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Summary Article: **chlorine**

From *The Columbia Encyclopedia*

(klŏr'ĕn, klŏr'-) [Gr.,=green], gaseous chemical element; symbol Cl; at. no. 17; interval in which at. wt. ranges 35.446–35.457; m.p. –100.98 degrees Celsius; b.p. –34.6 degrees Celsius; density 3.2 grams per liter at STP; valence –1, +1, +3, +5, +7. Chlorine is a greenish-yellow poisonous gas with a disagreeable, suffocating odor; it is about two and one-half times as dense as air. Only fluorine among the nonmetals is more chemically active. Chlorine belongs to the halogen family of elements, found in Group 17 of the periodic table. The gas is composed of diatomic molecules (Cl₂) with molecular weight 70.906.

Chlorine was discovered in 1774 by K. W. Scheele, who thought it was a compound of oxygen; it was named and identified as an element by Sir Humphry Davy in 1810.

Chlorine is soluble in water; its aqueous solution, called chlorine water, consists of a mixture of chlorine, hydrochloric acid, and hypochlorous acid; only a part of the chlorine introduced actually goes into solution, the major part reacting chemically with the water. Chlorine water has strong oxidizing properties resulting from the oxygen set free when the unstable hypochlorous acid decomposes. Chlorine reacts readily with hydrogen to form hydrogen chloride. It burns if ignited in a hydrogen atmosphere and, if unignited, can form explosive mixtures with hydrogen; it also unites with the hydrogen in compounds such as turpentine, a hydrocarbon. In the presence of moisture it combines directly with certain metals, such as copper and iron, to form chlorides. Iron ignites when heated in a chlorine atmosphere. With metals and oxygen, chlorine forms several chlorates; it also combines with many nonmetals and certain radicals.

Because of its activity chlorine does not occur uncombined in nature, but its compounds are numerous and abundant. Sodium chloride (common salt) is present in seawater, salt wells, and large salt deposits, often in association with other chlorides. Chlorine is produced commercially chiefly by the electrolysis of sodium chloride, either molten or in solution. Other chlorides are sometimes employed. Chlorine can also be prepared from hydrochloric acid by oxidation of the hydrogen chloride (Deacon's process) and from bleaching powder.

Chlorine is used in water purification; as a disinfectant and as an antiseptic (mercuric chloride); and in the manufacture of bleaching powder (chloride of lime), dyes, and explosives. Chlorinated hydrocarbons have been used extensively as pesticides; some examples are DDT, dieldrin, aldrin, endrin, lindane, chlordane, and heptachlor. These compounds resist degradation and have become very troublesome environmental pollutants. Carbon tetrachloride and trichloroethylene are used as solvents. The Freon refrigerants are hydrocarbons that have been reacted with chlorine and fluorine. Chlorine is an important constituent of many poison gases. It is used in such compounds as calomel, chloroform, and chloral hydrate, which are used in medicine. It is also employed in the extraction of bromine from seawater. It is used in preparing some synthetic rubbers, in petroleum refining, and to prepare pure hydrochloric acid (see hydrogen chloride).

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