

Common Synonyms (9)-Pentaboron nonahydride	Liquid Ignites when exposed to air. Floats on water.	Colorless 	Strong sour milk odor
KEEP PEOPLE AWAY. AVOID CONTACT WITH LIQUID AND VAPOR. Evacuate. 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. Notify local health and pollution control agencies. Protect water intakes.			
Fire	IGNITES WHEN EXPOSED TO AIR. Water may be ineffective on fire. DO NOT USE WATER OR FOAM ON FIRE. DO NOT USE WATER ON ADJACENT FIRES.		
Exposure	CALL FOR MEDICAL AID; HAZARD IS FROM PRODUCTS OF COMBUSTION. VAPOR POISONOUS IF INHALED. Move victim to fresh air. If breathing is difficult, give oxygen. LIQUID POISONOUS IF SWALLOWED OR IF SKIN IS EXPOSED. Irritating to 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. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting. IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.		
Water Pollution	Effect of low concentrations on aquatic life is unknown. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.		

1. CORRECTIVE RESPONSE ACTIONS

Dilute and disperse
Stop discharge
Clean shore line

2. CHEMICAL DESIGNATIONS

- 2.1 CG Compatibility Group: Not listed.
- 2.2 Formula: B_5H_9
- 2.3 IMO/UN Designation: 4.2/1380
- 2.4 DOT ID No.: 1380
- 2.5 CAS Registry No.: 19624-22-7
- 2.6 NAERG Guide No.: 135
- 2.7 Standard Industrial Trade Classification: 52495

3. HEALTH HAZARDS

- 3.1 Personal Protective Equipment: Self-contained breathing apparatus or air-line mask; goggles or face shield; rubber gloves and protective clothing
- 3.2 Symptoms Following Exposure: Inhalation of low concentrations causes dizziness, blurred vision, nausea, fatigue, light headedness or nervousness; higher concentrations also cause abnormal muscular contractions or twitching of any part of the body, difficult breathing, poor muscular coordination, imperfect articulation of speech, convulsions, and (rarely) coma. Contact with liquid causes severe irritation of eyes and irritation of skin (acute local inflammation with the formation of small blisters, redness and swelling). Can be absorbed through the skin. Compound cannot be swallowed, because it is spontaneously flammable in air.
- 3.3 Treatment of Exposure: Get medical attention following all exposures to this compound. INHALATION: remove victim to fresh air; watch for delayed symptoms for 1-2 days. EYES: wash with copious quantities of water for at least 30 min., holding eyelids apart to insure thorough flushing. SKIN: wash immediately with soap and water; rinse affected area with a 3% ammonia solution followed by additional flushing with water.
- 3.4 TLV-TWA: 0.005 ppm
- 3.5 TLV-STEL: Not listed.
- 3.6 TLV-Ceiling: 0.015 ppm
- 3.7 Toxicity by Ingestion: Grade 4; LD₅₀ < 50 mg/kg
- 3.8 Toxicity by Inhalation: Currently not available.
- 3.9 Chronic Toxicity: Currently not available
- 3.10 Vapor (Gas) Irritant Characteristics: Vapors cause moderate irritation such that personnel will find high concentrations unpleasant. The effect is temporary.
- 3.11 Liquid or Solid Characteristics: Currently not available
- 3.12 Odor Threshold: 0.8 ppm
- 3.13 IDLH Value: 1 ppm.
- 3.14 OSHA PEL-TWA: 0.005 ppm
- 3.15 OSHA PEL-STEL: Not listed.
- 3.16 OSHA PEL-Ceiling: Not listed.
- 3.17 EPA A EGL: Not listed

4. FIRE HAZARDS

- 4.1 Flash Point: Not pertinent (ignites spontaneously in air)
- 4.2 Flammable Limits in Air: 0.42%-98%
- 4.3 Fire Extinguishing Agents: Preferably shut off leak and let fire burn; extinguish with dry chemical or carbon dioxide.
- 4.4 Fire Extinguishing Agents Not to Be Used: Halogenated hydrocarbons, water
- 4.5 Special Hazards of Combustion Products: Toxic fumes may be formed.
- 4.6 Behavior in Fire: Tends to reignite. Contact with water applied to adjacent fires produces flammable hydrogen gas.
- 4.7 Auto Ignition Temperature: Spontaneously flammable if impure. Approx. 35°C when pure.
- 4.8 Electrical Hazards: Not pertinent
- 4.9 Burning Rate: Not pertinent
- 4.10 Adiabatic Flame Temperature: Currently not available
- 4.11 Stoichiometric Air to Fuel Ratio: 28.6 (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

