MALEIC ANHYDRIDE

1. CORRECTIVE RESPONSE ACTIONS

Dilute and disperse
Stop discharge
Collection Systems: Dredge

2. CHEMICAL DESIGNATIONS

2.1 CG Compatibility Group: Not listed.
2.2 Formula: C4H4O3 = CHOCHO
2.3 IMO/UN Designation: 9.02215
2.4 DOT No.: 2115
2.5 CAS Registry No.: 108-31-6
2.6 HNIS Guide No.: 136
2.7 Standard Industrial Trade Classification: 51381

3. HEALTH HAZARDS

3.1 Personal Protective Equipment: Approved organic vapor acid gas cartridger, chemical goggles and face shield, rubber gloves, brimmed cap, and rubber apron.
3.2 Symptoms Following Exposure: Inhaling causes headache, dizziness, and nausea. Ingestion causes vomiting and diarrhea. Skin contact causes irritation. Inhalation may cause upper respiratory tract irritation.
3.3 Treatment of Exposure: INHALATION: give oxygen. EYE OR SKIN CONTACT: flush with lots of water for at least 15 min; for eyes, call a physician. For molten maleic burns, remove crust and treat as chemical and thermal burn.
3.4 TLV-TWA: 0.25 ppm
3.5 TLV-STEL: Not listed.
3.6 TLV-CEILING: Not listed.
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: None.
3.10 Vapor (Gas) Irritant Characteristics: Vapors cause moderate irritation, such that personal will find high concentrations unpleasant. The effect is temporary.
3.11 Liquid or Solid Characteristics: Causes smearing of the skin and first-degree burns on short exposure; may cause secondary burns on long exposure.
3.12 Odor Threshold: 1.3 - 2.0 mg/m³
3.13 IDLH Value: 10 mg/m³
3.14 OSHA PEEL-TWA: 3.25 ppm
3.15 OSHA PEEL-STEL: Not listed.
3.16 OSHA PEEL-Ceiling: Not listed.
3.17 EPA AELG: Not listed

4. FIRE HAZARDS

4.1 Flash Point: 215°F C.C.; 230°F O.C.
4.2 Flammable Limits in Air: 1.4%–7.1%
4.3 Fire Extinguishing Agents: Alcohol foam, dry chemical, or carbon dioxide.
4.4 Special Hazards of Combustion Products: Not pertinent
4.5 Behavior in Fire: When heated above 300°F in the presence of various materials may generate heat and carbon dioxide. Will explode if confined.
4.6 Stabilization of Reactions: Not pertinent
4.7 Auto-Ignition Temperature: 878°F
4.8 Electrical Hazards: Class I, Group D
4.9 Burning Rate: 1.4 in/min
4.10 Acidic Flame Temperature: Currently not available
4.11 Stoichiometric Air to Fuel Ratio: 14.3 (ratio)
4.12 Flame Temperature: Currently not available
4.13 Combustion Molar Ratio (Reactant to Product): 5.0 (ratio)
4.14 Minimum Oxygen Concentration for Combustion (MOC): Not listed

5. CHEMICAL REACTIVITY

5.1 Reactivity with Water: Water may cause cooling, as reaction with cold water is slow and non-hazardous.
5.2 Reactivity with Common Materials: No reaction
5.3 Stability During Transport: Stable
5.4 Neutralizing Agents for Acids and Caustics: Solid spills can usually be recovered before any significant reaction with water occurs. Flush area of spill covered before any significant reaction.
5.5 Polymerization: Very unlikely at ordinary temperatures, even in the molten state.
5.6 Initiator of Polymerization: None

6. WATER POLLUTION

6.1 Aquatic Toxicity: 150 ppm/24 hr/UN/Freshwater
6.2 Waterfowl Toxicity: Currently not available
6.3 Biological Oxygen Demand (BOD): 50% in 5 days
6.4 Food Chain Concentration Potential: None
6.5 GESAMP Hazard Profile: Bioaccumulation: 0, Damage to living resources: 1, Human Oral hazard: 2, Human Contact hazard: II, Reduction of amenities: XX

