EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT...

FOOD ADDITIVES

specialtyfoodingredients.eu
A BRIEF HISTORY OF ADDITIVES

At all times, man has had to ensure the conservation and protection of food that was often scarce and difficult to come by. The first chemical preservative, sea salt has been used to preserve meat and fish since earliest antiquity. In the Middle Ages, the Knights’ table was covered with aromatic and colourful dishes due to the use of multiple herbs and spices. At the time no one would have qualified saffron as a food colour or apple pomace as a texturiser.

Different times, different places: in Egypt and the Caribbean, carob powder, broad bean, pea, wheat flour were used for thickness.

Today, what we do by adding a dash of potato flour to the roast to thicken it, is nothing other than taking advantage of the thickening property of the starch present in potatoes. Hence, the use of foodstuffs to play a technological role to preserve, provide texture, is age-old in the kitchen. Recent knowledge development has enabled us to isolate and produce ingredients that have only been used empirically so far. Regulations have given the name of food additive to these ingredients used in small quantities for enhancement, or, in other words, for their technological role.

The mastery of food additives has revolutionised lifestyles and our approach to food. They allow, among others, to consume all food families on a day-to-day basis, without having to go to the store every day. It is the role of some to preserve the nutritional qualities of foodstuffs, for example by limiting the oxidation of vitamins or the deterioration of amino acids. Without salt, vinegar or saltpetre (potassium nitrate), nutritional deficiencies would have decimated populations.

In the 1990s, food additives inspired great chefs who created molecular gastronomy, which applies the principles of chemistry to the production of dishes for an organoleptic effect such as spherification, flocculation, gelling or emulsion, techniques that are quite common today.

The food additives are well and truly the result of centuries of culinary experiences.
THE ABCs OF ADDITIVES
DEFINITIONS AND USES

**ACIDIFIERS**
Increase the acidity of a foodstuff or are used to improve the organoleptic quality of a product by imparting it with an acid flavour. They are often organic acids such as ascorbic, citric, or acetic acids. In vegetable tins, acidifiers allow to decrease the heat treatment for fragile vegetables such as salsify, by lowering the pH.

They are also used in fruit pastes, confectioneries and jams.

**ANTIOXIDANTS**
The most frequently used ones are ascorbic acid and tocopherols, known to the general public by their nutriment name, vitamins C and E, which, in addition to their antioxidant effect on the body, also protect foodstuffs from oxidation. Antioxidants are also used to protect lipids [omega-3].

Who hasn’t used lemon juice to protect fruit salad from oxidation? Without knowing it, we use the antioxidant properties of the ascorbic and citric acids they contain.

**EMULSIFIERS**
The most frequently used emulsifiers include lecithins or esters and salts of fatty acids, which allow fat to mix with water. The most well-known one remains lecithin, which is found in egg yolk: it is thanks to this that mayonnaise does not separate!

**EMULSIFYING SALTS**
They are used in the production of processed cheeses to disperse proteins and lipids and obtain a homogeneous product.

**FOOD ADDITIVES**
They are added in small quantities to a foodstuff for the desired technological effect such as guaranteeing sanitary quality (i.e. preservatives, antioxidants, packaging gases), improving aspect and flavour (i.e. food colours, sweeteners, flavour enhancers, and acidifiers), giving a specific texture (i.e. thickeners, gelling agents, and raising agents) or ensuring stability (i.e. glazing agents, emulsifiers, anti-caking agents, and stabilisers).
**FOOD COLOURS**

They allow to achieve the desired colour for certain foodstuffs or to enhance their original colour lightened due to cooking or exposure to light, air, humidity, inter alia. Food colours are often of vegetable origin such as beetroot red, turmeric, carotenes, chlorophyll, paprika extract... They are used in desserts, confectionaries, soups or cooked meats.

