

Food Additives

Changing lifestyles have resulted in a greater demand for food that will stay fresh and safe longer. As more people move from farms to cities, there is an increasing need for foods that can be produced in great quantities, shipped over great distances, and stored for long periods of time.

As the population continues to grow and more food is needed, the use of additives to provide a safe, wholesome food supply will continue.

Today, we have a greater variety of foods than ever before, and more substances are being added to these foods. Food additives have become an important issue in our society, affecting consumers, the food industry, and government regulatory agencies.

While many people support the use of additives in foods, some critics call them dangerous and unnecessary chemicals. The reason people are afraid of food additives is that they don't understand what a food additive really is. Salt and sugar are both considered food additives. Historians believe salt was used before recorded history to preserve meat and fish. Herbs and spices have been treasured for many years because of the flavors they add to foods and for their use as preservatives.

What Is a Food Additive?

A food additive is anything added to a food. An easy example is chocolate milk. The chocolate is considered an additive to the milk. Chocolate is something you would not normally find in milk, therefore it becomes an additive. Vitamins are also common food additives. They are added to improve nutritional value. Some additives are added indirectly during processing, such as the oil on a pan to keep cookies from sticking.

Why Are Additives Used in Foods?

Additives are used in foods for one or more of the following reasons.

- **To maintain or improve nutritional value.** Many foods contain added vitamins and minerals that might not be in a person's diet or that have been destroyed or lost in processing. Common nutritional additives include vitamin D in milk, vitamin A in margarine, vitamin C in fruit drinks, and iodine in salt. Breads and cereals are enriched with

B vitamins that are lost or destroyed during the milling and processing of grains. Such fortification has helped prevent nutritional deficiency diseases that were once common, such as rickets (vitamin D), scurvy (vitamin C), pellagra (vitamin B₁), and goiter (iodine).

- **To maintain freshness.** Foods last as long as they do on the shelf or in your refrigerator because of additives that slow down spoilage, preserve natural color and flavor, and keep fats and oils from turning rancid. Ascorbic acid, for instance, keeps peaches from turning brown.
- **To help in processing or preparation.** Many compounds are added to foods for body and texture, to evenly distribute particles of one liquid in another liquid, to retain moisture, to affect cooking or baking results, and to prevent caking or lumping.

Chemicals called emulsifiers give products such as peanut butter and salad dressings an even texture and prevent them from separating into an oily layer at the top of the jar and a thick layer at the bottom.



- **To make food more appealing.** The most used additives are those that make food look and taste better. These include coloring agents, natural and synthetic flavors, flavor enhancers such as MSG (monosodium glutamate), and sweeteners. Common examples of foods that are colored artificially include flavored sherbets or candies.

Most margarine and cheeses in markets today are colored artificially. In many markets, the colored product usually outsells the uncolored one because consumers expect certain foods to be certain colors.

A table of food additives listing their functions and uses is found at the end of this publication.

How Are Food Additives Regulated?

Food additives are strictly regulated today. The 1906 Food and Drug Act and the more comprehensive Food, Drug, and Cosmetic Act of 1938 gave the government the power to remove contaminated and poisonous foods from the market. The 1958 Food Additives Amendments and the 1960 Color Additive Amendments placed the burden of proof for safety of additives on the food industry. Any company that uses an additive must furnish proof to the Food and Drug Administration that the additive is safe.

The Delaney Clause, part of the 1958 amendment, states, "No additive shall be deemed to be safe if it is found to induce cancer when ingested by man or animals." Simply stated, no substance that has been shown to cause cancer when eaten in any amount may be added to a food.

In 1958, many food additives that had been used for many years were placed on a list known as the GRAS list, which stands for Generally Recognized as Safe.

A review of about 450 natural and artificial substances with GRAS status was begun in 1971 and still continues today. Since this review was started, some substances have been removed from the list. Most have been changed to a category that now requires regulation, and others have been withdrawn from use. About 700 substances are now on the GRAS list, and most of these are flavorings.

How Is an Additive Approved?

Before an additive can be used to improve a food product, it is studied for toxicity to animals and people by the food or chemical manufacturer and is evaluated and regulated by the FDA.

The research and testing required to develop a food additive and to establish its safety may take several years and cost millions of dollars. The following steps must be completed before the food additive can be used commercially.

- Three kinds of toxicity studies are conducted on natural or synthetic chemicals that show promise. Acute toxicity tests are conducted to show the effects produced by the additive when a large dose is given to at least two species of laboratory animals.

Short-term toxicity studies (90 days) show the effects of the additive on a variety of laboratory animals. Finally, long-term toxicity studies of two years or more are conducted to show the effects of a lifetime consumption of the chemical. During these studies, growth, food consumption, general appearance, behavior, changes in offspring, and mortality are observed.

After feeding studies are completed, the lowest harmful level of the chemical is determined, and the next level below that is the no-effect level. This no-effect level is then divided by 100, and that amount is the most that can be added to a food. The law requires, however, that the amount used be the minimum needed to produce the intended effect in the food. So, even though 1/100 of the no-effect level may be used, if less than this amount is needed for the intended purpose of the additive, then only the amount actually needed may be used.

- The manufacturer must show the testing method used to determine the amount of the additive in the processed food.
- The company files a petition with the FDA requesting a regulation calling for the safe use of the chemical. This occurs after the results of the chemical studies are reviewed.
- The food additive is used commercially after the regulation has been published in the Federal Register in accordance with the terms of the regulation.

Benefits With Risks

In spite of the testing required for food additives, there are still questions about their safety. Since experiments must be done on animals, it is difficult to predict all the possible effects on humans. While it may not be too difficult to weigh the risks of smoking, driving a car, or jogging in a thunderstorm, not all human risk/benefit decisions are so easily made.

