

TOLUENE 2,4-DIISOCYANATE

TDI

CAUTIONARY RESPONSE INFORMATION

| | | | | |
|---|---|---|---------------------------|---------------------------|
| Common Synonyms | | Liquid | Colorless to light yellow | Sharp, sweet, fruity odor |
| Hylyene T Mondur TDS Nacconate 100 TDI 2,4-Tolylene diisocyanate | | Sinks and reacts with water. Freezing point is 68°F - 72°F. | | |
| <p>Keep people away. AVOID CONTACT WITH LIQUID AND VAPOR. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Call fire department. Notify local health and pollution control agencies. Protect water intakes.</p> | | | | |
| Fire | Combustible. POISONOUS GAS IS PRODUCED IN FIRE. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Extinguish with dry chemical or carbon dioxide. Water and foam may be ineffective on fire. Cool exposed containers with water. | | | |
| Exposure | CALL FOR MEDICAL AID. LIQUID POISONOUS IF SWALLOWED. Will burn skin and eyes. 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 | 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
 Do not burn

2. CHEMICAL DESIGNATIONS

2.1 **CG Compatibility Group:** 12; Isocyanate
 2.2 **Formula:** 1-CH₃C₆H₄(NCO)₂-2, 4
 2.3 **IMO/UN Designation:** Not listed
 2.4 **DOT ID No.:** 2078
 2.5 **CAS Registry No.:** 584-84-9
 2.6 **NAERG Guide No.:** 156
 2.7 **Standard Industrial Trade Classification:** 51489

3. HEALTH HAZARDS

- 3.1 **Personal Protective Equipment:** Organic vapor canister; goggles or face shield; rubber gloves, boots and apron.
- 3.2 **Symptoms Following Exposure:** Irritates eyes and skin. Potent sensitizer and lung irritant if inhaled. May produce bronchospasm (asthma), pneumonitis, bronchitis, and pulmonary edema. Nocturnal cough and shortness of breath are common. Repeated low-level exposure may produce chronic lung disease. Oral toxicity is low.
- 3.3 **Treatment of Exposure:** INHALATION: remove victim to fresh air; administer artificial respiration and oxygen if needed; call a doctor at once. INGESTION: do NOT induce vomiting; call a doctor. EYES: flush with water for at least 15 min.; call a doctor at once. SKIN: flush with water; wipe off; wipe with rubbing alcohol; wash with soap and water.
- 3.4 **TLV-TWA:** 0.005 ppm
 3.5 **TLV-STEL:** Not listed.
 3.6 **TLV-Ceiling:** 0.02 ppm
 3.7 **Toxicity by Ingestion:** Grade 2; LD₅₀ = 0.5 to 5 g/kg
 3.8 **Toxicity by Inhalation:** Currently not available.
 3.9 **Chronic Toxicity:** Currently not available
 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:** Fairly severe skin irritant; may cause pain and second-degree burns after a few minutes' contact.
 3.12 **Odor Threshold:** 0.4-2.14 ppm
 3.13 **IDLH Value:** 2.5 ppm
 3.14 **OSHA PEL-TWA:** Not listed.
 3.15 **OSHA PEL-STEL:** Not listed.
 3.16 **OSHA PEL-Ceiling:** 0.02 ppm
 3.17 **EPA AEGL:** Not listed

4. FIRE HAZARDS

- 4.1 **Flash Point:** 270°F O.C.
 4.2 **Flammable Limits in Air:** 0.9%-9.5%
 4.3 **Fire Extinguishing Agents:** Water, foam, dry chemical, or carbon dioxide
 4.4 **Fire Extinguishing Agents Not to Be Used:** Water or foam may cause frothing.
 4.5 **Special Hazards of Combustion Products:** Irritating vapors are generated when heated.
 4.6 **Behavior in Fire:** Not pertinent
 4.7 **Auto Ignition Temperature:** >300
 4.8 **Electrical Hazards:** Not pertinent
 4.9 **Burning Rate:** Currently not available
 4.10 **Adiabatic Flame Temperature:** Currently not available
 4.11 **Stoichiometric Air to Fuel Ratio:** 54.7 (calc.)
 4.12 **Flame Temperature:** Currently not available
 4.13 **Combustion Molar Ratio (Reactant to Product):** 15.0 (calc.)
 4.14 **Minimum Oxygen Concentration for Combustion (MOCC):** Not listed

5. CHEMICAL REACTIVITY

- 5.1 **Reactivity with Water:** Forms carbon dioxide gas and an organic base; the reaction is not violent.
 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:** Slow, not hazardous, above 113°F
 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 distilled, 99% total diisocyanate. The following isomer ratios are shipped: (a) 100% 2, 4-; (b) 80% 2, 4-; 20% 2, 6- (most common); (c) 65% 2, 4-; 35% 2, 6-. All mixtures have similar characteristics.
 7.2 **Storage Temperature:** 75-100°F
 7.3 **Inert Atmosphere:** Inerted
 7.4 **Venting:** Pressure-vacuum
 7.5 **IMO Pollution Category:** C
 7.6 **Ship Type:** 2
 7.7 **Barge Hull Type:** 1

