

# HYDROFLUORIC ACID

HFA

## CAUTIONARY RESPONSE INFORMATION

|                        |   |
|------------------------|---|
| <b>Common Synonyms</b> | Watery liquid      Colorless to green      Irritating odor  |
|                        | Sinks and mixes with water. Harmful vapor is produced.  |
|                        | <p>Evacuate.<br/>                     Keep people away. <b>AVOID CONTACT WITH LIQUID AND VAPOR.</b><br/>                     Wear chemical protective suit with self-contained breathing apparatus.<br/>                     Stay upwind and use water spray to "knock down" vapor.<br/>                     Notify local health and pollution control agencies.<br/>                     Protect water intakes.</p>  |
| <b>Fire</b>            | Not flammable.<br>Flammable gas may be produced on contact with metals.<br>Wear chemical protective suit with self-contained breathing apparatus.   |
| <b>Exposure</b>        | CALL FOR MEDICAL AID.<br>VAPOR<br>Will burn eyes, nose and throat.<br>Harmful if inhaled.<br>Move to fresh air.<br>If breathing has stopped, give artificial respiration.<br>If breathing is difficult, give oxygen.<br>IF IN EYES, hold eyelids open and flush with plenty of water.<br>LIQUID<br>Will burn skin and eyes.<br>Harmful if swallowed.<br>Remove contaminated clothing and shoes.<br>Flush affected areas with plenty of water.<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.<br>DO NOT INDUCE VOMITING. |
| <b>Water Pollution</b> | HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS.<br>May be dangerous if it enters water intakes.<br>Notify local health and wildlife officials.<br>Notify operators of nearby water intakes.   |

### 1. CORRECTIVE RESPONSE ACTIONS

Dilute and disperse  
 Stop discharge  
 Chemical and Physical Treatment:  
 Neutralize

### 2. CHEMICAL DESIGNATIONS

- 2.1 CG Compatibility Group: 1; Non-oxidizing mineral acid
- 2.2 Formula: HF-H<sub>2</sub>O
- 2.3 IMO/UN Designation: 8.0/1790
- 2.4 DOT ID No.: 1790
- 2.5 CAS Registry No.: 7664-39-3
- 2.6 NAERG Guide No.: 157
- 2.7 Standard Industrial Trade Classification: 52236

### 3. HEALTH HAZARDS

- 3.1 **Personal Protective Equipment:** Proper protective clothing must be worn that encapsulates the body including the face. All persons handling this product must be familiar with and must observe all the precautions contained in the Manufacturing Chemists' Association Chemical Safety Data Sheet SD-25. A shower and an eye wash must be available.
- 3.2 **Symptoms Following Exposure:** Serious and painful burns of eyes and skin.
- 3.3 **Treatment of Exposure:** INGESTION: have victim drink water or milk; do NOT induce vomiting. SKIN: if victim has come in contact with liquid or vapor, put him in a shower and call a physician. EYES: flush with water for at least 15 min. and consult physician.
- 3.4 **TLV-TWA:** Not listed.
- 3.5 **TLV-STEL:** Not listed.
- 3.6 **TLV-Ceiling:** 3 ppm as F
- 3.7 **Toxicity by Ingestion:** Currently not available
- 3.8 **Toxicity by Inhalation:** Currently not available.
- 3.9 **Chronic Toxicity:** Currently not available
- 3.10 **Vapor (Gas) Irritant Characteristics:** Vapors cause severe irritation of eye and throat and can cause eye and lung injury. They cannot be tolerated even at low concentrations.
- 3.11 **Liquid or Solid Characteristics:** Severe skin irritant. Causes second and third-degree burns on short contact; very injurious to the eyes.
- 3.12 **Odor Threshold:** Currently not available
- 3.13 **IDLH Value:** 30 ppm as F
- 3.14 **OSHA PEL-TWA:** 3 ppm as F
- 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:**  
Not flammable
- 4.2 **Flammable Limits in Air:** Not flammable
- 4.3 **Fire Extinguishing Agents:** Not pertinent
- 4.4 **Fire Extinguishing Agents Not to Be Used:** Not pertinent
- 4.5 **Special Hazards of Combustion Products:** Toxic and irritating vapors are generated when heated.
- 4.6 **Behavior in Fire:** Not pertinent
- 4.7 **Auto Ignition Temperature:** Not flammable
- 4.8 **Electrical Hazards:** Not pertinent
- 4.9 **Burning Rate:** Not flammable
- 4.10 **Adiabatic Flame Temperature:** Currently not available
- 4.11 **Stoichiometric Air to Fuel Ratio:** Not pertinent
- 4.12 **Flame Temperature:** Currently not available
- 4.13 **Combustion Molar Ratio (Reactant to Product):** Not pertinent
- 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:** Will attack glass, concrete and certain metals containing silica, such as cast iron. Will attack natural rubber, leather, and many organic materials. May generate flammable hydrogen in contact with some metals.
- 5.3 **Stability During Transport:** Stable
- 5.4 **Neutralizing Agents for Acids and Caustics:** Flush with water; apply powdered limestone, slaked lime, soda ash, or sodium bicarbonate.
- 5.5 **Polymerization:** Not pertinent
- 5.6 **Inhibitor of Polymerization:** Not pertinent

