

PROPERTIES OF CHLORINE

General

Chlorine has a characteristic penetrating and irritating odor. The gas is greenish yellow in color and the liquid is clear amber.

Atomic and Molecular Properties

Atomic Symbol	Cl
Atomic Weight	35.453
Atomic Number	17
Molecular Weight	70.906

Chemical Properties

Flammability

Chlorine, gas or liquid, is non-explosive and non-flammable. It is an oxidizer and is capable of supporting combustion. Many organic chemicals react readily with chlorine, sometimes violently.

Valence

Chlorine usually forms compounds with a valence of -1 but it can combine with a valence of +1, +3, +4, +5 or +7.

Chemical Reactions

Reactions With Water - Chlorine is only slightly soluble in water.
(0.3 to 0.7 percent)

Reactions With Metals - At ordinary temperatures dry chlorine, gas or liquid, reacts with aluminum, arsenic, gold, mercury, selenium, tellurium, tin, and titanium. Carbon steel ignites near 483°F (251°C).

Reactions With Organic Compounds - Chlorine reacts with many organic compounds. Some reactions can be extremely violent or explosive.

Physical Properties

The following properties are for pure chlorine. "Standard conditions"-- where referenced -- are 32°F (0°C) and an absolute pressure of 14.696 psi (101.325 kPa).

Boiling Point (Liquefying Point) = -29.15°F (-33.97°C)

Density

Gas at Standard Conditions = 0.2006 lb/ft³ (3.213 kg/m³)

Saturated Gas = At 32°F (0°C), 0.7632 lb/ft³ (12.23 Kg/m³)

Saturated Liquid = 91.56 lb/ft³ (1467 kg/m³) at 32°F (0°C);
88.76 lb/ft³ (11.87 lb/gal; 1422 kg/m³) at 60°F (15.6°C)

Latent Heat of Vaporization = 123.9 Btu/lb (288.1 kJ/kg)

Melting Point - Freezing Point = -149.76°F (-100.98°C)

Solubility in Water = 6.93 lbs/100 gals. (60°F and 14.696 psi)

Specific Gravity = Gas, 2.485 (air); Liquid, 1.467 0/4°C (water)

Vapor Pressure = 53.51 psi (368.9 kPa) at 32°F (0°C);
112.95 psi (778.8 kPa) at 77°F (25°C).

Viscosity

Saturated Gas = 0.0125 centipoise (0.0125 mPa·s) at 32°F (0°C);
0.0132 centipoise (0.0132 mPa·s) at 60°F (15.6°C)

Liquid = 0.3863 centipoise (0.3863 mPa·s) at 32°F (0°C);
0.3538 centipoise (0.3538 mPa·s) at 60°F (15.6°C).

Occurrence

Chlorine is widely distributed in nature although not as a free element. Approximately two percent of the earth's surface materials is chlorine which is mostly in the form of sodium chloride in sea water and in natural deposits as carnallite (MgCl₂·KCl·6H₂O) and as sylvite (KCl).