8. HAZARD CLASSIFICATIONS

- 8.1 **49 CFR Category:** Poison
 8.2 **49 CFR Class:** 6.1
 8.3 **49 CFR Package Group:** II
 8.4 **Marine Pollutant:** No
 8.5 **NFPA Hazard Classification:**
- | Category | Classification |
|---------------------------|----------------|
| Health Hazard (Blue)..... | 3 |
| Flammability (Red)..... | 1 |
| Instability (Yellow)..... | 1 |
| Special (White)..... | W |
- 8.6 **EPA Reportable Quantity:** 100 pounds
 8.7 **EPA Pollution Category:** B
 8.8 **RCRA Waste Number:** U223
 8.9 **EPA FWPCA List:** Not listed

9. PHYSICAL & CHEMICAL PROPERTIES

- 9.1 **Physical State at 15° C and 1 atm:** Solid
 9.2 **Molecular Weight:** 174.16
 9.3 **Boiling Point at 1 atm:** 482°F = 250°C = 523°K
 9.4 **Freezing Point:** 68-72°F = 20-22°C = 293-295°K
 9.5 **Critical Temperature:** Not pertinent
 9.6 **Critical Pressure:** Not pertinent
 9.7 **Specific Gravity:** 1.22 at 25°C (liquid)
 9.8 **Liquid Surface Tension:** (est.) 25 dynes/cm = 0.025 N/m at 25°C
 9.9 **Liquid Water Interfacial Tension:** (est.) 45 dynes/cm = 0.045 N/m at 25°C
 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.) -10,000 Btu/lb = -5720 cal/g = -239 X 10³ 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:** Low

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 |
| 80 | 76.049 | 85 | 0.398 | 77 | 1.179 | 68 | 5.770 |
| 85 | 75.879 | 90 | 0.400 | 78 | 1.179 | 69 | 5.623 |
| 90 | 75.700 | 95 | 0.402 | 79 | 1.179 | 70 | 5.481 |
| 95 | 75.530 | 100 | 0.403 | 80 | 1.179 | 71 | 5.342 |
| 100 | 75.360 | 105 | 0.405 | 81 | 1.179 | 72 | 5.207 |
| 105 | 75.179 | 110 | 0.407 | 82 | 1.179 | 73 | 5.077 |
| 110 | 75.009 | 115 | 0.409 | 83 | 1.179 | 74 | 4.950 |
| 115 | 74.839 | 120 | 0.411 | 84 | 1.179 | 75 | 4.826 |
| 120 | 74.660 | 125 | 0.413 | 85 | 1.179 | 76 | 4.707 |
| 125 | 74.490 | 130 | 0.415 | 86 | 1.179 | 77 | 4.590 |
| 130 | 74.320 | 135 | 0.417 | 87 | 1.179 | 78 | 4.477 |
| 135 | 74.139 | 140 | 0.419 | 88 | 1.179 | 79 | 4.367 |
| 140 | 73.969 | 145 | 0.421 | 89 | 1.179 | 80 | 4.260 |
| | | 150 | 0.423 | 90 | 1.179 | 81 | 4.156 |
| | | | | 91 | 1.179 | 82 | 4.056 |
| | | | | 92 | 1.179 | 83 | 3.957 |
| | | | | 93 | 1.179 | 84 | 3.862 |
| | | | | 94 | 1.179 | 85 | 3.769 |
| | | | | 95 | 1.179 | | |
| | | | | 96 | 1.179 | | |
| | | | | 97 | 1.179 | | |
| | | | | 98 | 1.179 | | |
| | | | | 99 | 1.179 | | |
| | | | | 100 | 1.179 | | |
| | | | | 101 | 1.179 | | |
| | | | | 102 | 1.179 | | |

| 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 |
| | I | 130 | 0.004 | 130 | 0.00011 | | N |
| | N | 140 | 0.006 | 140 | 0.00015 | | O |
| | S | 150 | 0.008 | 150 | 0.00022 | | T |
| | O | 160 | 0.012 | 160 | 0.00031 | | P |
| | L | 170 | 0.017 | 170 | 0.00044 | | E |
| | U | 180 | 0.024 | 180 | 0.00060 | | R |
| | B | 190 | 0.033 | 190 | 0.00082 | | T |
| | L | 200 | 0.045 | 200 | 0.00112 | | I |
| | E | 210 | 0.062 | 210 | 0.00150 | | N |
| | | 220 | 0.084 | 220 | 0.00199 | | E |
| | | 230 | 0.112 | 230 | 0.00263 | | N |
| | | 240 | 0.149 | 240 | 0.00344 | | T |
| | | 250 | 0.196 | 250 | 0.00447 | | |
| | | 260 | 0.256 | 260 | 0.00577 | | |
| | | 270 | 0.332 | 270 | 0.00738 | | |
| | | 280 | 0.428 | 280 | 0.00938 | | |
| | | 290 | 0.547 | 290 | 0.01184 | | |
| | | 300 | 0.696 | 300 | 0.01486 | | |