

Food Additives

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Glossary of Terms

ANTICAKING AND FREE-FLOW AGENTS:

These substances prevent lumping, clustering or caking in crystalline and finely divided powders. They absorb water.

ANTIMICROBIAL AGENTS:

These substances prevent the growth of microorganisms such as yeast, mold, and bacteria.

ANTIOXIDANTS retard the oxidation of unsaturated fats and oils, colorings, and flavorings. Oxidation leads to rancidity, flavor changes, and loss of color. Most of these effects are caused by reaction of oxygen in the air with fats.

BLEACHING OR MATURING AGENTS:

These agents are added to flour during or after milling to improve the color and baking qualities. Most work by "oxidizing" some critical component of the flour.

CHELATING AGENTS trap trace amounts of metal atoms that would otherwise cause food to discolor or go rancid.

COLORS:

These products provide or enhance the color of food.

CURING AGENTS:

These substances impart color and flavor to foods. They often increase shelf stability and may have antimicrobial characteristics.

DOUGH CONDITIONERS:

These substances modify the starch and/or protein (gluten) fractions of flour. They accelerate the aging process. This improves the handling characteristics and baking quality of doughs.

DRYING AGENTS:

These substances absorb moisture to maintain a "dry" environment for the food or ingredient.

EMULSIFIERS keep oil and water mixed together.

ENZYMES:

These substances are proteins which catalyze (speed up) reactions. Some are used to improve food quality or food processing characteristics.

FIRMING AGENTS:

These products act on pectins (which cement plant cells together) to help them resist the softening that may accompany food processing (canning).

FLAVOR ENHANCERS have little or no flavor of their own, but accentuate the natural flavor of foods. They are usually used when very little of a natural ingredient is present.

FLAVORING AGENTS:

These substances add flavor or aroma, or replace flavors lost in processing.

FORMULATION AIDS:

These substances help to produce the desired texture of the food.

FUMIGANTS:

These substances may be used to control pests (insects, molds, etc.)

HUMECTANTS:

These agents help foods to retain moisture.

LEAVENING AGENTS:

These substances produce carbon dioxide (usually in baked products) to give a characteristic texture.

LUBRICANTS:

These substances are added to food- contact-surfaces to prevent food from sticking.

NON-NUTRITIVE SWEETENERS:

These substances provide the sweetness of sugar with less than 2% of the calories.

NUTRIENT SUPPLEMENTS:

These agents provide essential nutrients for human metabolism.

NUTRITIVE SWEETENERS:

These sweeteners sweeten food, but add more than 2% of the calories of a sugar-sweetened product.

OXIDIZING AND REDUCING AGENTS:

These substances cause chemical changes (oxidize or reduce) in some of the food ingredients to help make the product more acceptable, easier to process, or more stable.

pH CONTROL SUBSTANCES:

These products affect the acidity/alkalinity of a product or ingredient. They may change the pH or maintain original pH.

PROCESSING AIDS:

These substances enhance the ability of a food ingredient to be processed into a desired end product. Some improve functional characteristics, while other improve quality characteristics.

PROPELLANTS AND AERATING AGENTS:

These agents provide force for the expulsion of a product or add "air" to a product.

SEQUESTRANTS:

These substances combine with metal ions to prevent the metal from entering into unwanted reactions.

SOLVENTS:

These substances are used to separate one substance from another, usually by dissolving one of the substances in the solvent then removing the solvent.

STABILIZERS AND THICKENERS:

These agents increase the viscosity of a solution. They improve body, consistency, and prevent emulsions from separating.

SURFACE ACTIVE AGENTS:

These agents modify the surface properties (surface tension) of liquid food ingredients. They enhance characteristics such as whipping, foaming or anti-foaming, wetting, and dispersing.

SYNERGISTS: These substances interact with other food ingredients to produce an effect which is greater than the additive effect of the two ingredients along.

TEXTURIZERS:

These subjects alter the viscosity and "feel" of food.

