

CAUSTIC SODA

*Transforming salt
into various products
for our daily lives.*



cloroSur

abicolor



Caustic soda is the main by-product in chlorine production.

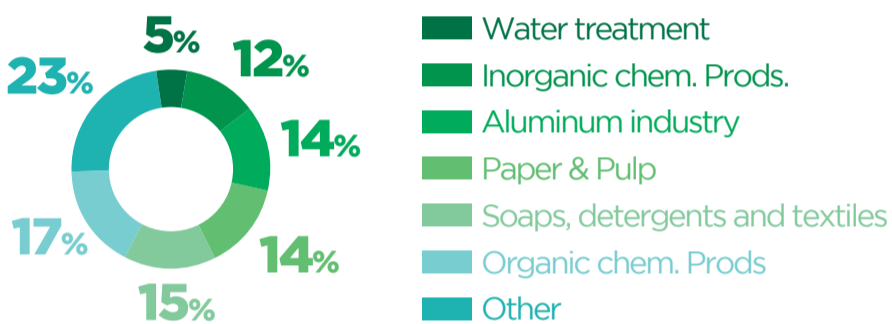
The transformation of salt and water into caustic soda and chlorine

The chlor-alkali production chain begins with electrolysis, by passing an electrical current through a solution containing sodium chloride (salt) and water, using one of the three most common processes in its industrial manufacturing: mercury cells, diaphragm cells or membrane cells. Electrolysis is the process whereby salt and water molecules are broken and subsequently regrouped into caustic soda, chlorine and hydrogen molecules. The production results in a fixed ratio of 1.12 tons of caustic soda per ton of chlorine. Hydrogen, which is also a by-product of the electrolysis, is recovered and then used as fuel or raw material for the production of hydrochloric acid. Other products in this industry are sodium carbonate (soda ash), potassium hydroxide (caustic potash), hydrochloric acid and sodium hypochlorite.

Caustic soda is an essential reagent for the production of various organic chemical products. Among the main applications is the bleaching of pulp and paper, besides being widely used in the chemical and petrochemical industry, metallurgy (alumina production for the aluminum industry), soaps and detergents, textile and food industries. Of natural origin, it plays an important role in pollution prevention and treatment of wastewater, enabling many industrial processes (for further details see the products derived from caustic soda inside this booklet).

In 2015, the worldwide production capacity of caustic soda stands at around 92 million metric tons.

Caustic Soda Applications



Helping to control pollution

Caustic soda is highly valued for its neutralizing power and also because it helps to control and remedy acidic pollution of the environment. Therefore, it is used in various processes to control acidity, neutralize acid wastes and washing gases. As it is an alkali compound, caustic soda is a chemical opposite to acids and can therefore neutralize them. The neutralization reaction produces water and salt. Gas washers are devices used for air pollution control designed to use the alkaline properties of caustic soda. Such systems neutralize the acid gas emissions from chimneys, thereby helping to make the environment cleaner and pollution free. Moreover, metal plating facilities generate waste containing dissolved heavy metal concentrations that must be removed before the effluents are discharged into municipal sewers and surrounding water bodies. Normally this can be achieved by adding an alkaline chemical product like caustic soda to the effluents. The insoluble metal hydroxides formed by the reaction between caustic soda and metals of effluents are physically removed as part of the pre-treatment of effluents.

Caustic soda can also be used to neutralize acid drainage from mines. During mining operations, when air and water come into contact with freshly extracted minerals containing sulfur, these rapidly oxidize and release a certain amount of acidity, metals and other chemical components that are harmful to the environment. Acid mine drainage is a major environmental hazard. Caustic soda is particularly effective in neutralizing low flows of acid drainage from mines in remote locations, as well as treating flows that have a high manganese content.

Help in personal hygiene

Caustic soda plays an important role in the manufacture of soap powders, soap bars and detergents, in addition to being used in the production of industrial soaps and special soaps. Developing countries have a significant demand for caustic soda, because in some of these countries, bar soap is used exclusively for washing fabrics and for personal hygiene. The special soaps include soaps for cleaning ovens and equipment for food preparation, more potent detergents for dishwashers, floor cleaning, metal cleaning, paint removers, liquid soaps and shampoos.

Various and numerous applications

Caustic soda is used in the production of cotton fabrics to strengthen the fibers and better absorb the dye. Estimates indicate that around 90% of the cotton is treated with caustic soda. Caustic soda also has a number of other applications in the food industry, for example, in refining animal and vegetable oil, to remove fatty acids and to peel vegetables and fruit, as well as in the pharmaceutical industry where sodium phenolate is used in antiseptics and to produce aspirin (acetylsalicylic acid). Large quantities of caustic soda are also demanded by the pulp industry to manufacture paper and in the alumina manufacturing process to produce primary aluminum. Additionally, significant amounts of caustic are used in treating municipal and industrial waste water.



