



COMMERCE ENERGETIQUE ET NEGOCE DES AFFAIRES

The role of salt

ABSTRACT

Iodized salt is used in food, feed and industrial applications in various forms

CENAGROUPE

The different types of salt

Food salt



Food salt Close-up of salt crystals.

Table salt, food salt or kitchen salt, is composed essentially of sodium chloride. It comes in different forms: coarse salt (or coarse salt), fine salt, fleur de sel.

Refined salt



Different types of Camargue salt

Refining makes it possible to obtain a white salt hitherto frequently preferred by the consumer. It is then composed of practically pure NaCl (99.9%), to the detriment of its nutritional qualities. The salt of the refined type remains the most used in food. About 7% of refined salt is also used as an additive, but most is used for industrial purposes (papermaking, textile and fabric dye control, soap and detergent production). Salt has a high market value.

Today, most refined salt is prepared from rock salt extracted from salt mines. After the raw salt has been brought up from the mines, it is refined to purify it and to facilitate its storage. Purification usually involves a recrystallization phase. During this phase, a brine solution is treated with chemicals that precipitate impurities (largely magnesium and calcium salts). The pure sodium chloride crystals are then collected in multiple evaporation steps and dried in an oven or autoclave.

Various admixtures, iodine addition and fluorination

Additives, anti-caking agents and fluorinated or iodinated compounds are usually added.

Anti-caking agents and potassium iodide (for iodized salt) are usually added during the drying phase. These agents are hygroscopic chemicals that absorb moisture and prevent salt crystals from clogging. The anti-caking agents used are phosphate, calcium or magnesium carbonates, fatty acid salts (acid salts), magnesium oxide, silicon dioxide, sodium aluminosilicate and tricalcium alumino-calcium silicate. Concerns have been raised regarding the possible toxic effects of aluminum in the latter two compounds, however the European Union and the United States allow their use in limited quantities. The refining salt is then ready for packaging and distribution.

Moreover, for some years now, manufacturers in the sector have been enriching or supplementing their salt with iodine (potassium iodide) and fluorine. Iodine is used to fight goitres and reduce cretinism, fluorine helps protect against cavities by strengthening the enamel. However, excess iodine and fluoride also lead to serious diseases.

Table iodized salt has reduced iodine deficiencies in the countries where it is used. Iodine is important to prevent insufficient thyroid hormone production (hypothyroidism), which can cause goitre, cretinism in children, and myxedema in adults.

Table salt



Salt shakers of the Ile de Ré

Table salt is a refined salt containing 95% or more of almost pure sodium chloride, often iodized and fluorinated. It usually contains substances that prevent crystal clogging (anti-caking agents) such as sodium silicoaluminate (the common name is Tixolox) and a tiny amount of invert sugar to prevent salt from turning yellow when exposed to sunlight, and to prevent iodine loss by vaporization. It is common to put a few grains of

raw rice in salt shakers to absorb moisture when anti-caking agents are not effective enough.

Table salt is mainly used in cooking and at the table as a condiment, often associated with pepper.

Table salt is now used all over the world.

Legal definitions of food salts

France



Salt content of sea water, and proportion of different salts, including trace elements.

Food grade salt is a crystalline product consisting mainly of sodium chloride,

from salt marshes, rock salt or brine from the dissolution of rock salt and meeting the following specifications :

- sodium chloride: not less than 97 % of the dry extract, excluding additives;
- copper: not more than 2 mg/kg ;
- lead: not more than 2 mg/kg ;
- arsenic: not more than 0,5 mg/kg ;
- cadmium: not more than 0,5 mg/kg ;
- mercury: not more than 0,1 mg/kg.

In France, the sales name for food grade salt is “food salt”, “table salt” or “cooking salt”.

For salt from salt marshes, the designation becomes “grey sea salt for food”, “grey table salt” or “grey sea salt for cooking”.

Quebec

Quebec table salts are composed differently. The ingredients are sodium chloride, sodium thiosulfate, potassium iodide and sodium ferrocyanide. Sometimes the term sodium chloride is replaced by the word salt.

Production techniques

The manufacture and use of salt is one of the oldest chemical industries. Several production sources are possible.

Rock salt

Detailed article: rock salt.

Rock salt is a deposit of mineral containing a large concentration of edible salt. These salt deposits were formed by the ancient evaporation of lakes or inland seas. This type of deposit is called evaporite. Each deposit has a particular composition. One can find there almost pure halite (NaCl), but also sylvite (KCl) or gypsum (CaSO₄). These deposits can be extracted traditionally in a mine or by water injection. The injected water dissolves the salt, and the brine solution can be pumped to the surface where the salt is harvested.

