

FOOD ADDITIVES

Food additives carry out a variety of necessary functions, from helping to maintain nutritional and sensory quality to keeping food safe over the duration of the shelf life. The use of additives is strictly regulated. In Canada they are regulated under the Food and Drug Regulations. Health Canada provides information on the following website:

<https://www.canada.ca/en/health-canada/services/food-nutrition/food-safety/food-additives.html#a1>

This website lists the permitted food additives in Canada. There are 15 categories that cover the range of technical functions performed by this class of compounds.

PRESERVATIVES - ANTIMICROBIAL AGENTS

This is a well-known group used to control the growth of micro-organisms (bacteria, yeasts and moulds). Nitrates and nitrites are one of the most common curing preservative. They were found by accident and it was soon realized they helped extend the shelf life of meat by preventing rancidity and by also controlling the growth of bacteria. When added to meat at allowable levels, nitrite completely inhibits *Clostridium botulinum* growth, almost completely inhibits *Clostridium perfringens*, and slows the growth of many other pathogenic bacteria such as *Listeria monocytogenes*. Nitrate salt is inert and must be first converted by bacteria to the form nitrite before it can be helpful for meat quality and safety.

Sorbic acid and its sodium or potassium salts (sorbates) are widely used to control mould and yeast. They are particularly effective against moulds. Common usage is in wine, baked goods, and more. Sorbates are often used alone or in combination with benzoates (salts of benzoic acid). Benzoates are antimicrobial agents well suited for acid foods and are more active against yeasts and bacteria and less so against mould. They are commonly used in jams, salad dressing, juices, pickles, carbonated drinks, and soy sauce.

PRESERVATIVES - ANTIOXIDANTS

Oxidation of food is a destructive process, causing loss of nutritional value and changes in chemical composition. Although there are many components that are sensitive to oxidation, fats and oils or foods containing them, are the most likely to deteriorate first. As the fat decomposes and reacts with oxygen, chemicals called peroxides are produced. These are responsible for the characteristic smell and soapy flavour of a rancid fat. BHA and BHT are synthetic antioxidants which work by stabilizing free radicals. Tocopherols are natural antioxidants (forms of vitamin E) which act by stopping the chain reaction of free radicals producing more free radicals. Ascorbic acid and sodium ascorbate are also used often to control oxidation in fruits, cheese, potato chips, and more.



FACT SHEET

APRIL 2021 | ©Perennia 2021

Many of the groups in the allowable list assist in reducing food waste by performing functions which maintain food quality on a physical functional level including appearance. These perform functions to allow food products to flow, maintain their structural identity and consumer appeal. Some categories are described below.

ANTI-CAKING AGENTS


Anti-caking agents are added to allow food and ingredients to flow and mix evenly during the food production process. They function in two different ways: by absorbing excess moisture or by coating the food particles creating a barrier around the individual particles. Calcium silicate, a common anti-caking agent that adsorbs both water and oil, is added to table salt, baking powder, spices and dry mixes.

EMULSIFYING, GELLING, STABILIZING OR THICKENING AGENTS

Emulsifiers work by forming physical barriers that keep droplets from coalescing allowing for a uniform mixture of normally immiscible oil and water. Due to having both a hydrophilic (water-loving or polar) head group and a hydrophobic (oil-loving or nonpolar) tail, the emulsifiers act by forming a layer at the surface of the droplet and lowering the interfacial tension between the droplet and continuous phase, preventing droplets from coalescing. Lecithin is a common emulsifier found in a variety of foods including chocolate. It was originally found in eggs but is now extracted from soy or sometimes sunflower.

Many hydrocolloid materials are widely used for their unique textural, structural and functional characteristics where they provide stabilization for emulsions, suspensions and foams, and general thickening properties. Polysaccharides such as gum arabic, guar gum and carrageenan are commonly used. Gelatin, a protein derived from collagen, is one of the few non-carbohydrate gelling and stabilizing agents used extensively.

COLOURING AGENTS

Colour is one of the most important organoleptic attributes that directly affects consumers' acceptance and food selection. In the past, synthetic colours were largely used but there has been a trend toward substitution with colours from natural sources. The Health Canada list of permitted colouring agents lists both synthetic and natural source colours. The symbol  indicates synthetic colours. Naturally-derived food colourants are increasingly being used by manufacturers. Anthocyanins, carotenoids, phenolic compounds, beet derivatives, annatto and some curcuminoids are among the most commonly used and have been found to be highly effective in their applications. Synthetic colours are still used in many situations where an intense colour is desired or traditional foods that have certain consumer expectations. Labeling for colours in Canada has recently changed requiring listing by their individual common names. The term 'colour' may no longer be used in the list of ingredients to declare the presence of one or more food colours.

SWEETENERS

Sweeteners that are considered additives fall into two categories: non-nutritive sweeteners and sugar alcohols. Non-nutritive sweeteners are primarily used for the production of low-calorie products including baked goods, confectioneries, dairy products, desserts, preserves, soft drinks, and tabletop sweeteners. They are also used as a carbohydrate replacement for people with diabetes and in chewing gum and candies to minimize the risk of tooth decay. Some common examples are saccharin, aspartame and sucralose. Sugar alcohols include mannitol, sorbitol, isomalt and xylitol. They are used as sweeteners in products like chewing gums, candies, chocolate bars and mints. Using sugar alcohols in foods lowers the total carbohydrate content and still provides a sweet taste. These compounds do contain energy but they are absorbed more slowly and have little or no effect on blood glucose levels.

Food additives have been and continue to be a controversial subject. Some of the more common concerns relate to allergies or sensitivities. Food colours (tartrazine, carmine, allura red), aspartame and sulfites are often implicated in adverse reactions such as increased severity of asthma, headaches and hives. Although there is no solid evidence that food additives cause attention-deficit/hyperactivity disorder, there is a common thought that certain food colourings and preservatives may increase hyperactive behavior. Better research is needed to find out if limiting food additives will prove positive for this group.

Other controversies surround nitrites in meats. Although nitrites have an important role in preservation, they are implicated in the formation of carcinogenic compounds called nitrosamines that can form when nitrites and amino acids are present while cooking with high heat. In response to this discovery, regulators have limited the level of nitrites and required manufacturers to add Vitamin C which acts to prevent nitrosamine formation.

Food additives will always play an important role to ensure safe, good quality food and minimize spoilage. Health Canada's List of Permitted Additives is compiled under rigorous scrutiny and contains allowable limits for guidance to food industry. Experts in food manufacture, research and regulation are continually making new discoveries and changes to how food is delivered to consumers with the health and safety of Canadians at the forefront.

References:

<https://www.canada.ca/en/health-canada/services/food-nutrition/food-safety/food-additives/lists-permitted.html>

<https://www.canr.msu.edu/news/preservatives-keeping-our-foods-safe-fresh>

<https://www.food-safety.com/articles/4149-formulating-food-safety-an-overview-of-antimicrobial-ingredients>

https://fyi.extension.wisc.edu/meats/files/2012/02/Nitrate-and-nitrite-in-cured-meat_10-18-2012.pdf

<https://www.faia.org.uk>

<http://www.chemistryindustry.biz/anticaking-agent.html>

<http://understandingfoodadditives.org.uk/pages/Ch2p7-1.htm>

<https://www.healthline.com/nutrition/are-nitrates-and-nitrites-harmful#what-are-nitrates-and-nitrites>

https://www.health.harvard.edu/newsletter_article/Diet-and-attention-deficit-hyperactivity-disorder

<http://www.ukfoodguide.net/index.htm>