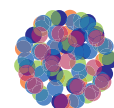


C2 CHLOR-ALKALI

SODIUM SALTS



**CHEMICAL
INDUSTRIES**
RESOURCE PACK

Salt

The word 'salt' is a general chemical term that refers to the ionic compound that is formed when an acid reacts with a base. They may be simple salts such as NaCl, KCl, and Na₂SO₄; acid salts like NaHCO₃ and NaH₂PO₄; or double salts like KAl(SO₄)₂. Table salt is sodium chloride, a chemical compound with the formula NaCl. Sodium chloride has been used to flavour and preserve food for thousands of years. As a result, salt became an essential part of commercial transactions and was often used as money or barter. Exchange of salt for slaves in ancient Greece gave rise to the expression 'not worth his salt'. The Romans gave a salarium (salary) to those who were 'worth their salt,' and Roman soldiers were given salt rations known as salaria argenta. Today, salt continues to be of major economic importance, with thousands of uses in addition to flavouring and preserving food.

Sodium chloride forms colourless, cubic crystals that are made up of large numbers of NaCl formula units, to give a three-dimensional crystalline lattice in which each sodium ion is surrounded by six chloride ions and each chloride ion is surrounded by six sodium ions. The strong electrostatic attractions between the positive and negative ions, known as ionic bonds, hold the solid sodium chloride together.

Sodium chloride occurs naturally as the mineral halite, commonly called rock salt, in large underground deposits on every continent. Natural brines, or salty

waters other than seawater, are found in wells and lakes, such as the Great Salt Lake of Utah and the Dead Sea. Salt is also found in surface deposits in regions subject to arid climates.

The manufacture and use of salt is one of the oldest chemical industries. The three main methods for recovering salt are:

- Underground salt mining, which uses techniques similar to those for mining coal;
- Solar evaporation of seawater or natural brine in lakes or large lagoons; and
- Evaporation of brines obtained by pumping water into a rock salt deposit, dissolving the salt, and bringing the brine to the surface.

The annual world salt production is about 180 million tonnes. The top producers are the United States and China with 40 million and 27 million tonnes, respectively.

Industrial use

Electrolysis of molten sodium chloride produces sodium metal and chlorine gas:
$$2 \text{NaCl}(\ell) \rightarrow 2\text{Na}(\ell) + \text{Cl}_2(\text{g})$$

Salt is also one of the raw materials used in the Solvay process for manufacturing sodium carbonate (soda ash).

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A large pile of salt at a salt mine in Uppington



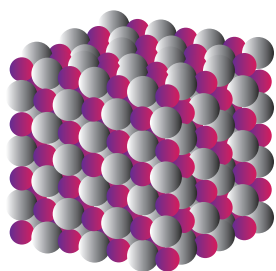
Source: www.chemistryexplained.com

Salt crystals magnified 100x



Source: California State University

A 3-D representation of a sodium chloride crystal



Source: Wikimedia Commons

Salt in history

Salt's profound impact on human civilisation spans recorded history, and precedes it. Salt has influenced human existence virtually from the beginning. Neolithic settlements were at salt springs. Caravans trekked deserts trading salt ounce-for-ounce for gold.

Most cultures have folklore and art forms based on salt. And many cultures share traditions such as offering bread and salt to welcome visitors.

Salt's economic and military significance produced trading partnerships, or armed combat. Economies and cultures ranging from the Sahara in West Africa to the Himalayan peaks of Nepal gives a glimpse of the salt trading culture of centuries gone by.

Religious texts and liturgy frequently employ salt metaphorically, for example 'Ye are the salt of the Earth'.

Salt was involved in such historic events as the building of the Erie Canal, the French Revolution and the drive for India's independence from British colonial rule.

This material was obtained from the Salt Institute. Learners - if you use any part of it you need to write it in your own words and include the following in your reference list: Salt Institute. 2009. Salt in history. [Online]. Available: <http://www.saltinstitute.org/Uses-benefits/Salt-in-history>. [19 July 2010].

Caption: A bar of salt



Source: Wikimedia Commons

DID YOU KNOW?

Seawater contains an average of 2.6% (by weight) NaCl, or 78 million tonnes per cubic kilometre.



The role of salt

Table salt is pure salt that has been ground into fine particles. Because salt tends to cake in humid climates, an anti-caking agent such as magnesium carbonate or calcium silicate is often added. Table salt is also available as iodised salt with 0,1 percent potassium iodide by weight. Because iodide ion is essential to thyroid gland function, the routine use of iodised salt ensures adequate iodine in the diet.

Salt is used to cure meat and fish by soaking them in brine, rubbing salt onto them, or injecting them with a salt solution. Salt is also used to make pickles by soaking cucumbers in brine. Rock salt is sprinkled on highways to melt ice.

Nearly half of the 40 million tonnes of salt produced each year in the United States is used in the chemical manufacture of chlorine and sodium hydroxide (caustic soda) by electrolysis of brine solution.

Both sodium chloride and potassium chloride are essential to the electrolyte balance in body fluids. Good health depends on the proper ratio of potassium ions to sodium ions. One solution is to eat unprocessed, natural foods and to salt foods with a commercial product that contains both potassium and sodium chlorides called "Lite Salt" or "Low Salt".

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