7. SHIPPING INFORMATION

7.1 Grades of Purity: Commercial: 99.5%
7.2 Storage Temperature: Ambient
7.3 Inert Atmosphere: Not required
7.4 Venting: Open
7.5 IMO Pollution Category: D
7.6 Ship Type: 3
7.7 Barge Hull Type: Currently not available

8. HAZARD CLASSIFICATIONS

8.1 49 CFR Category: Corrosive material
8.2 49 CFR Class: 8
8.3 49 CFR Package Group: III
8.4 Marine Pollutant: No
8.5 NFPA Hazard Classification:

9. PHYSICAL & CHEMICAL PROPERTIES

9.1 Physical State at 15°C and 1 atm: Solid
9.2 Molecular Weight: 98.06
9.3 Boiling Point at 1 atm: 389°F = 200°C = 472°F
9.4 Freezing Point: 127°F = 53°C = 326°F
9.5 Critical Temperature: Not pertinent
9.6 Critical Pressure: Not pertinent
9.7 Specific Gravity: 1.43 at 15°C (solid)
9.8 Liquid Surface Tension: Not pertinent
9.9 Liquid Water Interfacial Tension: Not pertinent
9.10 Vapor (Gaseous) 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: –5936 Btu/lb = –3298 kcal/g
9.14 Heat of Decomposition: Not pertinent
9.15 Heat of Solution: –135 Btu/lb = –65.0 cal/g
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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### Table 9.20: Saturated Liquid Density

<table>
<thead>
<tr>
<th>Temperature (degrees F)</th>
<th>Pounds per cubic foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOT</td>
<td>NOT</td>
</tr>
<tr>
<td>PE</td>
<td>PER</td>
</tr>
<tr>
<td>TISTE</td>
<td>TISTE</td>
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</tbody>
</table>

### Table 9.21: Liquid Heat Capacity

<table>
<thead>
<tr>
<th>Temperature (degrees F)</th>
<th>British thermal unit per pound-F</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOT</td>
<td>NOT</td>
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<tr>
<td>PE</td>
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</tr>
<tr>
<td>TISTE</td>
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</tr>
</tbody>
</table>

### Table 9.22: Liquid Thermal Conductivity

<table>
<thead>
<tr>
<th>Temperature (degrees F)</th>
<th>British thermal unit inch per hour-square foot-F</th>
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</thead>
<tbody>
<tr>
<td>NOT</td>
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<tr>
<td>PE</td>
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<td>TISTE</td>
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### Table 9.23: Liquid Viscosity

<table>
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<th>Temperature (degrees F)</th>
<th>Centipoise</th>
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<tr>
<td>PE</td>
<td>PER</td>
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</table>

### Table 9.24: Solubility in Water

<table>
<thead>
<tr>
<th>Temperature (degrees F)</th>
<th>Pounds per 100 pounds of water</th>
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</thead>
<tbody>
<tr>
<td>INSOLUBLE</td>
<td>NOT</td>
</tr>
<tr>
<td>PE</td>
<td>PER</td>
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<td>TISTE</td>
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</table>

### Table 9.25: Saturated Vapor Pressure

<table>
<thead>
<tr>
<th>Temperature (degrees F)</th>
<th>Pounds per square inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOT</td>
<td>NOT</td>
</tr>
<tr>
<td>PE</td>
<td>PER</td>
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<tr>
<td>TISTE</td>
<td>TISTE</td>
</tr>
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</table>

### Table 9.26: Saturated Vapor Density

<table>
<thead>
<tr>
<th>Temperature (degrees F)</th>
<th>Pounds per cubic foot</th>
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</thead>
<tbody>
<tr>
<td>NOT</td>
<td>NOT</td>
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<tr>
<td>PE</td>
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<td>TISTE</td>
<td>TISTE</td>
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</table>

### Table 9.27: Ideal Gas Heat Capacity

<table>
<thead>
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<th>Temperature (degrees F)</th>
<th>British thermal unit per pound-F</th>
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<tr>
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