

DIETHYLAMINE

DEN

CAUTIONARY RESPONSE INFORMATION

Common Synonyms			
DEN	Watery liquid	Colorless	Fishy, ammonia odor
Floats and mixes with water. Flammable, irritating vapor is produced.			
<p>Keep people away. Avoid contact with liquid and vapor. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). 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.</p>			
Fire	<p>FLAMMABLE. Flashback along vapor trail may occur. Irritating vapors are produced when heated. Vapor may explode if ignited in an enclosed area. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Extinguish with dry chemical, alcohol foam or carbon dioxide. Cool exposed containers with water.</p>		
Exposure	<p>CALL FOR MEDICAL AID.</p> <p>VAPOR Irritating to eyes, nose and throat. Harmful if inhaled. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>LIQUID Will burn 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.</p>		
Water Pollution	<p>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.</p>		

1. CORRECTIVE RESPONSE ACTIONS

Dilute and disperse
 Stop discharge

2. CHEMICAL DESIGNATIONS

- 2.1 CG Compatibility Group: 7; Aliphatic amine
- 2.2 Formula: (CH₃CH₂)₂NH
- 2.3 IMO/UN Designation: 3.1/1154
- 2.4 DOT ID No.: 1154
- 2.5 CAS Registry No.: 109-89-7
- 2.6 NAERG Guide No.: 132
- 2.7 Standard Industrial Trade Classification: 51451

3. HEALTH HAZARDS

- 3.1 **Personal Protective Equipment:** Chemical safety goggles, rubber gloves, and apron.
- 3.2 **Symptoms Following Exposure:** Irritation and burning of eyes, skin, and respiratory system. High concentration of vapor can cause asphyxiation.
- 3.3 **Treatment of Exposure:** In case of contact, flush skin or eyes with plenty of water for at least 15 min.; for eyes, get medical attention.
- 3.4 **TLV-TWA:** 5 ppm
- 3.5 **TLV-STEL:** 15 ppm
- 3.6 **TLV-Ceiling:** Not listed.
- 3.7 **Toxicity by Ingestion:** Grade 2; LD₅₀ = 0.5 to 5 g/kg (rat)
- 3.8 **Toxicity by Inhalation:** Currently not available.
- 3.9 **Chronic Toxicity:** None
- 3.10 **Vapor (Gas) Irritant Characteristics:** Vapor is moderately irritating such that personnel will not usually tolerate moderate or high vapor concentrations.
- 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:** 0.14 ppm
- 3.13 **IDLH Value:** 200 ppm
- 3.14 **OSHA PEL-TWA:** 25 ppm
- 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:** 5°F O.C.
- 4.2 **Flammable Limits in Air:** 1.8%-10.1%
- 4.3 **Fire Extinguishing Agents:** Dry chemical, carbon dioxide, or alcohol foam
- 4.4 **Fire Extinguishing Agents Not to Be Used:** Currently not available
- 4.5 **Special Hazards of Combustion Products:** Vapors are irritating
- 4.6 **Behavior in Fire:** Vapors are heavier than air and may travel considerable distance to a source of ignition and flash back.
- 4.7 **Auto Ignition Temperature:** 594°F
- 4.8 **Electrical Hazards:** Currently not available
- 4.9 **Burning Rate:** 6.7 mm/min.
- 4.10 **Adiabatic Flame Temperature:** Currently not available
- 4.11 **Stoichiometric Air to Fuel Ratio:** 36.9 (calc.)
- 4.12 **Flame Temperature:** Currently not available
- 4.13 **Combustion Molar Ratio (Reactant to Product):** 10.5 (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 hazardous reaction
- 5.3 **Stability During Transport:** Stable
- 5.4 **Neutralizing Agents for Acids and Caustics:** Flush with water
- 5.5 **Polymerization:** Not pertinent
- 5.6 **Inhibitor of Polymerization:** Not pertinent