Sea salt



Salt marsh and camel in Camargue

Detailed article: salt marsh.

Salt is also obtained by evaporation of sea water, usually in shallow basins heated by sunlight; salt thus obtained was once called compartment salt, and is now often called sea salt.

Climate change may affect some sea salt producers if cloud cover and rainfall increase in some areas. As an example of the influence of meteorology, the summer of 2007 was very rainy, so the salt flats on the Ile de Ré were only able to harvest 50 tonnes of salt, or 2% of the average production. For example, 2011 saw the harvest of Guérande salt start a month ahead of schedule thanks to more than favourable weather conditions.

Other

Related article : sodium chloride.

Salt, of marine origin, can be extracted directly from the sea, via brine, i.e. from evaporated marine water loaded with salt or from fossil deposits (salt gem).

- Sea salt is harvested in salt marshes, such as in Guérande, on the island of Ré, in Aigues Mortes or Salin-de-Giraud or on the island of Oléron.

- Fossil salt or rock salt is extracted from salt mines, as in Bex in Switzerland, Varangéville in France, or Wieliczka in Poland.

The evaporation of the brine water can be natural or caused by man who heats the salt water, as in Salins-les-Bains. It is an activity that the Gauls already practiced on several sites in northwest France, 400 years before Julius Caesar, and which in this case probably contributed to the deforestation of these regions. This salt is called "ignigenous salt", i.e. "born of fire".

Application



Salted cod stand at Villeneuve-lès-Avignon market.

In the kitchen, salt is used to season dishes. Italians prefer the coarse salt with which they season their pasta; Belgians are more likely to use the fine salt packed in sachets.

Salt also helps to preserve food by reducing water activity. In the Middle Ages, it was the main means of preserving meat and fish. Even today, some African regions without refrigerators use salt to preserve meat and fish, just as consumers in so-called developed countries find salty products on the market: salted turnip, herring, cod, etc.



Salting truck.

Refined salt is also used to ensure the operation (regeneration in positive ions) of water softeners, present in dishwashers or in the domestic water supply circuit.

This is called "regenerating salt". Several recent experiments have shown that the use of coarse salt (cooking salt) is perfectly valid instead of regenerating salt and does not pose any problems for the devices.

Unrefined salt is also used to clear snow or thaw roads (eutectic fusion).

Power supply

In men

Contrary to popular belief, salt is not a taste enhancer, but it does change the perception of taste, which is why it is widely used in cooking⁷.

The foods containing the most salt are deli meats and cheeses, as well as cooked preparations (cooked dishes, prepared soups) of industrial foods.

Salt also plays several roles in bread-making: fermentation, organoleptic qualities, preservation. So bread also contains a lot of salt, but many pastry recipes also include salt in their dough.

Table salt can be "iodized" by adding iodine salt, which is necessary for the thyroid gland to secrete thyroid hormones and for intellectual development. The sale of iodized salt is required by regulations in several countries. The chloride and sodium ions contained in salt are also very important for the body's functioning. Indeed, these ions play a role in nerve impulse conduction, muscle contraction and water retention in the body.

Human health

In France and many industrialized countries, salt consumption is too high. This over-consumption, also due to salt in industrial preparations, causes serious health problems, such as hypertension or obesity, which cause tens of thousands of premature deaths each year. There are other salts (such as potassium chloride KCl, present in unrefined table salt but more toxic for people with heart disease, kidney disease or blood pressure problems) but not very widespread and more expensive.

In animal



Sheep licking a salt stone in the Ubaye valley.

In other animals, salt performs the same organic functions as in humans. Often, wild mammals, especially herbivores, lick salt stones or natural salt sources.

In agriculture, cattle, ovids and other herbivores have stones to lick. This need is due to the high consumption of calcium because of their vegetarian diet. In addition, cattle lose even more salt during milking. That is why they are given salt licking stones to cover their needs.

Effect on the taste buds

Sodium chloride can modify the primary flavours; it reduces bitterness and sweetness, weights acid and participates in the intensity of umami, according to mechanisms still poorly understood.

According to industrial producers,

« Sodium chloride (NaCl) increases the palatability of foods, i.e. it intensifies the perception of flavours. The Na⁺ ions stimulate the taste buds while the Cl⁻ ions give the salty taste. Salt therefore enhances the flavour perception of certain foods with an initially bland profile and thus has an impact on the overall flavour profile of the finished product, making it generally more pleasant. Non-volatile chemical compounds are dissolved by saliva and detected by several parts of the tongue, palate or throat. »

(Excerpt from a Sodium Reduction Guide for the Food Industry).

