TOLUENE

TOL

CAUTIONARY RESPONSE INFORMATION

Common Synonyms Methylbenzene Methylbenzol Toluol	Watery liquid Colorless Pleasant odor Floats on water. Flammable, irritating vapor is produced.

Keep people away.
Shut off ignition sources and call fire department.
Stay upwind and use water spray to ``knock down'' vapor.
Avoid contact with liquid and 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 nausea, vomiting, headache, dizziness, difficult breathing, or loss of consciousness. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing difficult, give oxygen. LIQUID Irritating to skin and eyes. If swallowed, will cause nausea, vomiting or loss of consciousness. 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. DO NOT INDUCE VOMITING.
Water Pollution	Dangerous to aquatic life in high concentrations. Fouling to shoreline. 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
Clean shore line
Salvage waterfowl

2. CHEMICAL DESIGNATIONS

2.1 CG Compatibility Group: 32; Aromatic Hydrocarbon
2.2 Formula: $C_6H_5CH_3$
2.3 IMO/UN Designation: 3.2/1294
2.4 DOT ID No.: 1294
2.5 CAS Registry No.: 108-88-3
2.6 NAERG Guide No.: 130
2.7 Standard Industrial Trade Classification: 51123

3. HEALTH HAZARDS

3.1 Personal Protective Equipment: Air-supplied mask; goggles or face shield; plastic gloves.
3.2 Symptoms Following Exposure: Vapors irritate eyes and upper respiratory tract; cause dizziness, headache, anesthesia, respiratory arrest. Liquid irritates eyes and causes drying of skin. If aspirated, causes coughing, gagging, distress, and rapidly developing pulmonary edema. If ingested causes vomiting, griping, diarrhea, depressed respiration.
3.3 Treatment of Exposure: INHALATION: remove to fresh air, give artificial respiration and oxygen if needed; call a doctor. INGESTION: do NOT induce vomiting; call a doctor. EYES: flush with water for at least 15 min. SKIN: wipe off, wash with soap and water.
3.4 TLV-TWA: 50 ppm
3.5 TLV-STEL: Not listed.
3.6 TLV-Ceiling: Not listed.
3.7 Toxicity by Ingestion: Grade 2; LD_{50} = 0.5 to 5 g/kg
3.8 Toxicity by Inhalation: Currently not available.
3.9 Chronic Toxicity: Kidney and liver damage may follow ingestion.
3.10 Vapor (Gas) Irritant Characteristics: Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. 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: 0.17 ppm
3.13 IDLH Value: 500 ppm
3.14 OSHA PEL-TWA: 200 ppm
3.15 OSHA PEL-STEL: 500 ppm, 10 minute peak once in 8 hour shift
3.16 OSHA PEL-Ceiling: 300 ppm
3.17 EPA AEGL: Not listed

4. FIRE HAZARDS

4.1 Flash Point: 55°F O.C. 40°F C.C.
4.2 Flammable Limits in Air: 1.27%-7%
4.3 Fire Extinguishing Agents: Carbon dioxide or dry chemical for small fires, ordinary foam for large fires.
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 a considerable distance to a source of ignition and flash back.
4.7 Auto Ignition Temperature: 896°F
4.8 Electrical Hazards: Class I, Group D
4.9 Burning Rate: 5.7 mm/min.
4.10 Adiabatic Flame Temperature: Currently not available
4.11 Stoichometric Air to Fuel Ratio: 42.8 (calc.)
4.12 Flame Temperature: Currently not available
4.13 Combustion Molar Ratio (Reactant to Product): 11.0 (calc.)
4.14 Minimum Oxygen Concentration for Combustion (MOCC): N_2 diluent: 9.5%

