BENZENE

BNZ

CAUTIONARY RESPONSE INFORMATION

Common Synonyms
Benzol
Benzole

Watery liquid Colorless Gasoline-like odor

Floats on water. Flammable, irritating vapor is produced. Freezing point is 42°F.

Restrict access.
Avoid contact with liquid and vapor.
Wear goggles and self-contained breathing apparatus.
Shut off ignition sources and call fire department.
Stay upwind and use water spray to ``knock down'' vapor.
Notify local health and pollution control agencies.
Protect water intakes.

Fire

FLAMMABLE.
Flashback along vapor trail may occur.
Vapor may explode if ignited in an enclosed area.
Wear goggles and self-contained breathing apparatus.
Extinguish with dry chemical, foam, or carbon dioxide.
Water may be ineffective on fire.
Cool exposed containers with water.

Exposure

CALL FOR MEDICAL AID.

VAPOR
Irritating to eyes, nose and throat.
If inhaled, will cause headache, difficult breathing, or loss of consciousness.
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

HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS.
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
Contain
Collection Systems: Skim
Chemical and Physical Treatment: Burn
Salvage waterfowl

2. CHEMICAL DESIGNATIONS

2.1 CG Compatibility Group: 32; Aromatic Hydrocarbon
2.2 Formula: C_6H_6
2.3 IMO/UN Designation: 3.2/1114
2.4 DOT ID No.: 1114
2.5 CAS Registry No.: 71-43-2
2.6 NAERG Guide No.: 130
2.7 Standard Industrial Trade Classification: 51122

3. HEALTH HAZARDS

3.1 Personal Protective Equipment: Self contained positive pressure breathing apparatus; protective gloves and clothing.
3.2 Symptoms Following Exposure: Dizziness, excitation, pallor, followed by flushing, weakness, headache, breathlessness, chest constriction, nausea, and vomiting. Coma and possible death.
3.3 Treatment of Exposure: SKIN: flush with water followed by soap and water; remove contaminated clothing and wash skin. EYES: flush with plenty of water until irritation subsides. INHALATION: remove from exposure immediately. Call a physician. IF breathing is irregular or stopped, start resuscitation, administer oxygen.
3.4 TLV-TWA: 0.5 ppm
3.5 TLV-STEL: 2.5 ppm
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: Leukemia.
3.10 Vapor (Gas) Irritant Characteristics: If present in high concentrations, vapors may cause irritation of eyes or respiratory system. The effect is temporary.
3.11 Liquid or Solid Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin.
3.12 Odor Threshold: 4.68 ppm
3.13 IDLH Value: 500 ppm
3.14 OSHA PEL-TWA: 1 ppm.
3.15 OSHA PEL-STEL: 5 ppm
3.16 OSHA PEL-Ceiling: Not listed
3.17 EPA AEGL: Not listed

4. FIRE HAZARDS

4.1 Flash Point: 12°F C.C.
4.2 Flammable Limits in Air: 1.3%-7.9%
4.3 Fire Extinguishing Agents: Dry chemical, foam, or carbon dioxide.
4.4 Fire Extinguishing Agents Not to Be Used: Water may be ineffective.
4.5 Special Hazards of Combustion Products: Not pertinent.
4.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back.
4.7 Auto Ignition Temperature: 1097°F
4.8 Electrical Hazards: Class I, Group D
4.9 Burning Rate: 6.0 mm/min.
4.10 Adiabatic Flame Temperature: Currently not available
4.11 Stoichometric Air to Fuel Ratio: 35.7 (calc.)
4.12 Flame Temperature: Currently not available
4.13 Combustion Molar Ratio (Reactant to Product): 9.0 (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: 5 ppm/6 hr/minnow/lethal/distilled water
20 ppm/24 hr/sunfish/TL_m/tap water
6.2 Waterfowl Toxicity: Currently not available
6.3 Biological Oxygen Demand (BOD): 1.2 lb/lb, 10 days
6.4 Food Chain Concentration Potential: None.
6.5 GESAMP Hazard Profile:
Bioaccumulation: 0
Damage to living resources: 2
Human Oral hazard: 1
Human Contact hazard: II
Reduction of amenities: XXX

7. SHIPPING INFORMATION

7.1 Grades of Purity: Industrial pure – 99+%; Thiophene-free – 99+%; Nitration – 99+%; Industrial – 90% - 85+%; Reagent – 99+%
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: 3

8. HAZARD CLASSIFICATIONS

8.1 49 CFR Category: Flammable liquid
8.2 49 CFR Class: 3
8.3 49 CFR Package Group: II
8.4 Marine Pollutant: No
8.5 NFPA Hazard Classification:

Category	Classification
Health Hazard (Blue).....	2
Flammability (Red).....	3
Instability (Yellow).....	0

8.6 EPA Reportable Quantity: 10 pounds
8.7 EPA Pollution Category: A
8.8 RCRA Waste Number: U019
8.9 EPA FWPCA List: Yes

9. PHYSICAL & CHEMICAL PROPERTIES

9.1 Physical State at 15° C and 1 atm: Liquid
9.2 Molecular Weight: 78.11
9.3 Boiling Point at 1 atm: 176°F = 80.1°C = 353.3°K
9.4 Freezing Point: 42.0°F = 5.5°C = 278.7°K
9.5 Critical Temperature: 552.0°F = 288.9°C = 562.1°K
9.6 Critical Pressure: 710 psia = 48.3 atm = 4.89 MN/m^2
9.7 Specific Gravity: 0.879 at 20°C (liquid)
9.8 Liquid Surface Tension: 28.9 dynes/cm = 0.0289 N/m at 20°C
9.9 Liquid Water Interfacial Tension: 35.0 dynes/cm = 0.035 N/m at 20°C
9.10 Vapor (Gas) Specific Gravity: 2.8
9.11 Ratio of Specific Heats of Vapor (Gas): 1.061
9.12 Latent Heat of Vaporization: 169 Btu/lb = 94.1 cal/g = 3.94 X 10^5 J/kg
9.13 Heat of Combustion: –17,460 Btu/lb = –9698 cal/g = –406.0 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: 30.45 cal/g
9.18 Limiting Value: Currently not available
9.19 Reid Vapor Pressure: 3.22 psia

NOTES

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9.20 SATURATED LIQUID DENSITY	
Temperature (degrees F)	Pounds per cubic foot
55	55.330
60	55.140
65	54.960
70	54.770
75	54.580
80	54.400
85	54.210
90	54.030
95	53.840
100	53.660
105	53.470
110	53.290
115	53.100
120	52.920
125	52.730
130	52.540
135	52.360
140	52.170
145	51.990
150	51.800
155	51.620
160	51.430
165	51.250
170	51.060
175	50.870

9.21 LIQUID HEAT CAPACITY	
Temperature (degrees F)	British thermal unit per pound-F
45	0.394
50	0.396
55	0.398
60	0.400
65	0.403
70	0.405
75	0.407
80	0.409
85	0.411
90	0.414
95	0.416
100	0.418

9.22 LIQUID THERMAL CONDUCTIVITY	
Temperature (degrees F)	British thermal unit inch per hour-square foot-F
75	0.988
80	0.981
85	0.975
90	0.969
95	0.962
100	0.956
105	0.950
110	0.944
115	0.937
120	0.931
125	0.925
130	0.919
135	0.912
140	0.906
145	0.900
150	0.893
155	0.887
160	0.881
165	0.875
170	0.868

9.23 LIQUID VISCOSITY	
Temperature (degrees F)	Centipoise
55	0.724
60	0.693
65	0.665
70	0.638
75	0.612
80	0.588
85	0.566
90	0.544
95	0.524
100	0.505
105	0.487
110	0.470
115	0.453
120	0.438

9.24 SOLUBILITY IN WATER	
Temperature (degrees F)	Pounds per 100 pounds of water
77	0.180

9.25 SATURATED VAPOR PRESSURE	
Temperature (degrees F)	Pounds per square inch
50	0.881
60	1.171
70	1.535
80	1.989
90	2.547
100	3.227
110	4.049
120	5.033
130	6.201
140	7.577
150	9.187
160	11.060
170	13.220
180	15.700
190	18.520
200	21.740
210	25.360

9.26 SATURATED VAPOR DENSITY	
Temperature (degrees F)	Pounds per cubic foot
50	0.01258
60	0.01639
70	0.02109
80	0.02681
90	0.03371
100	0.04196
110	0.05172
120	0.06317
130	0.07652
140	0.09194
150	0.10960
160	0.12980
170	0.15270
180	0.17850
190	0.20750
200	0.23970
210	0.27560

9.27 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	British thermal unit per pound-F
0	0.204
25	0.219
50	0.234
75	0.248
100	0.261
125	0.275
150	0.288
175	0.301
200	0.313
225	0.325
250	0.337
275	0.349
300	0.360
325	0.371
350	0.381
375	0.392
400	0.402
425	0.412
450	0.421
475	0.431
500	0.440
525	0.449
550	0.457
575	0.465
600	0.474