Health

It was once used for its dehydrating properties (amochosia).

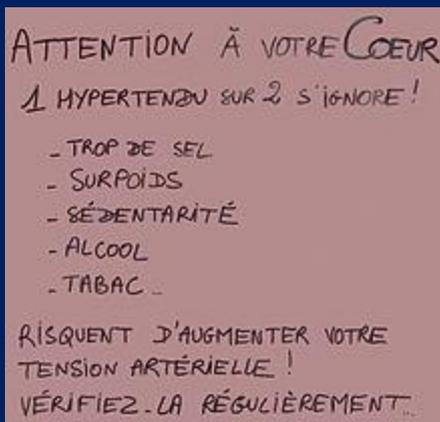
Excessive salt consumption by people in developed countries is established. The medical and scientific community (WHO, Inserm, etc.) considers that salt consumption in developed countries is excessive (for France, twice the WHO recommendations) and may be responsible for cardiovascular and renal diseases. 80% of the excess salt comes from ready meals, soups and other industrialized products. Salt addiction could exist from the age of infants through small jars and baby food.

The quantity of salt absorbed daily can be estimated by a precise dietary interrogation, but can easily be objectified by measuring the quantity of sodium excreted in the urine, in the absence of certain medicinal intakes (in particular diuretics): in a stable situation the excreted quantity is close to the quantity ingested.

Health Effects

Salt contains about 40% sodium by weight, which is responsible for most of the positive or negative effects of salt.

Negative effects



Message posted in the window of a pharmacy.

The harmful effects of excess salt have been known since 1969.

Salt, or sodium chloride, acts on blood pressure by increasing it.

Salt is not the only factor, but it increases risk, also promoting water retention. Rising blood pressure increases the risk of cardiovascular events, mainly heart attacks. Salt abuse is therefore particularly not recommended for people suffering from high blood pressure, but also for other people. On the contrary, the

reduction of sodium intake allows the reduction of blood pressure figures. The decrease in sodium intake could also, independently of the decrease in blood pressure, reduce the risk of cardiovascular disease.

Excess salt is also bad for the kidneys: Excessive salt consumption increases the risk of high blood pressure, one of the main causes of kidney failure. On a daily basis, excess salt can also lead to complications in people already suffering from kidney failure. Sick kidneys are less and less able to manage this excess salt, which can lead to water retention, which in turn causes high blood pressure.

In June 2005, the European Food Safety Agency recalled that "current levels of sodium consumption are directly associated with an increase in blood pressure, a risk factor for cardiovascular and renal diseases which are the main causes of morbidity[disease, NDLR] and mortality in Europe. "Over a period of 10-15 years, subjects who reduced their salt intake by up to 25-30% suffered a quarter fewer cardiovascular events.

In cases of heart failure, excess salt increases the risk of decompensation and can sometimes lead to serious complications requiring hospitalization (acute pulmonary edema).

Each year, excess salt kills 1.6 million people worldwide.

Positive effects

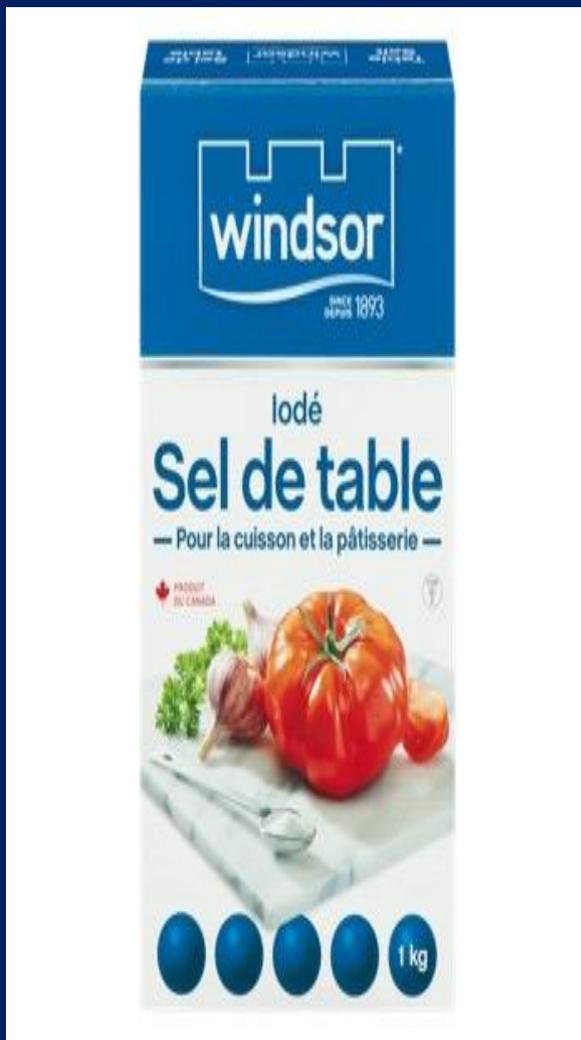
Salt, in small doses, remains an essential element. It helps maintain a correct blood pressure and prevents disorders related to insufficient concentration of salt in the blood (hyponatremia) such as it is seen in some cases of dehydration. The minimum physiological need is around 2 g/day. Too low a salt intake could even increase the risk of cardiovascular disease.