6. WATER POLLUTION

- 6.1 **Aquatic Toxicity:** 85 mg/l/48 hr/creek chub/TL_w/fresh water
- 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: 2
 Human Oral hazard: 2
 Human Contact hazard: II
 Reduction of amenities: XXX

7. SHIPPING INFORMATION

- 7.1 **Grades of Purity:** Technical: 99%
- 7.2 **Storage Temperature:** Currently not available
- 7.3 **Inert Atmosphere:** Currently not available
- 7.4 **Venting:** Currently not available
- 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:** 100 pounds
- 8.7 **EPA Pollution Category:** B
- 8.8 **RCRA Waste Number:** Not listed
- 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:** 73.14
- 9.3 **Boiling Point at 1 atm:** 132°F = 55.5°C = 328.7°K
- 9.4 **Freezing Point:** -57.6°F = -49.8°C = 223.4°K
- 9.5 **Critical Temperature:** 434.3°F = 223.5°C = 496.7°K
- 9.6 **Critical Pressure:** 538 psia = 36.6 atm = 3.71 MN/m²
- 9.7 **Specific Gravity:** 0.708 at 20°C (liquid)
- 9.8 **Liquid Surface Tension:** 20.05 dynes/cm = 0.02005 N/m at 20°C
- 9.9 **Liquid Water Interfacial Tension:** Not pertinent
- 9.10 **Vapor (Gas) Specific Gravity:** 2.5
- 9.11 **Ratio of Specific Heats of Vapor (Gas):** 1.079
- 9.12 **Latent Heat of Vaporization:** 170 Btu/lb = 93 cal/g = 3.9 X 10⁵ J/kg
- 9.13 **Heat of Combustion:** -17,990 Btu/lb = -9994 cal/g = -418.4 X 10⁵ J/kg
- 9.14 **Heat of Decomposition:** Not pertinent
- 9.15 **Heat of Solution:** -202 Btu/lb = -112 cal/g = -4.69 X 10⁵ 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:** 0.7 psia

NOTES

DIETHYLAMINE

DEN

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	45.340	20	0.575	35	0.906		
40	45.160	30	0.580	40	0.898		C
45	44.980	40	0.585	45	0.890		U
50	44.800	50	0.590	50	0.882		R
55	44.620	60	0.595	55	0.874		E
60	44.440	70	0.601	60	0.866		N
65	44.260	80	0.606	65	0.858		T
70	44.090	90	0.611	70	0.850		L
75	43.910	100	0.616	75	0.842		Y
80	43.730	110	0.621	80	0.834		
85	43.550	120	0.626	85	0.826		N
90	43.370	130	0.632	90	0.818		O
95	43.190			95	0.809		T
100	43.010			100	0.801		
105	42.840			105	0.793		A
110	42.660			110	0.785		V
115	42.480			115	0.777		A
120	42.300			120	0.769		I
				125	0.761		L
				130	0.753		A
							B
							L
							E

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
	M	35	1.613	35	0.02222	0	0.335
	I	40	1.846	40	0.02518	25	0.349
	S	45	2.107	45	0.02845	50	0.363
	C	50	2.399	50	0.03208	75	0.377
	I	55	2.725	55	0.03607	100	0.391
	B	60	3.087	60	0.04047	125	0.405
	L	65	3.488	65	0.04530	150	0.418
	E	70	3.933	70	0.05059	175	0.432
		75	4.425	75	0.05639	200	0.445
		80	4.967	80	0.06271	225	0.458
		85	5.564	85	0.06960	250	0.471
		90	6.220	90	0.07709	275	0.484
		95	6.939	95	0.08523	300	0.497
		100	7.726	100	0.09405	325	0.510
		105	8.586	105	0.10360	350	0.523
		110	9.524	110	0.11390	375	0.535
		115	10.550	115	0.12500	400	0.548
		120	11.660	120	0.13700	425	0.560
						450	0.572
						475	0.584
						500	0.596
						525	0.607
						550	0.619
						575	0.631
						600	0.642