BENZENE PHOSPHORUS DICHLORIDE

BPD

CAUTIONARY RESPONSE INFORMATION

Common Synonyms	Liquid	Colorless	Unpleasant odor
Dichlorophenylphosphine Phenylphosphine dichloride Phenylphosphonous dichloride Phenylphosphorus dichloride	Reacts violently with water. Poisonous visible vapor cloud is produced.		

Restrict access.
Evacuate.
Avoid contact with liquid and vapor.
Notify local health and pollution control agencies.
Protect water intakes.

Fire

Fire data not available.

Exposure

CALL FOR MEDICAL AID.
GAS PRODUCED IN REACTION WITH WATER.
POISONOUS IF INHALED.
Irritating to eyes, nose and throat.
Move to fresh air.
If breathing has stopped, give artificial respiration.
If breathing is difficult, give oxygen.

LIQUID
Irritating to skin and eyes.
Harmful if swallowed.
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.

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
Chemical and Physical Treatment:
Neutralize
Do not add water to undissolved material
Do not burn

2. CHEMICAL DESIGNATIONS

2.1 CG Compatibility Group: Not listed.
2.2 Formula: $C_6H_5PCl_2$
2.3 IMO/UN Designation: Not listed
2.4 DOT ID No.: 2798
2.5 CAS Registry No.: Currently not available
2.6 NAERG Guide No.: 137
2.7 Standard Industrial Trade Classification: 51550

3. HEALTH HAZARDS

3.1 Personal Protective Equipment: Self-contained breathing apparatus; acid-type canister mask; goggles and face shield; rubber gloves; protective clothing.
3.2 Symptoms Following Exposure: Inhalation causes irritation of nose and throat; pulmonary edema may develop following severe exposures. Contact with skin or eyes causes severe burns. Ingestion causes severe burns of mouth and stomach.
3.3 Treatment of Exposure: Get medical attention following all exposures to this compound. INHALATION: remove to fresh air; if breathing has stopped, start mouth-to-mouth resuscitation. EYES: flush with water for at least 15 min.; do not use oils or ointments. SKIN: flush with water; wash with soap and water. INGESTION: give large amounts of milk or water; do NOT induce vomiting; if vomiting does occur, give milk or beaten eggs at one-hour intervals.
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: Currently not available
3.10 Vapor (Gas) Irritant Characteristics: Currently not available
3.11 Liquid or Solid Characteristics: Currently not available
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: 215°F O.C.
May be lower because of presence of dissolved phosphorus.
4.2 Flammable Limits in Air: Not pertinent
4.3 Fire Extinguishing Agents: Large amounts of water.
4.4 Fire Extinguishing Agents Not to Be Used: Not pertinent
4.5 Special Hazards of Combustion Products: Toxic fumes include oxides of phosphorus and hydrogen chloride.
4.6 Behavior in Fire: Containers may rupture. Hot liquid is spontaneously flammable because of presence of dissolved phosphorus.
4.7 Auto Ignition Temperature: 319°F
4.8 Electrical Hazards: Currently not available
4.9 Burning Rate: Currently not available
4.10 Adiabatic Flame Temperature: Currently not available
4.11 Stoichometric Air to Fuel Ratio: 38.1 (calc.)
4.12 Flame Temperature: Currently not available
4.13 Combustion Molar Ratio (Reactant to Product): 10.0 (calc.)
4.14 Minimum Oxygen Concentration for Combustion (MOCC): Not listed

5. CHEMICAL REACTIVITY

5.1 Reactivity with Water: Reacts vigorously to form hydrogen chloride (hydrochloric acid).
5.2 Reactivity with Common Materials: Corrodes metal, except 316 stainless steel, nickel, or Hastelloy.
5.3 Stability During Transport: Stable
5.4 Neutralizing Agents for Acids and Caustics: Flush with water, rinse with sodium bicarbonate or lime solution.
5.5 Polymerization: Not pertinent
5.6 Inhibitor of Polymerization: Not pertinent

