

HYDROGEN PEROXIDE

HPO

CAUTIONARY RESPONSE INFORMATION

Common Synonyms	Watery liquid Colorless Slightly sharp odor
	Sinks and mixes with water. Irritating vapor is produced.
<p>Evacuate. Keep people away. AVOID CONTACT WITH LIQUID AND VAPOR. Wear chemical protective suit including self-contained breathing apparatus. Call fire department. Notify local health and pollution control agencies. Protect water intakes.</p>	
Fire	Not flammable. May cause fire and explode on contact with combustibles and metals. Containers may explode when heated. Wear chemical protective suit including self-contained breathing apparatus. Flood discharge area with water.
Exposure	CALL FOR MEDICAL AID. 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. LIQUID Will burn skin and 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.
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

Dilute and disperse
Stop discharge

2. CHEMICAL DESIGNATIONS

- 2.1 CG Compatibility Group: Not listed.
- 2.2 Formula: H₂O₂; H₂O
- 2.3 IMO/UN Designation: 5.1/2015
- 2.4 DOT ID No.: 2015
- 2.5 CAS Registry No.: Currently not available
- 2.6 NAERG Guide No.: 143
- 2.7 Standard Industrial Trade Classification: 52491

3. HEALTH HAZARDS

- 3.1 **Personal Protective Equipment:** Protective garments, both outer and inner, made of a woven polyester fabric or of modacrylic or polyvinylidene fabrics; impermeable apron made of polyvinyl chloride or polyethylene film; neoprene gloves and boots; goggles.
- 3.2 **Symptoms Following Exposure:** Although solutions and vapors are nontoxic, they are irritating. Vapor causes discomfort of eyes and nose. Moderately concentrated liquid causes whitening of the skin and severe stinging sensation. In most cases the stinging subsides quickly and the skin gradually returns to normal without any damage. Highly concentrated liquid can cause blistering of skin if left on for any length of time; can also cause eye damage.
- 3.3 **Treatment of Exposure:** Contact should be avoided, but immediate flushing with water will prevent any reaction in case of accidental contact.
- 3.4 TLV-TWA: 1 ppm
- 3.5 TLV-STEL: Not listed.
- 3.6 TLV-Ceiling: Not listed.
- 3.7 **Toxicity by Ingestion:** Currently not available
- 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 personnel will find high concentrations unpleasant. The effect is temporary.
- 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:** Currently not available
- 3.13 IDLH Value: 75 ppm
- 3.14 OSHA PEL-TWA: 1 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:**
Not flammable but may cause fire and react violently on contact with combustibles and metals.
- 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:** Not pertinent
- 4.6 **Behavior in Fire:** May explode in fire
- 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:** Dirt and many metals cause a rapid decomposition with liberation of oxygen gas; occurs particularly if concentration is above 40%.
- 5.3 **Stability During Transport:** Pure grades are quite stable, but contamination with metals or dirt can cause rapid or violent decomposition.
- 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:**
> 40 ppm*/fingering trout/toxic/salt 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: 0
Human Contact hazard: 1
Reduction of amenities: 0

7. SHIPPING INFORMATION

- 7.1 **Grades of Purity:** Common commercial strengths are 27.5%, 35%, 50%, 70%, 90% and 98%. "High Strength" means greater than 52%. Purity: Technical; Mil. Spec.; ACS. The hazard increases with the strength.
- 7.2 **Storage Temperature:** Ambient
- 7.3 **Inert Atmosphere:** No requirement
- 7.4 **Venting:** Safety relief or pressure-vacuum
- 7.5 **IMO Pollution Category:** C
- 7.6 **Ship Type:** 2 or 3
- 7.7 **Barge Hull Type:** Currently not available

8. HAZARD CLASSIFICATIONS

- 8.1 **49 CFR Category:** Oxidizer
- 8.2 **49 CFR Class:** 5.1
- 8.3 **49 CFR Package Group:** I
- 8.4 **Marine Pollutant:** No
- 8.5 **NFPA Hazard Classification:**

Category	Classification
Health Hazard (Blue).....	2
Flammability (Red).....	0
Instability (Yellow).....	3
- 8.6 **EPA Reportable Quantity:** Not listed.
- 8.7 **EPA Pollution Category:** Not listed.
- 8.8 **RCRA Waste Number:** Not listed
- 8.9 **EPA FWPCA List:** Not listed

9. PHYSICAL & CHEMICAL PROPERTIES

- 9.1 **Physical State at 15° C and 1 atm:** Liquid
- 9.2 **Molecular Weight:** 34.01
- 9.3 **Boiling Point at 1 atm:** 257°F = 125°C = 398°K
- 9.4 **Freezing Point:** -40.5°F = 40.3°C = 232.9°K
- 9.5 **Critical Temperature:** Not pertinent
- 9.6 **Critical Pressure:** Not pertinent
- 9.7 **Specific Gravity:** 1.29 at 20°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):** 1.241
- 9.12 **Latent Heat of Vaporization:** 542 Btu/lb = 301 cal/g = 12.6 X 10⁵ J/kg
- 9.13 **Heat of Combustion:** Not pertinent
- 9.14 **Heat of Decomposition:** -1220 Btu/lb = -676 cal/g = -28.3 X 10⁵ J/kg
- 9.15 **Heat of Solution:** -20.2 Btu/lb = -11.2 cal/g = -0.469 X 10⁵ J/kg
- 9.16 **Heat of Polymerization:** Not pertinent
- 9.17 **Heat of Fusion:** 8.58 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 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
34	82.330	52	0.760		N		N
36	82.259	54	0.760		O		O
38	82.190	56	0.760		T		T
40	82.120	58	0.760				
42	82.049	60	0.760		P		P
44	81.980	62	0.760		E		E
46	81.910	64	0.760		R		R
48	81.839	66	0.760		T		T
50	81.770	68	0.760		I		I
52	81.700	70	0.760		N		N
54	81.629	72	0.760		E		E
56	81.570	74	0.760		N		N
58	81.500	76	0.760		T		T
60	81.429	78	0.760				
62	81.360	80	0.760				
64	81.290	82	0.760				
66	81.219	84	0.760				
68	81.150	86	0.760				
70	81.080						
72	81.009						
74	80.940						
76	80.870						
78	80.799						
80	80.730						
82	80.660						
84	80.589						

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	40	0.033	40	0.00021	0	0.285
	I	50	0.048	50	0.00030	25	0.291
	S	60	0.071	60	0.00043	50	0.297
	C	70	0.101	70	0.00060	75	0.302
	I	80	0.143	80	0.00084	100	0.308
	B	90	0.200	90	0.00115	125	0.314
	L	100	0.276	100	0.00156	150	0.319
	E	110	0.377	110	0.00209	175	0.324
		120	0.509	120	0.00278	200	0.329
		130	0.680	130	0.00365	225	0.334
		140	0.900	140	0.00475	250	0.339
		150	1.181	150	0.00613	275	0.343
		160	1.535	160	0.00785	300	0.347
		170	1.979	170	0.00996	325	0.352
		180	2.532	180	0.01254	350	0.356
		190	3.215	190	0.01568	375	0.360
						400	0.363
						425	0.367
						450	0.371
						475	0.374
						500	0.377
						525	0.380
						550	0.383
						575	0.386
						600	0.388