**PRESERVATIVES**

They are essential to protect against alterations due to microorganisms. Some have been known for centuries such as acetic acid (vinegar) or potassium nitrate (saltpetre). Preservatives help to preserve our foodstuffs without affecting their flavour or nutritional value. They are particularly useful in fruit- or vegetable-based products, cooked meats or fish.

**LEGALISATION**

Approximately 320 food additives are authorised in the EU today (positive list). They are submitted to a pre-market authorisation based on proof of safety, of usefulness (technological effect) and of purpose that does not mislead consumers (Regulation [EC] 1333/2008).

**RAISING AGENTS**

They work by releasing gas when heated and very efficiently leavens dough. It is, like carbonates, incorporated into viennoiseries or other bread products, but is also sold in sachets and is then called "baking powder". It is for that matter the secret ingredient recommended for a successful nougatine!

**SWEETENERS**

Noncariogenic bulk sweeteners (polyols), with half the calories of saccharose (sugar) or with no calorie, must be distinguished from high-intensity sweeteners (steviol glycosides, aspartame, saccharin, acesulfame K, etc.) with a sweetening power up to 300 times that of saccharose.

Regulations mainly authorise them to replace sugars in energy-reduced foodstuffs, non-cariogenic foodstuffs and foodstuffs without added sugars.
TECHNOLOGICAL EFFECT

The technological effect of a food additive is simply the role played by the additive in food. For example, anticaking agents allow keeping products in powder form without caking. To this day regulations cover 26 functional categories of food additives.

TEXTURISING AGENTS

Pectin, gum arabic, guar gum, alginates, agar-agar and other carob grains have thickening, gelling or stabilising properties. Modified starches (from wheat, maize, etc.) impact texture and, for example, allow cooking at high temperatures. When the aim is to reduce sugar or fat content, these ingredients are useful to provide texture and creaminess to foods and low-fat products.
What is the ADI? How are food additives used?

The Acceptable Daily Intake, expressed in milligrams of substance per kilogram of body weight and per day, in the case of a food additive corresponds to the quantity of said additive that may be ingested on a daily basis over a lifetime without health risks. Established by competent scientists, the ADI is based on an evaluation of available toxicological data. Two cases are possible:

- Either experts identify the highest dose that has no effect on the most sensitive animal species after a series of studies. In order to extrapolate to humans, they use a generous safety margin of at least 100, which aims to take into account the differences between humans and animals as well as the differences in sensitivity between humans. Regulations then establish maximum conditions of use of the additive, guaranteeing safe consumption to consumers, below the detailed ADI, regardless of their food habits.

- Or with respect to toxicological results, no effect is observed even after the highest doses. Scientists therefore judge that it is not necessary to assign a detailed ADI, which is then referred to as ADI not specified. Nearly one third of authorised additives show an ADI not specified, such as acetic acid, ascorbic acid, lecithins, gum arabic and mono- and diglycerides of fatty acids. They are used in strictly necessary quantities to achieve the desired technological effect.

In both cases, the consumer’s safety is guaranteed.

Who supervises the consumption of food additives?

Member States of the European Union are obliged to monitor the level of consumption of food additives, to ensure that their population is always below the ADI. Should the follow-up show that the ADI is exceeded, the authorities review the conditions of use of the additive and can then decide to decrease the maximum authorised quantities or to limit the use of the additive in certain foodstuffs. The consumer’s safety is guaranteed.

Why are there many food additives? Can manufacturers use just any additives?

There are approximately 320 food additives authorised in Europe and classified into 26 functional categories.

This diversity represents a guarantee of safety and food quality. The manufacturer must statutorily use the one that is best adapted to the desired technological effect, whilst taking into account the production properties and the nature of the product. It is for that matter more efficient and safer to use several substances in small quantities rather than resort to a smaller number of additives, the combined consumption of which could lead to exceeding the ADI of each.
Do food additives cause allergies?