7. SHIPPING INFORMATION

- 7.1 Grades of Purity: Technical; 95%; Hi-Purity: 99+%
- 7.2 Storage Temperature: Cool ambient
- 7.3 Inert Atmosphere: Inerted with dry nitrogen
- 7.4 Venting: Safety relief
- 7.5 IMO Pollution Category: Currently not available
- 7.6 Ship Type: Currently not available
- 7.7 Barge Hull Type: Currently not available

8. HAZARD CLASSIFICATIONS

- 8.1 49 CFR Category: Spontaneously Combustible
- 8.2 49 CFR Class: 4.2
- 8.3 49 CFR Package Group: I
- 8.4 Marine Pollutant: No
- 8.5 NFPA Hazard Classification:

Category	Classification
Health Hazard (Blue)	4
Flammability (Red)	4
Instability (Yellow)	2
- 8.6 EPA Reportable Quantity: Not listed.
- 8.7 EPA Pollution Category: Not listed.
- 8.8 RCRA Waste Number: Not listed
- 8.9 EPA FWP/CA List: Not listed

9. PHYSICAL & CHEMICAL PROPERTIES

- 9.1 Physical State at 15°C and 1 atm: Liquid
- 9.2 Molecular Weight: 63.2
- 9.3 Boiling Point at 1 atm: 137.1°F = 58.4°C = 331.5°K
- 9.4 Freezing Point: -52.2°F = -46.8°C = 224.6°K
- 9.5 Critical Temperature: 440.6°F = 227°C = 500.2°K
- 9.6 Critical Pressure: 570 psia = 38 atm = 3.9 MN/m²
- 9.7 Specific Gravity: 0.623 at 20°C (liquid)
- 9.8 Liquid Surface Tension: 20.8 dynes/cm = 0.0208 N/m at 25°C
- 9.9 Liquid Water Interfacial Tension: Not pertinent
- 9.10 Vapor (Gas) Specific Gravity: 2.2
- 9.11 Ratio of Specific Heats of Vapor (Gas): 1.0399
- 9.12 Latent Heat of Vaporization: 219 Btu/lb = 122 cal/g = 5.10 X 10³ J/kg
- 9.13 Heat of Combustion: -29,100 Btu/lb = -16,200 cal/g = -677 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

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	39.920	-20	0.488	-20	1.071	35	0.398
40	39.770	-15	0.492	-15	1.066	40	0.385
45	39.620	-10	0.496	-10	1.062	45	0.372
50	39.460	-5	0.500	-5	1.057	50	0.361
55	39.310	0	0.504	0	1.053	55	0.350
60	39.160	5	0.508	5	1.048	60	0.339
65	39.010	10	0.513	10	1.044	65	0.329
70	38.850	15	0.517	15	1.039	70	0.319
75	38.700	20	0.521	20	1.035	75	0.310
80	38.550	25	0.525	25	1.030	80	0.301
85	38.400	30	0.529	30	1.026	85	0.293
90	38.240	35	0.533	35	1.021	90	0.285
95	38.090	40	0.538	40	1.017	95	0.278
100	37.940	45	0.542	45	1.012	100	0.270
		50	0.546	50	1.008	105	0.263
		55	0.550	55	1.003	110	0.257
		60	0.554	60	0.999	115	0.250
		65	0.558	65	0.994	120	0.244
		70	0.563	70	0.990		
		75	0.567	75	0.985		
		80	0.571				
		85	0.575				

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	1.812	55	0.02072	90	0.838	
N	60	2.063	60	0.02338	100	0.846	
S	65	2.344	65	0.02630	110	0.855	
O	70	2.657	70	0.02953	120	0.864	
L	75	3.004	75	0.03308	130	0.873	
U	80	3.389	80	0.03697	140	0.882	
B	85	3.815	85	0.04123	150	0.890	
L	90	4.285	90	0.04589	160	0.899	
E	95	4.802	95	0.05097	170	0.908	
	100	5.372	100	0.05651	180	0.917	
R	105	5.997	105	0.06253	190	0.925	
E	110	6.682	110	0.06906	200	0.934	
A	115	7.431	115	0.07613	210	0.943	
C	120	8.249	120	0.08378	220	0.952	
T	125	9.140	125	0.09204	230	0.961	
S	130	10.110	130	0.10100	240	0.969	
	135	11.170	135	0.11050	250	0.978	
	140	12.310	140	0.12090	260	0.987	
	145	13.550	145	0.13190			
	150	14.890	150	0.14380			
	155	16.340	155	0.15650			