BENZYL CHLOROFORMATE

BCF

CAUTIONARY RESPONSE INFORMATION

Common Synonyms	Liquid	Colorless	Sharp, irritating odor
Benzylcarbonyl chloride Benzyl chlorocarbonate Carbobenzoxy chloride Chloroformic acid, benzyl ester	Sinks in water. Reacts with water.		

Restrict access.
Call fire department.
Avoid contact with liquid.
Stop discharge if possible.
Notify local health and pollution control agencies.
Protect water intakes.

Fire

Combustible.
POISONOUS GASES ARE PRODUCED IN FIRE.
Containers may explode in fire.
Wear chemical protective suit with self-contained breathing apparatus.
Extinguish with dry chemicals, foam or carbon dioxide.

Exposure

Call for medical aid.

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

Stop discharge
Collection Systems: Pump
Chemical and Physical Treatment: Neutralize
Do not burn

2. CHEMICAL DESIGNATIONS

2.1 CG Compatibility Group: Not listed.
2.2 Formula: $C_6H_5CH_2OCOCl$
2.3 IMO/UN Designation: 8/1739
2.4 DOT ID No.: 1739
2.5 CAS Registry No.: 501-53-1
2.6 NAERG Guide No.: 137
2.7 Standard Industrial Trade Classification: 51374

3. HEALTH HAZARDS

3.1 Personal Protective Equipment: Self-contained breathing apparatus or acid-type canister mask; goggles or face shield; rubber gloves; protective clothing.
3.2 Symptoms Following Exposure: Inhalation causes mucous membrane irritation. Eyes are irritated by excessive exposure to vapor. Liquid causes severe irritation of eyes and irritates skin. Ingestion causes irritation of mouth and stomach.
3.3 Treatment of Exposure: INHALATION: remove from exposure; support respiration; call physician. EYES: irrigate with copious amounts of water for 15 min. SKIN: flush with large quantities of water; wash with soap and water. INGESTION: give large amounts of water; do NOT induce vomiting.
3.4 TLV-TWA: Not listed.
3.5 TLV-STEL: Not listed.
3.6 TLV-Ceiling: Not listed.
3.7 Toxicity by Ingestion: Grade 3; LD_{50} = 50 to 500 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: Causes smarting of the skin and first-degree burns on short exposure and may cause second-degree burns on long exposure.
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: 176°F O.C. 227°F C.C. Vigorous decomposition occurs at these temperatures; thus these values are anomalous due to the effect of the decomp. products (benzyl chloride and CO_2).
4.2 Flammable Limits in Air: Not pertinent
4.3 Fire Extinguishing Agents: Dry chemical, foam and carbon dioxide.
4.4 Fire Extinguishing Agents Not to Be Used: Currently not available
4.5 Special Hazards of Combustion Products: Toxic phosgene, hydrogen chloride, and benzyl chloride vapors may form.
4.6 Behavior in Fire: Containers may explode.
4.7 Auto Ignition Temperature: Currently not available
4.8 Electrical Hazards: Currently not available
4.9 Burning Rate: 4.0 mm/min.
4.10 Adiabatic Flame Temperature: Currently not available
4.11 Stoichometric Air to Fuel Ratio: 40.5 (calc.)
4.12 Flame Temperature: Currently not available
4.13 Combustion Molar Ratio (Reactant to Product): 12.0 (calc.)
4.14 Minimum Oxygen Concentration for Combustion (MOCC): Not listed

5. CHEMICAL REACTIVITY

5.1 Reactivity with Water: Forms hydrogen chloride (hydrochloric acid). The reaction is not very vigorous in cold water.
5.2 Reactivity with Common Materials: Slow corrosion of metal.
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: Exothermic.
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:
Bioaccumulation: 0
Damage to living resources: 4
Human Oral hazard: -
Human Contact hazard: I
Reduction of amenities: XXX

7. SHIPPING INFORMATION

7.1 Grades of Purity: 97+%
7.2 Storage Temperature: Ambient, in cool place
7.3 Inert Atmosphere: No requirement
7.4 Venting: Pressure-vacuum
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: Corrosive material
8.2 49 CFR Class: 8
8.3 49 CFR Package Group: I
8.4 Marine Pollutant: Yes
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: 170.6
9.3 Boiling Point at 1 atm: (decomposes) 306°F = 152°C = 425°K
9.4 Freezing Point: Not pertinent
9.5 Critical Temperature: Not pertinent
9.6 Critical Pressure: Not pertinent
9.7 Specific Gravity: 1.22 at 20°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: > 1
9.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent
9.12 Latent Heat of Vaporization: (est.) 90 Btu/lb = 50 cal/g = 2.1 X 10^5 J/kg
9.13 Heat of Combustion: (est.) –10,000 Btu/lb = –5,700 cal/g = –240 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: 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
51	76.740	51	0.450	51	1.048	52	3.103
52	76.709	52	0.450	52	1.048	54	3.027
53	76.679	53	0.450	53	1.048	56	2.954
54	76.639	54	0.450	54	1.048	58	2.883
55	76.610	55	0.450	55	1.048	60	2.814
56	76.570	56	0.450	56	1.048	62	2.748
57	76.540	57	0.450	57	1.048	64	2.683
58	76.500	58	0.450	58	1.048	66	2.621
59	76.469	59	0.450	59	1.048	68	2.561
60	76.429	60	0.450	60	1.048	70	2.502
61	76.400	61	0.450	61	1.048	72	2.445
62	76.360	62	0.450	62	1.048	74	2.390
63	76.330	63	0.450	63	1.048	76	2.336
64	76.290	64	0.450	64	1.048	78	2.284
65	76.259	65	0.450	65	1.048	80	2.234
66	76.219	66	0.450	66	1.048	82	2.185
67	76.190	67	0.450	67	1.048	84	2.137
68	76.150	68	0.450	68	1.048	86	2.091
69	76.120	69	0.450				
70	76.089	70	0.450				
71	76.049	71	0.450				
72	76.020	72	0.450				
73	75.980	73	0.450				
74	75.950	74	0.450				
75	75.910	75	0.450				
76	75.879	76	0.450				

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	215	0.347	215	0.00818	0	0.176
	E	220	0.438	220	0.01025	10	0.176
	A	225	0.551	225	0.01280	20	0.176
	C	230	0.691	230	0.01593	30	0.176
	T	235	0.864	235	0.01977	40	0.176
	S	240	1.076	240	0.02445	50	0.176
		245	1.337	245	0.03015	60	0.176
		250	1.655	250	0.03706	70	0.176
		255	2.043	255	0.04543	80	0.176
		260	2.515	260	0.05553	90	0.176
		265	3.086	265	0.06768	100	0.176
		270	3.777	270	0.08226	110	0.176
		275	4.609	275	0.09971	120	0.176
		280	5.611	280	0.12050	130	0.176
		285	6.811	285	0.14540	140	0.176
		290	8.247	290	0.17480	150	0.176
		295	9.961	295	0.20980	160	0.176
		300	12.000	300	0.25110	170	0.176