# The element: chlorine essay

General Information

We researched the chemical element known as chlorine. Chlorine has an atomic number of 17 and an atomic weight of 35.

453. It has a valence number of 3. The element has 3 energy levels. Chlorine exists as a greenish-yellow gas at normal temperatures and pressures. Chlorine is second in reactivity only to fluorine among the halogen elements.

Chlorine is a nonmetal. It is estimated that 0. 045% of the earths crust and 1. 9% of sea water are chlorine.

Chlorine combines with metals and nonmetals and organic materials to form hundreds of chlorine compounds. Chlorine is about 2. 5 times as dense as air and moderately soluble in water, forming a pale yellowish green solution. Chlorine is so reactive that it never occurs free in nature.

Chemical Properties

Chlorine is in the halogen family, and like all the other halogen elements chlorine has a strong tendency to gain one electron and become a chloride ion. Chlorine readily reacts with metals to form chlorides, most of which are soluble in water. Chlorine also reacts directly with many nonmetals such as sulfur, phosphorus, and other halogens. Chlorine can support combustion; if a candle were to be thrown into a vessel of chlorine, it would continue to burn, releasing dense, black clouds of smoke, The chlorine combines with hydrogen of the paraffin, forming hydrogen chloride, and uncombined carbon is left in the form of soot.

Soot is black residue from fuel. Chlorine replaces iodine and bromine from their salts. Dry chlorine is somewhat inert or not able to move, but moist chlorine unites directly with most of the elements.

History

Chlorine was discovered in 1774 by Karl Scheele.

Humphry Davy proved that chlorine was an element. Extensive production began 100 years later. During the 20th Century. The amount of Chlorine used was considered a measure of industrial growth. In, 1975 chlorine productions ranked seventh on the list of largest-volume chemicals produced in the United States. The importance of chlorine has changed as new uses have been added.

In 1925 paper and pulp used over one- half . The chlorine made and chemical products only 10%. By the 1960s paper and pulp use accounted for only 15-17% and the chemical uses increased to 75-80%. Peoples uses have contributed to the growth of large cities, and new textiles, plastics, paints, and miscellaneous uses have raised mans standard of living. Many large companies are based primarily on the manufacture of chlorine and its compounds.

In 1978 17% of the United States production went into the production of vinyl chloride monomer. Other chlorinated organics consumed 48% of United States Production.

Toxicity and Precautions

Chlorine was used in World War I as a poison gas. In fact most poisonous gases have chlorine in them.

Chlorine is very corrosive to moist tissue and has a very irritating effect on the lungs and mucous membranes of the nose and throat. Inhalation of chlorine gas can cause edema of the lungs and respiratory stoppage. When hydrogen and chlorine gases are mixed together, the mixture is stable if kept in a cool, dark place. If heated or exposed to sunlight, the mixture explodes. Chlorine is easily liquefied and usually transported in its liquid state in pressurized drums. Great care must be taken, however, to prevent the containers from bursting and liberating large amounts of the gas.

In the United States most European countries, large quantities of chlorine may only be transported by train. The present trend is to limit the transport of chlorine as much as possible by producing and using the element in the same location.

Uses

Chlorine has many great uses. Chlorine is an excellent oxidizing agent. At first.

The use of Chlorine was used as a bleaching agent in the paper, pulp, and textile industries and as a germicide for drinking water preparation swimming pool purification, and hospital sanitation has made community living possible. Chlorine is used in bleaching as said before. The bleaching action of chlorine in aqueous solution is due to the formation of hypochlorous acid, a powerful oxidizing agent. If a colored, oxidizable material is present,

hypochlorous acid releases its oxygen to oxidize the material to a colorless compound. Liquid bleach is usually an aqueous solution of sodium hypochlorite, and dry powder bleaches contain chloride of lime. Since chlorine destroys silk and wool, commercial hypochlorite bleaches should never be used on these fibers.

Chlorine is also used as a disinfectant. The oxidizing ability of chloride of lime enables it to destroy bacteria; therefore large amounts are used to treat municipal water systems.

This chemical is also used in swimming pools and for treating sewage. Chlorine is used as rock salt.

Sodium chloride, NaCl, is used directly as mined (rock salt), or as found on the surface, or as brine also known as salt water. It can be dissolved, purified, and reprecipated or given in return for use in foods or when chemical purity is required. Its main uses are in the production of soda ash and chlorine products. The form uses it as refrigeration, dust, and ice control, food processing, and food preservation.

Calcium chloride, CaCl2, is usually obtained from salt water or as a by product of chemical processing. Its main uses are road treatment, coal treatment, and concrete conditioning. In addition to these products, for which chlorine is needed, various other chlorine compounds play an important part in chemistry and the chemical industry. The chlorides of most metals are easily soluble in water, which widens their applicability.

Some other important compounds are the chlorates, the perchlorates, and the hypochlorites. Hydrochloric acid is one of the most frequently used acids.

Preparation

The most important method for preparation of chlorine is the electrolysis of a solution of common salt, sodium chloride. The chlorine gas is liberated at the positive anode or positively charged electrode, which is made of graphite since a metal anode would react with chlorine. At the iron cathode or negatively charged electrode, sodium ions are reduced to sodium metal, which reacts immediately with water to form sodium hydroxide.

Another method of preparing chlorine is by the electrolysis of molten salt. This process is used specifically to produce sodium, and the chlorine is a commercial by product. When large quantities of waste hydrochloric and are available. Chlorine may be recovered by oxidation of the acid.

This method has the advantage of converting great quantities of waste acid to useful substances. No matter what process is used to prepare chlorine, the gas must be well dried.

Dry chlorine is much less corrosive than moist chlorine gas. In the laboratory chlorine may be prepared by heating manganese oxide with hydrochloric acid.

Conclusion

In conclusion chlorine is a very wonderful element. Chlorine has hundreds of compounds. If we did not have these compounds we would not have clean

water, we would have an insect problem, we could not make many important compounds that are used in medicine, and some of the battles in World War I might have been lost if it were not for chlorine.

Our world would not be the same if not for chlorine.