### 6. WATER POLLUTION

- 6.1 **Aquatic Toxicity:**  
60 ppm/fish/lethal/fresh water  
\*Time period not specified
- 6.2 **Waterfowl Toxicity:** Currently not available
- 6.3 **Biological Oxygen Demand (BOD):** None
- 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: XX

### 7. SHIPPING INFORMATION

- 7.1 **Grades of Purity:** Reagent: 48-51%; technical: 52-55%; 70% grade
- 7.2 **Storage Temperature:** Ambient
- 7.3 **Inert Atmosphere:** No requirement
- 7.4 **Venting:** Pressure-vacuum
- 7.5 **IMO Pollution Category:** B
- 7.6 **Ship Type:** Data not available
- 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:** I
- 8.4 **Marine Pollutant:** No
- 8.5 **NFPA Hazard Classification:**

| Category                  | Classification |
|---------------------------|----------------|
| Health Hazard (Blue)..... | 4              |
| Flammability (Red).....   | 0              |
| Instability (Yellow)..... | 0              |
- 8.6 **EPA Reportable Quantity:** 100 pounds
- 8.7 **EPA Pollution Category:** B
- 8.8 **RCRA Waste Number:** U134
- 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:** Not pertinent
- 9.3 **Boiling Point at 1 atm:** 152°F = 67°C = 340°K
- 9.4 **Freezing Point:** Not pertinent
- 9.5 **Critical Temperature:** Not pertinent
- 9.6 **Critical Pressure:** Not pertinent
- 9.7 **Specific Gravity:** 1.258 at 25°C (liquid)
- 9.8 **Liquid Surface Tension:** Not pertinent
- 9.9 **Liquid Water Interfacial Tension:** Not pertinent
- 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:** 649 Btu/lb = 361 cal/g = 15.1 X 10<sup>3</sup> J/kg
- 9.13 **Heat of Combustion:** Not pertinent
- 9.14 **Heat of Decomposition:** Not pertinent
- 9.15 **Heat of Solution:** -66.6 Btu/lb = -37.0 cal/g = -1.55 X 10<sup>3</sup> J/kg
- 9.16 **Heat of Polymerization:** Not pertinent
- 9.17 **Heat of Fusion:** 54.7 cal/g
- 9.18 **Limiting Value:** Currently not available
- 9.19 **Reid Vapor Pressure:** Varies \*Physical properties apply to 70% of solution.

### 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 |
| 15                               | 80.429                | 34                           | 0.702                               |                                     | N   | 32                         | 0.850      |
| 20                               | 80.280                | 36                           | 0.704                               |                                     | O   |                            |            |
| 25                               | 80.120                | 38                           | 0.707                               |                                     | T   |                            |            |
| 30                               | 79.959                | 40                           | 0.709                               |                                     |   |                            |            |
| 35                               | 79.809                | 42                           | 0.711                               |                                     | P   |                            |            |
| 40                               | 79.650                | 44                           | 0.713                               |                                     | E   |                            |            |
| 45                               | 79.490                | 46                           | 0.715                               |                                     | R   |                            |            |
| 50                               | 79.339                | 48                           | 0.718                               |                                     | T   |                            |            |
| 55                               | 79.179                | 50                           | 0.720                               |                                     | I   |                            |            |
| 60                               | 79.030                | 52                           | 0.722                               |                                     | N   |                            |            |
| 65                               | 78.870                | 54                           | 0.724                               |                                     | E   |                            |            |
| 70                               | 78.709                | 56                           | 0.727                               |                                     | N   |                            |            |
| 75                               | 78.559                | 58                           | 0.729                               |                                     | T   |                            |            |
| 80                               | 78.400                | 60                           | 0.731                               |                                     |   |                            |            |
| 85                               | 78.250                | 62                           | 0.733                               |                                     |   |                            |            |
|                                  |                       | 64                           | 0.735                               |                                     |   |                            |            |
|                                  |                       | 66                           | 0.738                               |                                     |   |                            |            |
|                                  |                       | 68                           | 0.740                               |                                     |   |                            |            |
|                                  |                       | 70                           | 0.742                               |                                     |   |                            |            |
|                                  |                       | 72                           | 0.744                               |                                     |   |                            |            |
|                                  |                       | 74                           | 0.747                               |                                     |   |                            |            |
|                                  |                       | 76                           | 0.749                               |                                     |   |                            |            |
|                                  |                       | 78                           | 0.751                               |                                     |   |                            |            |
|                                  |                       | 80                           | 0.753                               |                                     |   |                            |            |
|                                  |                       | 82                           | 0.755                               |                                     |   |                            |            |
|                                  |                       | 84                           | 0.758                               |                                     |   |                            |            |

| 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<br>I<br>S<br>C<br>I<br>B<br>L<br>E |                                  | C<br>U<br>R<br>R<br>E<br>N<br>T<br>L<br>Y |                                 | C<br>U<br>R<br>R<br>E<br>N<br>T<br>L<br>Y |                                 | N<br>O<br>T<br>P<br>E<br>R<br>T<br>I<br>N<br>E<br>N<br>T |
|                             |                                      |                                  | N<br>O<br>T                               |                                 | N<br>O<br>T                               |                                 |  |
|                             |                                      |                                  | A<br>V<br>A<br>I<br>L<br>A<br>B<br>L<br>E |                                 | A<br>V<br>A<br>I<br>L<br>A<br>B<br>L<br>E |                                 |  |