

# CYANOGEN

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## CAUTIONARY RESPONSE INFORMATION

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| <b>Common Synonyms</b><br>Dicyan<br>Dicyanogen<br>Ethane dinitrile<br>Oxalic acid dinitrile<br>Oxalotrile  | <b>Gas</b><br><br>Colorless<br><br>Almond Odor   |
| Floats and boils on water. Poisonous, flammable visible vapor cloud is produced.   |  |
| <p><b>KEEP PEOPLE AWAY. AVOID CONTACT WITH LIQUID AND VAPOR. Avoid inhalation.</b><br/> <b>Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves).</b><br/> <b>Shut off ignition sources. Call fire department.</b><br/> <b>Evacuate area in case of large discharge.</b><br/> <b>Stay upwind. Use water spray to "knock down" vapor.</b><br/> <b>Notify local health and pollution control agencies.</b><br/> <b>Protect water intakes.</b></p> |  |
| <b>Fire</b>  | <p><b>FLAMMABLE.</b><br/> <b>POISONOUS GASES ARE PRODUCED IN FIRE.</b><br/>         Containers may explode in fire.<br/>         Flashback along vapor trail may occur.<br/>         Vapor may explode if ignited in an enclosed area.<br/>         Wear goggles, self-contained breathing apparatus and rubber overclothing (including gloves).<br/>         Let fire burn.<br/>         Stop flow of gas if possible.<br/>         Cool exposed containers and protect men effecting shutoff with water.</p>   |
| <b>Exposure</b>  | <p>CALL FOR MEDICAL AID.</p> <p><b>VAPOR</b><br/> <b>POISONOUS IF INHALED.</b><br/>         Irritating to eyes.<br/>         Move victim to fresh air.<br/>         If in eyes, hold eyelids open and flush with plenty of water.<br/>         If breathing has stopped, give artificial respiration (but not mouth-to-mouth).</p> <p><b>LIQUID</b><br/> <b>POISONOUS IF SWALLOWED.</b><br/>         Will cause frostbite.<br/>         Remove contaminated clothing and shoes.<br/>         Flush affected areas with plenty of water.<br/> <b>DO NOT RUB AFFECTED AREAS.</b><br/>         IF IN EYES, hold eyelids open and flush with plenty of water.<br/>         IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting.<br/>         IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.</p> |
| <b>Water Pollution</b>   | <p>Effect of low concentrations on aquatic life is unknown.<br/>         May be dangerous if it enters water intakes.<br/>         Notify local health and wildlife officials.<br/>         Notify operators of nearby water intakes.</p>  |

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| <p><b>1. CORRECTIVE RESPONSE ACTIONS</b><br/>         Dilute and disperse<br/>         Stop discharge<br/>         Do not burn</p>   | <p><b>2. CHEMICAL DESIGNATIONS</b><br/>         2.1 CG Compatibility Group: Not listed.<br/>         2.2 Formula: (CN)<sub>2</sub><br/>         2.3 IMO/UN Designation: 2/1026<br/>         2.4 DOT ID No.: 1026<br/>         2.5 CAS Registry No.: 460-19-5<br/>         2.6 NAERG Guide No.: 119<br/>         2.7 Standard Industrial Trade Classification: 51484</p> |
| <p><b>3. HEALTH HAZARDS</b></p> <p>3.1 <b>Personal Protective Equipment:</b> Self-contained breathing apparatus; rubber gloves; rubber protective clothing; rubber-soled shoes.</p> <p>3.2 <b>Symptoms Following Exposure:</b> Vapor irritates eyes and causes giddiness, headache, fatigue, and nausea if inhaled.</p> <p>3.3 <b>Treatment of Exposure:</b> In general, treatment is similar to that used following exposure to hydrogen cyanide. <b>INHALATION:</b> move victim to fresh air and have him lie down; do not permit him to exert himself; remove contaminated clothing but keep patient covered and comfortably warm; summon a physician; break an amyl nitrite pearl in a cloth and hold it lightly under the victim's nose for 15 seconds; repeat five times at about 15-sec. intervals; use artificial respiration if breathing has stopped. <b>EYES:</b> flush with water for at least 15 min.</p> <p>3.4 <b>TLV-TWA:</b> 10 ppm<br/>         3.5 <b>TLV-STEL:</b> Not listed.<br/>         3.6 <b>TLV-Ceiling:</b> Not listed.<br/>         3.7 <b>Toxicity by Ingestion:</b> Currently not available<br/>         3.8 <b>Toxicity by Inhalation:</b> Currently not available.<br/>         3.9 <b>Chronic Toxicity:</b> Currently not available<br/>         3.10 <b>Vapor (Gas) Irritant Characteristics:</b> Currently not available<br/>         3.11 <b>Liquid or Solid Characteristics:</b> Currently not available<br/>         3.12 <b>Odor Threshold:</b> Currently not available<br/>         3.13 <b>IDLH Value:</b> Not listed.<br/>         3.14 <b>OSHA PEL-TWA:</b> Not listed.<br/>         3.15 <b>OSHA PEL-STEL:</b> Not listed.<br/>         3.16 <b>OSHA PEL-Ceiling:</b> Not listed.<br/>         3.17 <b>EPA AEGL:</b> Not listed</p> |   |