The evaluation of the safety of the additive includes the additive’s allergenic potential. The vast majority of food additives do not cause allergies. To this day and for more than ten years, only sulphites in concentration of more than 10 mg/kg or 10 mg/litre appear on the list of ingredients to be mentioned on the food label, as they are likely to cause side-effects in sensitive individuals (Regulation [EU] No. 1169/2011). Additives based on foodstuffs recognised as allergens, such as cereals containing gluten, crustaceans, eggs, fish, peanuts, soya, milk, nuts, celery, mustard, sesame seeds, lupin and molluscs, are considered to be allergens: their presence is indicated on the food label. It is a case for lysozyme, obtained from egg white and used as a preservative for certain low-fat cheeses; or soy lecithin, used as an emulsifier.

If it is scientifically proven that the ingredient is not likely to cause side effects in sensitive individuals, the authorities grant an exemption for the allergen labelling. For example, lactitol, obtained from milk and used as a sweetener, has shown that it does not cause allergies or intolerance.

Are all food additives used by a manufacturer listed on the label?

Yes, but on the other hand regulations leave the freedom to the operator to indicate the E number or the name of the food additive in the list of ingredients. A minor exception nonetheless: packaging gases (e.g., oxygen, nitrogen, CO2, helium and argon) represent a category of additives. The regulation considers that when they are used, the gas escapes when the product is opened (e.g., cooked meats). In order to provide honest and unambiguous information to consumers, the regulation requires that the public be informed with the mention: Modified Atmosphere Packaging.

Do organic products contain food additives?

Some 50 additives are authorised in organic agriculture. These include potassium metabisulfite, monocalcium phosphate, agar-agar, pectin, tocopherol or rosemary extracts, hydroxypropylmethylcellulose, vegetable carbon, sulphites in wine, and nitrates. The positive list of authorised organic additives is regularly updated.
### DID YOU KNOW?

Which of these colours from natural sources are used and authorised in our foodstuffs?

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Humans have been using colours from natural origin to improve the appetite of food since the Middle Ages, at the very least.

Saffron contributes a yellow colouring, turmeric imparts an orange colour, sandalwood a red colour, sunflower blue or violet, parsley green, etc.
Glutamate: a Japanese discovery

In the early 20th century, a Japanese scientist, Prof. Kikunae Ikeda, stayed in Germany for two years to study physics. He was interested in the flavours of foodstuffs that had been unknown to him thus far, i.e., tomatoes, cheese, asparagus and meats.

He noted a new flavour presence in these foods, which was different from salty, sweet, bitter and acid: he called it umami. Once back in Japan, he clearly identified this pleasant flavour in broth prepared with dried kombu seaweed (Laminaria japonica). In 1908, he successfully extracted the characteristic component of this flavour: he had just discovered monosodium glutamate.

The carrageenans of Irish moss

More than 600 years ago, the people of the Irish County of Carragheen used Irish moss for their flans. This dried weed gels in the presence of milk, thanks to the carrageenans it contains.

Around 1700, Irish emigrants noted that their “Irish moss” also grew on the Massachusetts coast. These days, carrageenans are authorised as a food additive.

Agar-agar: “food of the Gods”

Called kanten or “food of the Gods”, its discovery in the 17th century in Japan was the result of a stroke of luck: a Japanese chef, by recovering remnants of algae preserved in the snow is said to have had the idea to boil them and thus obtain a firm jelly. He had just launched the production process for red algae jellies, later retrieved by Japanese monks who learned to master his art. Japan would retain its exclusive use until the end of World War II, before finally sharing it with the rest of the world. It is the word agar-agar, of Malay origin, that was adopted for its marketing in the West.

Carob at the origin of the carat unit of weight

Brown, flat and elongated, biconvex and very hard, carob seeds are separated from each other by pulpy partitions. There are 15 to 20 seeds per pod. The light yellow pulp contained in these pods is floury and sweet when mature. Carob seed flour has thickening properties and is authorised as a food additive. The word carat, a unit of mass for diamonds and gold, comes from carob and corresponded to the weight of a carob seed (between 185 and 205 mg, 1 carat = 200 mg).