PARSEL

University of Ioannina

Teacher Notes

Salt – the good, the bad, and the tasty

The history of salt

The history of salt is associated with the history of mankind and human civilisation. Very early, men discovered the property of salt as preservative of food. By salting meat, fish, cheese, olives and other vegetables, people were able to preserve food for long time; this allowed movement of people, as they could carry preserved (salted) foods with them.

In ancient Rome, salt functioned as money, and its use for exchange of goods was valid in other places and times. Even the word 'salt' derives from the Latin word 'salarium', meaning payment with salt. (From salarium derives the English word salary.) In Asiatic countries, its weight was exchanged for gold. Countries that had and exploited salt lakes were powerful. A large number of wars in human history broke for the exploitation of salt.

Mineral deposits of salt have been formed as a result of evaporation of oceans millions of years ago. During geological rearrangements of the earth shell, large regions that once were seas were transformed into mountains. In Bolivia there is a mountain plain laid with salt. Also, salt mining is done on the Himalayas, in Africa, and in the U.S.A.

The origin of salt

See extra file.

Kinds of salt

Mineral salt. 70% of the world salt production comes from mineral salt. This salt, which was left behind by the oceans, is found with various admixtures. There can be a lot of soil or stones

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or animal skeletons, and whatever could have been laid on it during thousands of years. In general, the purity of mineral salt varies from salt mine to salt mone,and salt needs a good washing to get rid of all these foreign materials.

Sea salt. All seas do not have the same salt content. There is 3% w/w content in north seas, 3.8-4% in the Mediterranean, while in the Dead Sea it goes up to 8%. The largest amount of salt produced in the Mediterranean is large-grain; it is realtive pure. Red or black salt from Chile does not undergo any processing, and owes its colour to volcanic clay and to the carbon.

Types of sea salt

Natural salt: It does not contain additives or contains just few.
Flower of salt: It is collected by hand from the top of salt crystallised from sea water, has not undergone any processing, and contains trace elements such as fluorine, magnesium, potassium, and calcium. It is more expensive.

Industrial uses of salt

Except for cooking, salt is used as food preservative, for the preparation of sodium, baking soda, industrial soda, and other industrially important compounds.

Additives in salt

A very small quantity (~50 ppm) of potassium iodide (KI) is added to cooking salt to provide protection to the thyroid gland. This is *iodided salt*. Other additives include sodium carbonate as a stabiliser (it prevents accumulation of salt).

On the other hand, because salt in the human body contributes to increased blood pressure, people who have increased blood pressure should reduce salt consumption with their food. To this purpose, salt with reduced content in NaCl is commercially available. It contains potassium chloride (KCl) as substitute for salt, in quantities 25% and even 50% w/w.

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The role of salt in cell-membrane equilibria

Cell membranes of mammals are membranes that separate biological fluids inside and outside of cells. The have the property that are impermeable by water (the solvent in biological fluids), but are permeable to some ions. Thus, they are permeable to potassium ions (K^+), but in relaxation state, they are impermeable to sodium (K^+), and chloride (Cl^-) and other ions. As a result, the concentration of K^+ inside the cells is about 20 times higher than outside the cell. This has an effect on the function of cells.

Salt and osmotic pressure of solutions

Increased salt concentrations of aqueous solutions have as result the increase in the osmotic pressure of the solution. A disturbance in osmotic pressure balance is the cause of fluids coming out of fruits and vegetables when we add salt to vegetables (or sugar to the fruits). Note also that an aqueous solution of sodium chloride that has the proper concentration so that its osmotic pressure is the same as that of human blood, is used in medicine as physiological serum.

Salt in cooking

Vegetables

1. Salt absorbs water/liquids from vegetables. For this reason, we add salt to vegetables e.g. to spinach, so that to remove liquids and make them dry. Often we add salt to improve taste.
2. Salt added to the water in which vegetables are boiled contributes to the vegetables maintaining their colour.
3. Salt makes beans hard, so we salt them at the end of cooking.

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Meat

1. We don't salt meat before we roast it because salt absorbs liquids, which are removed from the meat. We salt at the end of roasting.
2. On the contrary, when we cook meat in the pan, we salt at the beginning, and we adjust taste at the end.

Fish

To maintain fish, we add salt after we have prepared them for cooking.

Sweets

Salt adds to the taste of sweets, so we add very little salt to them at the preparation stage.

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