Recommended quantities

In March 2003, the WHO (World Health Organization) concluded that the amount of salt absorbed should be less than 5 grams per day.

In February 2007, the WHO recalled ways to reduce the risk of cardiovascular disease, in particular by "eating as little as possible of foods rich in fat, sugar and salt. »

Iodized food salt



Salt and Chemical Industry



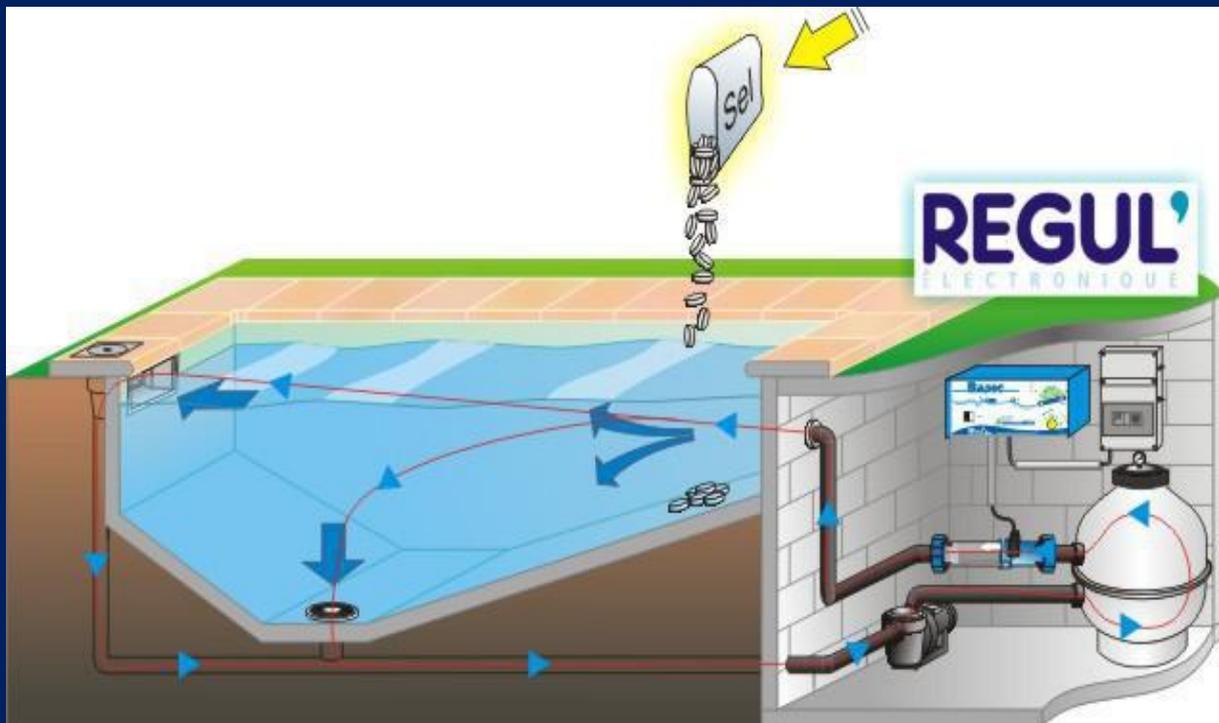
Salt and Agriculture



Salt and Pharmaceutical Industry



Salt and water treatment



Flower of natural salt



Virgin salt



Other uses of salt

Salt house maintenance

Salt maintenance of precious metals case of uranium

Salt lightning maintenance

Salt maintenance to remove spells

Salt for purification

Salt and beauty

Why is it important for cooking salt to be iodized?

Quite simply iodine is used to fight goitres and to reduce cretinism.

and fluoride helps prevent cavities by strengthening the enamel.