## 4. FIRE HAZARDS

- 4.1 **Flash Point:**  
Flammable gas
- 4.2 **Flammable Limits in Air:** 6.6%-43%
- 4.3 **Fire Extinguishing Agents:** Let fire burn, shut off flow of gas, cool exposed areas with water.
- 4.4 **Fire Extinguishing Agents Not to Be Used:** Not pertinent
- 4.5 **Special Hazards of Combustion Products:** Unburned vapors are highly toxic.
- 4.6 **Behavior in Fire:** Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back. Containers may explode in fire, releasing the highly toxic gas.
- 4.7 **Auto Ignition Temperature:** Currently not available
- 4.8 **Electrical Hazards:** Currently not available
- 4.9 **Burning Rate:** Not pertinent
- 4.10 **Adiabatic Flame Temperature:** Currently not available
- 4.11 **Stoichiometric Air to Fuel Ratio:** 19.0 (calc.)
- 4.12 **Flame Temperature:** Currently not available
- 4.13 **Combustion Molar Ratio (Reactant to Product):** 4.0 (calc.)
- 4.14 **Minimum Oxygen Concentration for Combustion (MOCC):** Not listed

## 5. CHEMICAL REACTIVITY

- 5.1 **Reactivity with Water:** No reaction, but water provides heat to vaporize liquid cyanogen.
- 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:**  
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:** 98.5%
- 7.2 **Storage Temperature:** Cool ambient
- 7.3 **Inert Atmosphere:** No requirement
- 7.4 **Venting:** Store containers in well ventilated area
- 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:** Poison gas
- 8.2 **49 CFR Class:** 2.3
- 8.3 **49 CFR Package Group:** Not pertinent.
- 8.4 **Marine Pollutant:** Yes
- 8.5 **NFPA Hazard Classification:**

|                           |                |
|---------------------------|----------------|
| Category                  | Classification |
| Health Hazard (Blue)..... | 4              |
| Flammability (Red).....   | 4              |
| Instability (Yellow)..... | 2              |
- 8.6 **EPA Reportable Quantity:** 100 pounds
- 8.7 **EPA Pollution Category:** B
- 8.8 **RCRA Waste Number:** P031
- 8.9 **EPA FWPCA List:** Not listed

## 9. PHYSICAL & CHEMICAL PROPERTIES

- 9.1 **Physical State at 15° C and 1 atm:** Gas
- 9.2 **Molecular Weight:** 52.0
- 9.3 **Boiling Point at 1 atm:** -6.1°F = -21.1°C = 252.1°K
- 9.4 **Freezing Point:** -18.2°F = -27.9°C = 245.3°K
- 9.5 **Critical Temperature:** 259.9°F = 126.6°C = 399.8°K
- 9.6 **Critical Pressure:** 857 psia = 58.2 atm = 5.91 MN/m<sup>2</sup>
- 9.7 **Specific Gravity:** 0.954 at -21°C (liquid)
- 9.8 **Liquid Surface Tension:** 22 dynes/cm = 0.022 N/m at -21°C
- 9.9 **Liquid Water Interfacial Tension:** Not pertinent
- 9.10 **Vapor (Gas) Specific Gravity:** 1.8
- 9.11 **Ratio of Specific Heats of Vapor (Gas):** 1.205 at 25°C
- 9.12 **Latent Heat of Vaporization:** 200 Btu/lb = 111 cal/g = 4.65 X 10<sup>5</sup> J/kg
- 9.13 **Heat of Combustion:** -9,059 Btu/lb = -5,033 cal/g = -210.6 X 10<sup>5</sup> J/kg
- 9.14 **Heat of Decomposition:** Not pertinent
- 9.15 **Heat of Solution:** 2,520 Btu/lb = 1,400 cal/g = 58.5 X 10<sup>5</sup> 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:** Currently not available