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: 1180 mg/l/96 hr/sunfish/TL_m/fresh water
6.2 Waterfowl Toxicity: Currently not available
6.3 Biological Oxygen Demand (BOD): 0%, 5 days; 38% (theor), 8 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: Research, reagent, nitration-all 99.8 + %; industrial: contains 94 + %, with 5% xylene and small amounts of benzene and nonaromatic hydrocarbons; 90/120: less pure than industrial.
7.2 Storage Temperature: Ambient
7.3 Inert Atmosphere: No requirement
7.4 Venting: Open (flame arrester) or 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: 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: 1000 pounds
8.7 EPA Pollution Category: C
8.8 RCRA Waste Number: U220
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: 92.14
9.3 Boiling Point at 1 atm: 231.1°F = 110.6°C = 383.8°K
9.4 Freezing Point: –139°F = –95.0°C = 178.2°K
9.5 Critical Temperature: 605.5°F = 318.6°C = 591.8°K
9.6 Critical Pressure: 596.1 psia = 40.55 atm = 4.108 MN/m^2
9.7 Specific Gravity: 0.867 at 20°C (liquid)
9.8 Liquid Surface Tension: 29.0 dynes/cm = 0.0290 N/m at 20°C
9.9 Liquid Water Interfacial Tension: 36.1 dynes/cm = 0.0361 N/m at 25°C
9.10 Vapor (Gas) Specific Gravity: Not pertinent
9.11 Ratio of Specific Heats of Vapor (Gas): 1.089
9.12 Latent Heat of Vaporization: 155 Btu/lb = 86.1 cal/g = 3.61 X 10^5 J/kg
9.13 Heat of Combustion: –17,430 Btu/lb = –9686 cal/g = –405.5 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: 17.17 cal/g
9.18 Limiting Value: Currently not available
9.19 Reid Vapor Pressure: 1.1 psia

NOTES

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9.20 SATURATED LIQUID DENSITY

Temperature (degrees F)	Pounds per cubic foot
-30	57.180
-20	56.870
-10	56.550
0	56.240
10	55.930
20	55.620
30	55.310
40	54.990
50	54.680
60	54.370
70	54.060
80	53.750
90	53.430
100	53.120
110	52.810
120	52.500

9.21 LIQUID HEAT CAPACITY

Temperature (degrees F)	British thermal unit per pound-F
0	0.396
5	0.397
10	0.399
15	0.400
20	0.402
25	0.403
30	0.404
35	0.406
40	0.407
45	0.409
50	0.410
55	0.411
60	0.413
65	0.414
70	0.415
75	0.417
80	0.418
85	0.420
90	0.421
95	0.422
100	0.424
105	0.425
110	0.427
115	0.428
120	0.429
125	0.431

9.22 LIQUID THERMAL CONDUCTIVITY

Temperature (degrees F)	British thermal unit inch per hour-square foot-F
0	1.026
10	1.015
20	1.005
30	0.994
40	0.983
50	0.972
60	0.962
70	0.951
80	0.940
90	0.929
100	0.919
110	0.908
120	0.897
130	0.886
140	0.876
150	0.865
160	0.854
170	0.843
180	0.833
190	0.822
200	0.811
210	0.800

9.23 LIQUID VISCOSITY

Temperature (degrees F)	Centipoise
0	1.024
5	0.978
10	0.935
15	0.894
20	0.857
25	0.821
30	0.788
35	0.757
40	0.727
45	0.700
50	0.673
55	0.649
60	0.625
65	0.603
70	0.582
75	0.562
80	0.544
85	0.526
90	0.509
95	0.493
100	0.477

9.24 SOLUBILITY IN WATER

Temperature (degrees F)	Pounds per 100 pounds of water
68	0.050

9.25 SATURATED VAPOR PRESSURE

Temperature (degrees F)	Pounds per square inch
0	0.038
10	0.057
20	0.084
30	0.121
40	0.172
50	0.241
60	0.331
70	0.449
80	0.600
90	0.792
100	1.033
110	1.332
120	1.700
130	2.148
140	2.690
150	3.338
160	4.109
170	5.018
180	6.083
190	7.323
200	8.758
210	10.410

9.26 SATURATED VAPOR DENSITY

Temperature (degrees F)	Pounds per cubic foot
0	0.00070
10	0.00103
20	0.00150
30	0.00212
40	0.00296
50	0.00405
60	0.00547
70	0.00727
80	0.00954
90	0.01237
100	0.01584
110	0.02007
120	0.02518
130	0.03127
140	0.03850
150	0.04700
160	0.05691
170	0.06840
180	0.08162
190	0.09675
200	0.11400
210	0.13340

9.27 IDEAL GAS HEAT CAPACITY

Temperature (degrees F)	British thermal unit per pound-F
0	0.228
25	0.241
50	0.255
75	0.268
100	0.281
125	0.294
150	0.306
175	0.319
200	0.331
225	0.343
250	0.355
275	0.367
300	0.378
325	0.389
350	0.400
375	0.411
400	0.422
425	0.432
450	0.443
475	0.453
500	0.462
525	0.472
550	0.482
575	0.491
600	0.500