6. WATER POLLUTION

6.1 Aquatic Toxicity: Currently not available
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: Not listed

7. SHIPPING INFORMATION

7.1 Grades of Purity: Commercial
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: Currently not available

8. HAZARD CLASSIFICATIONS

8.1 49 CFR Category: Corrosive material
8.2 49 CFR Class: 8
8.3 49 CFR Package Group: II
8.4 Marine Pollutant: No
8.5 NFPA Hazard Classification: Not listed
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: Liquid
9.2 Molecular Weight: 179.0
9.3 Boiling Point at 1 atm: 430°F = 221°C = 494°K
9.4 Freezing Point: –60°F = –51°C = 222°K
9.5 Critical Temperature: Not pertinent
9.6 Critical Pressure: Not pertinent
9.7 Specific Gravity: 1.140 at 25°C (liquid)
9.8 Liquid Surface Tension: (est.) 25 dynes/cm = 0.025 N/m at 20°C
9.9 Liquid Water Interfacial Tension: Not pertinent
9.10 Vapor (Gas) Specific Gravity: Not pertinent
9.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent
9.12 Latent Heat of Vaporization: Not pertinent
9.13 Heat of Combustion: (est.) –8,200 Btu/lb = –4,500 cal/g = -190×10^5 J/kg
9.14 Heat of Decomposition: Not pertinent
9.15 Heat of Solution: –72 Btu/lb = –40 cal/g = -1.7×10^5 J/kg
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

BENZENE PHOSPHORUS DICHLORIDE

BPD

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
32	72.540	34	0.431	34	1.048	52	5.463
34	72.469	36	0.432	36	1.048	54	5.368
36	72.400	38	0.433	38	1.048	56	5.275
38	72.330	40	0.434	40	1.048	58	5.185
40	72.259	42	0.436	42	1.048	60	5.097
42	72.190	44	0.437	44	1.048	62	5.011
44	72.120	46	0.438	46	1.048	64	4.927
46	72.049	48	0.439	48	1.048	66	4.845
48	71.980	50	0.440	50	1.048	68	4.765
50	71.910	52	0.441	52	1.048	70	4.688
52	71.839	54	0.442	54	1.048	72	4.611
54	71.770	56	0.443	56	1.048	74	4.537
56	71.709	58	0.444	58	1.048	76	4.465
58	71.639	60	0.446	60	1.048	78	4.394
60	71.570	62	0.447	62	1.048	80	4.325
62	71.500	64	0.448	64	1.048	82	4.257
64	71.429	66	0.449	66	1.048	84	4.191
66	71.360	68	0.450	68	1.048	86	4.126
68	71.290	70	0.451	70	1.048		
70	71.219	72	0.452	72	1.048		
72	71.150	74	0.453	74	1.048		
74	71.080	76	0.454	76	1.048		
76	71.009						
78	70.940						
80	70.870						

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
	R	150	0.025	150	0.00068		N
	E	160	0.035	160	0.00093		O
	A	170	0.048	170	0.00126		T
	C	180	0.065	180	0.00168		
	T	190	0.087	190	0.00223		P
	S	200	0.116	200	0.00293		E
		210	0.153	210	0.00382		R
		220	0.201	220	0.00494		T
		230	0.262	230	0.00634		I
		240	0.339	240	0.00807		N
		250	0.434	250	0.01021		E
		260	0.553	260	0.01282		N
		270	0.700	270	0.01600		T
		280	0.880	280	0.01985		
		290	1.100	290	0.02447		
		300	1.367	300	0.03001		
		310	1.689	310	0.03659		
		320	2.075	320	0.04438		
		330	2.536	330	0.05356		
		340	3.085	340	0.06432		
		350	3.733	350	0.07689		
		360	4.498	360	0.09150		
		370	5.394	370	0.10840		
		380	6.441	380	0.12790		
		390	7.659	390	0.15030		
		400	9.071	400	0.17600		