Risks associated with food are not always obvious, and deaths from food are very rare. Many people believe there should be no hazards associated with the food supply. However, a zero risk or absolute safety in any area, including food, is not possible.

Many substances, both naturally occurring and added by processors, are beneficial in small amounts but are harmful when ingested in large doses. The benefits from the use of small amounts of these substances greatly outweigh the possible risks. Today's precise, analytical methods allow scientists to detect

the presence of extremely small amounts of substances. The Delaney Clause was written at a time when large amounts of substances were required to be detectable.

We must tolerate a certain amount of risk to enjoy the benefits of additives. Dried-out cookies, moldy bread, grainy ice cream, rancid fat, and mushy canned fruit are things of the past thanks to food additives.

Minimizing the Risks

You can do many things to improve the quality of your diet without being too concerned about the safety of the foods you eat. Follow these suggestions.

- Make a nutritious diet your goal. Eat a variety of foods, and don't be afraid of additives. Stay informed, and read the labels to find out what is in the food you buy. The list of ingredients is always in descending order, so you can determine the relative amount of each ingredient.
- Learn what additives do. When you eat convenience foods, supplement them with fresh foods. Limit the amount of highly fortified foods you eat, such as the breakfast bars or cereals that claim to contain all of the vitamins and minerals you need in one serving. Too much of some vitamins and minerals can be harmful.
- Shop cautiously at health food stores. Although they sometimes offer items available nowhere else, their products are sometimes higher priced. Research studies have shown that food bought at some of these stores is no more nutritious than food available at supermarkets.
- If you buy organically grown food, be sure of your source. Organic is a labeling term that denotes products produced under the authority of the Organic Foods Production Act. The principal guidelines for organic production are to use materials and practices that enhance the ecological balance of natural systems that integrate the parts of the farming system into an ecological whole.

- Use your power of the marketplace. If you are informed, you can select foods on the basis of which characteristics—convenience, appeal, storage time—are most important to you. It's your choice.
- Make your views known. Let manufacturers and lawmakers know what you want and don't want in your food. Food additives bring certain risks and benefits. You must decide what degree of risk is acceptable for foods that are appealing, nutritious, convenient, and readily available. As a consumer, you have the greatest power over decisions about food additives. Companies do not market foods that do not sell.

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Food Additives: Their Functions and Uses

Function	Common Examples	Foods in Which Additives May Be Used
To maintain or improve nutritional quality		
Enrichers —replace nutrients lost in processing	Ascorbic acid, ferrous sulfate, potassium, iodine, niacin, riboflavin, thiamin, vitamin A, palmitate, vitamin D	Enriched or fortified breads and cereals, macaroni products, salt, margarine
Fortifiers —add nutrients that may not be present	Folate, vitamin C, vitamin D	Flour, flavored drinks, milk
To maintain product quality		
Anti-oxidants —delay/prevent rancidity of fats caused by oxidation after exposure to oxygen in the air	Butylates hydroxyanisole (BHA), butylated hydroxytoluene (BHT), citric acid, propyl gallate, tocopherols (vitamin E), sodium nitrate	Cake mixes, pudding mixes, snack foods, vegetable shortenings, ham or luncheon meats
Anti-microbial preservatives —prevent food spoilage from bacteria, molds, and yeast	Acetic acid, calcium propionate, potassium nitrate, sodium benzoate, sodium nitrite, sodium propionate, sorbic acid	Bread, margarine, soft drinks, fruit juices, ham, bacon, processed cheese, table syrup
Humectants —retain moisture	Glycerine, glycerol, glycol monostearate, propylene, sorbitol	Candy, coconut, marshmallows
Anti-caking agents —prevent caking, lumping or clustering of finely powdered or crystalline substances	Calcium silicate, iron-ammonium citrate, silicon dioxide, sodium silico aluminate	Salt, gelatin desserts, cake mixes, powdered sugar, baking powder
To aid in processing or preparing		
Emulsifiers —distribute particles of one substance in another	Lecithin, monoglycerides, diglycerides, polysorbate 60, sorbitan monostearate	Margarine, cake mixes, ice cream, pudding, non-dairy toppings, processed cheese, salad dressings
Stabilizers, thickeners, texturizers —produce a smooth, uniform texture or stabilize emulsions	Carboxymethyl cellulose, carrageenan, gelatin, guar gum, gum arabic, modified starch, pectin, locust bean gum, xanthan gum	Candies, chocolate drinks, salad dressings, pudding mixes, frozen desserts
Leavening agents —make foods light in texture	Baking powder, baking soda, yeast	Breads, cakes, rolls
pH control agents —change or maintain acidity or alkalinity	Citric acid, monosodium phosphate, sodium bicarbonate	Baked products, soft drinks, powdered fruit drinks
Maturing and bleaching agents, dough conditioners —improve baking qualities	Benzoyl peroxide, calcium bromate, hydrogen peroxide, potassium bromate	Flour, cake mixes, baked goods
To affect appeal characteristics		
Flavor enhancers —increase or decrease the original taste or aroma	Hydrolyzed vegetable protein, monosodium glutamate (MSG), yeast-malt sprout extract	Canned soups, packaged dinners, baked products, salad dressings, gravies, frozen dinners
Flavors —add a new or different taste	Artificial flavor, benzaldehyde, herbs, spices, hydrolyzed vegetable protein, monosodium glutamate, vanillin	Cake mixes, salad dressings, soft drinks, pudding, soups, fruit flavored toppings
Colors —give desired color to food	Artificial color, carotene, caramel, cochineal, orange B, paprika, tartrazine	Bakery products, soft drinks, gelatins, powdered fruit drinks, candy



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