

# OXYGEN

OXY

## CAUTIONARY RESPONSE INFORMATION

<b>Common Synonyms</b> Liquid oxygen LOX	Gas	Light blue	Odorless
Sinks and boils in water.			
<p>Evacuate.                  Keep people away. Avoid contact with liquid and vapor.                  Wear rubber overclothing (including gloves).                  Shut off ignition sources and call fire department.</p>			
<b>Fire</b>	Not flammable. Containers may explode in fire. Cool exposed containers with water.		
<b>Exposure</b>	Call for medical aid.  VAPOR If inhaled will cause dizziness, or difficult breathing.  LIQUID Will cause frostbite. Flush affected areas with plenty of water. DO NOT RUB AFFECTED AREAS.		
<b>Water Pollution</b>	Not harmful to aquatic life.		

### 1. CORRECTIVE RESPONSE ACTIONS

Stop discharge

### 2. CHEMICAL DESIGNATIONS

- 2.1 CG Compatibility Group: Not listed.
- 2.2 Formula: O<sub>2</sub>
- 2.3 IMO/UN Designation: 2/1073
- 2.4 DOT ID No.: 1072
- 2.5 CAS Registry No.: 7782-44-7
- 2.6 NAERG Guide No.: 122
- 2.7 Standard Industrial Trade Classification: 52221

### 3. HEALTH HAZARDS

- 3.1 **Personal Protective Equipment:** Safety goggles or face shield; insulated gloves; long sleeves; trousers worn outside boots or over high-top shoes to shed spilled liquid.
- 3.2 **Symptoms Following Exposure:** Inhalation of 100% oxygen can cause nausea, dizziness, irritation of lungs, pulmonary edema, pneumonia, and collapse. Liquid may cause frostbite of eyes and skin.
- 3.3 **Treatment of Exposure:** INHALATION: in all but the most severe cases (pneumonia), recovery is rapid after reduction of oxygen pressure; supportive treatment should include immediate sedation, anticonvulsive therapy if needed, and rest. EYES: treat frostbite burns. SKIN: treat frostbite; soak in lukewarm water.
- 3.4 **TLV-TWA:** Not listed.
- 3.5 **TLV-STEL:** Not listed.
- 3.6 **TLV-Ceiling:** Not listed.
- 3.7 **Toxicity by Ingestion:** Not pertinent
- 3.8 **Toxicity by Inhalation:** Currently not available.
- 3.9 **Chronic Toxicity:** Not pertinent
- 3.10 **Vapor (Gas) Irritant Characteristics:** Currently not available
- 3.11 **Liquid or Solid Characteristics:** Currently not available
- 3.12 **Odor Threshold:** Odorless
- 3.13 **IDLH Value:** Not listed.
- 3.14 **OSHA PEL-TWA:** Not listed.
- 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 supports combustion
- 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:** Increases intensity of any fire. Mixtures of liquid oxygen and any fuel are highly explosive.
- 4.7 **Auto Ignition Temperature:** Not pertinent
- 4.8 **Electrical Hazards:** Not pertinent
- 4.9 **Burning Rate:** Not pertinent
- 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:** Heat of water will vigorously vaporize liquid oxygen.
- 5.2 **Reactivity with Common Materials:**  
Avoid organic and combustible materials, such as oil, grease, coal dust, etc. If ignited, such mixtures can explode. The low temperature may cause brittleness in some materials.
- 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:**  
None
- 6.2 **Waterfowl Toxicity:** None
- 6.3 **Biological Oxygen Demand (BOD):** None
- 6.4 **Food Chain Concentration Potential:**  
None
- 6.5 **GESAMP Hazard Profile:** Not listed

### 7. SHIPPING INFORMATION

- 7.1 **Grades of Purity:** 99.5+%
- 7.2 **Storage Temperature:** -183°C
- 7.3 **Inert Atmosphere:** No requirement
- 7.4 **Venting:** Safety relief
- 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:** Nonflammable gas
- 8.2 **49 CFR Class:** 2.2
- 8.3 **49 CFR Package Group:** Not pertinent.
- 8.4 **Marine Pollutant:** No
- 8.5 **NFPA Hazard Classification:**

Category	Classification
Health Hazard (Blue).....	3
Flammability (Red).....	0
Instability (Yellow).....	0
Special (White).....	OX
- 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:** Gas
- 9.2 **Molecular Weight:** 32.0
- 9.3 **Boiling Point at 1 atm:** -297.3°F = -182.9°C = 90.3°K
- 9.4 **Freezing Point:** -361°F = -218°C = 55°K
- 9.5 **Critical Temperature:** -180°F = -118°C = 155°K
- 9.6 **Critical Pressure:** 738 psia = 50.1 atm = 5.09 MN/m<sup>2</sup>
- 9.7 **Specific Gravity:** 1.14 at -183°C (liquid)
- 9.8 **Liquid Surface Tension:** 13.47 dynes/cm = 0.01347 N/m at -183°C
- 9.9 **Liquid Water Interfacial Tension:** Not pertinent
- 9.10 **Vapor (Gas) Specific Gravity:** 1.1
- 9.11 **Ratio of Specific Heats of Vapor (Gas):** 1.3962
- 9.12 **Latent Heat of Vaporization:** 91.6 Btu/lb = 50.9 cal/g = 2.13 X 10<sup>5</sup> J/kg
- 9.13 **Heat of Combustion:** Not pertinent
- 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:** Very high

### 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
-295	70.660	-309	0.406	-308	1.040	-305	0.209
-290	69.509	-308	0.406	-306	1.040	-300	0.195
-285	68.370	-307	0.406	-304	1.040	-295	0.183
-280	67.219	-306	0.406	-302	1.040	-290	0.172
-275	66.080	-305	0.406	-300	1.040	-285	0.163
-270	64.929	-304	0.406	-298	1.040	-280	0.154
-265	63.790	-303	0.406	-296	1.040	-275	0.147
-260	62.650	-302	0.406	-294	1.040	-270	0.140
-255	61.500	-301	0.406	-292	1.040	-265	0.134
-250	60.360	-300	0.406	-290	1.040	-260	0.128
-245	59.210	-299	0.406	-288	1.040	-255	0.123
-240	58.070	-298	0.406	-286	1.040	-250	0.118
-235	56.920	-297	0.406	-284	1.040	-245	0.114
-230	55.780	-296	0.406	-282	1.040	-240	0.110
-225	54.630	-295	0.406	-280	1.040		
-220	53.490	-294	0.406	-278	1.040		
-215	52.350	-293	0.406	-276	1.040		
-210	51.200	-292	0.406	-274	1.040		

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	-293	18.360	-293	0.32840	0	0.219
	N	-292	19.420	-292	0.34530	10	0.219
	S	-291	20.530	-291	0.36280	20	0.219
	O	-290	21.680	-290	0.38100	30	0.219
	L	-289	22.890	-289	0.39980	40	0.219
	U	-288	24.150	-288	0.41930	50	0.219
	B	-287	25.460	-287	0.43950	60	0.219
	L	-286	26.820	-286	0.46040	70	0.219
	E	-285	28.250	-285	0.48210	80	0.219
		-284	29.730	-284	0.50440	90	0.219
		-283	31.270	-283	0.52760	100	0.219
		-282	32.870	-282	0.55150	110	0.219
		-281	34.530	-281	0.57610	120	0.219
		-280	36.260	-280	0.60160	130	0.219
						140	0.219
						150	0.219
						160	0.219
						170	0.219
						180	0.219
						190	0.219
						200	0.219
						210	0.219
						220	0.219
						230	0.219
						240	0.219
						250	0.219