## NOTES

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| 9.20<br>SATURATED LIQUID DENSITY |                       | 9.21<br>LIQUID HEAT CAPACITY |                                     | 9.22<br>LIQUID THERMAL CONDUCTIVITY |   | 9.23<br>LIQUID VISCOSITY   |            |
|----------------------------------|-----------------------|------------------------------|-------------------------------------|-------------------------------------|---|----------------------------|------------|
| Temperature<br>(degrees F)       | Pounds per cubic foot | Temperature<br>(degrees F)   | British thermal unit per<br>pound-F | Temperature<br>(degrees F)          | British thermal unit inch<br>per hour-square foot-F | Temperature<br>(degrees F) | Centipoise |
| -18                              | 59.970                | -18                          | 0.300                               | -18                                 | 0.967   | -18                        | 0.447      |
| -17                              | 59.940                | -17                          | 0.300                               | -17                                 | 0.967   | -17                        | 0.443      |
| -16                              | 59.900                | -16                          | 0.300                               | -16                                 | 0.967   | -16                        | 0.439      |
| -15                              | 59.870                | -15                          | 0.300                               | -15                                 | 0.967   | -15                        | 0.435      |
| -14                              | 59.840                | -14                          | 0.300                               | -14                                 | 0.967   | -14                        | 0.431      |
| -13                              | 59.801                | -13                          | 0.300                               | -13                                 | 0.967   | -13                        | 0.427      |
| -12                              | 59.770                | -12                          | 0.300                               | -12                                 | 0.967   | -12                        | 0.423      |
| -11                              | 59.730                | -11                          | 0.300                               | -11                                 | 0.967   | -11                        | 0.420      |
| -10                              | 59.700                | -10                          | 0.300                               | -10                                 | 0.967   | -10                        | 0.416      |
| -9                               | 59.660                | -9                           | 0.300                               | -9                                  | 0.967   | -9                         | 0.412      |
| -8                               | 59.630                | -8                           | 0.300                               | -8                                  | 0.967   | -8                         | 0.409      |
| -7                               | 59.590                | -7                           | 0.300                               | -7                                  | 0.967   | -7                         | 0.405      |

| 9.24<br>SOLUBILITY IN WATER |                                   | 9.25<br>SATURATED VAPOR PRESSURE |                        | 9.26<br>SATURATED VAPOR DENSITY |                       | 9.27<br>IDEAL GAS HEAT CAPACITY |                                     |
|-----------------------------|-----------------------------------|----------------------------------|------------------------|---------------------------------|-----------------------|---------------------------------|-------------------------------------|
| Temperature<br>(degrees F)  | Pounds per 100 pounds<br>of water | Temperature<br>(degrees F)       | Pounds per square inch | Temperature<br>(degrees F)      | Pounds per cubic foot | Temperature<br>(degrees F)      | British thermal unit per<br>pound-F |
|                             | M                                 | -10                              | 13.260                 | -10                             | 0.14290               | 30                              | 0.252                               |
|                             | I                                 | -5                               | 15.060                 | -5                              | 0.16040               | 35                              | 0.253                               |
|                             | S                                 | 0                                | 17.050                 | 0                               | 0.17960               | 40                              | 0.254                               |
|                             | C                                 | 5                                | 19.250                 | 5                               | 0.20070               | 45                              | 0.255                               |
|                             | I                                 | 10                               | 21.680                 | 10                              | 0.22360               | 50                              | 0.256                               |
|                             | B                                 | 15                               | 24.360                 | 15                              | 0.24860               | 55                              | 0.256                               |
|                             | L                                 | 20                               | 27.300                 | 20                              | 0.27570               | 60                              | 0.257                               |
|                             | E                                 | 25                               | 30.520                 | 25                              | 0.30510               | 65                              | 0.258                               |
|                             |                                   | 30                               | 34.050                 | 30                              | 0.33680               | 70                              | 0.259                               |
|                             |                                   | 35                               | 37.900                 | 35                              | 0.37120               | 75                              | 0.260                               |
|                             |                                   | 40                               | 42.100                 | 40                              | 0.40810               | 80                              | 0.260                               |
|                             |                                   | 45                               | 46.660                 | 45                              | 0.44790               | 85                              | 0.261                               |
|                             |                                   | 50                               | 51.610                 | 50                              | 0.49060               | 90                              | 0.262                               |
|                             |                                   | 55                               | 56.980                 | 55                              | 0.53630               | 95                              | 0.263                               |
|                             |                                   | 60                               | 62.790                 | 60                              | 0.58530               | 100                             | 0.264                               |
|                             |                                   | 65                               | 69.059                 | 65                              | 0.63760               | 105                             | 0.265                               |
|                             |                                   | 70                               | 75.820                 | 70                              | 0.69340               | 110                             | 0.265                               |
|                             |                                   | 75                               | 83.089                 | 75                              | 0.75280               | 115                             | 0.266                               |
|                             |                                   | 80                               | 90.910                 | 80                              | 0.81610               | 120                             | 0.267                               |
|                             |                                   | 85                               | 99.299                 | 85                              | 0.88320               | 125                             | 0.268                               |
|                             |                                   |                                  |                        |                                 |                       | 130                             | 0.269                               |
|                             |                                   |                                  |                        |                                 |                       | 135                             | 0.269                               |
|                             |                                   |                                  |                        |                                 |                       | 140                             | 0.270                               |
|                             |                                   |                                  |                        |                                 |                       | 145                             | 0.271                               |
|                             |                                   |                                  |                        |                                 |                       | 150                             | 0.272                               |