THICKENING AGENTS are natural or chemically modified carbohydrates that absorb some of the later that is present in food, thereby making the food thicker. Thickening agents "stabilize" factory-made foods by keeping the complex mixtures of oils, water, acids, and solids well mixed.

Additives on Food Labels

Table 1 provides the purpose and label term for common additives found on food labels.

Table 1. Additives on Food Labels	
Purpose	Label Term
Acid-alkaline Balance	Acetic acid, citric acid, hydrochloric acid, phosphoric acid, lactic acid, sodium hydroxide, sodium bicarbonate, malic acid, phosphates, sodium carbonate, monocalcium phosphate, sodium tartrate, adipic acid
Anticaking Agents	Stearates, silicates, iron-ammonium citrate, mannitol, silicon dioxide, yellow prussiate of soda
Antioxidants	BHA (butylated hydroxy anisole), BHT (butylated hydroxytoluene), propyl gallate, tocopherol, sodium citrate, calcium disodium EDTA, phosphates, TBHQ (tertiary butyl hydroxyquinone)
Color	Carotene, beet powder, annatto, cochineal, oleoresins, titanium dioxide, beta-apo-8, carotenal, beta carotene, canthaxanthin, caramel, dried algal meal, paprika, grape skin extract, iron oxide, turmeric, saffron, synthetic food colors (FD and C)
Emulsifiers	Propylene glycol, propylene glycol monoesters, sorbitan monostearate, cholic acid, glycocholic acid, deoxycholic acid, lecithin, sorbitan, polysorbate 60, mono- and di- glycerides, fatty acid esters, dioctyl sodium sulfosuccinate
Flavor	Citrus oils, amyl acetate, benzaldehyde, oleoresins, maltol spices, yeast extracts, essential oils
Flavor Enhancers	Monosodium glutamate, sodium lactate, disodium guanylate, disodium inosinate, hydrolyzed vegetable protein, nucleotides
Foaming Agents	Whey proteins, hydrolyzed yeast or vegetable proteins
Humectants	Fructose, corn syrup, honey, sorbitol, propylene glycol, glycerine, glycerine monostearate
Leavening Agents	Sodium acid phosphate, sodium aluminum sulfate, monocalcium phosphate, sodium bicarbonate
Maturing and Bleaching Agents	Chlorine, chlorine dioxide, L-cysteine, potassium bromate, benzoyl peroxide, bromine, acetone peroxide, azodicarbonamide, calcium bromate, hydrogen peroxide, sodium stearyl fumarate
Microbial Control	Calcium propionate, sodium benzoate, sorbic acid, ascorbic acid, methyl parabens (methyl, propyl, butyl or heptal parahydroxy benzoate), nitrite, calcium lactate, lactic acid, sodium diacetate, nitrate and erythrobate
Non-Nutritive Sweeteners	Saccharin, cyclamate, aspartame, acesulfame K, ammoniated glycyrrhizin
Nutritive Sweeteners	Fructose, high fructose corn syrup, sucrose, sorbitol, dextrose, invert sugar, mannitol
Nutrients	Vitamin A acetate or palmitate, thiamine hydrochloride or mononitrate (B-1), riboflavin or riboflavin-5-phosphate (B-2), niacin or niacinamide (B-3), pyridoxine hydrochloride (B-6), ascorbic acid (C), vitamin D-2 or D-3, tocopherols (E), calcium oxide, calcium sulfate, calcium phosphate, ferrous sulfate, phosphate or pyrophosphate (iron), potassium chloride or iodide, sodium phosphate
Sequestrants	EDTA, citric acid, polyphosphates, calcium disodium EDTA
Stabilizers and Thickeners	Gum arabic, gum acacia, modified starches, calcium carbonate, sodium caseinate, magnesium stearate, agar, carboxymethyl cellulose, alginates, pectins, carrageenan, locust bean gum, ammonium alginate, arabinogalactan, carob bean gum, cellulose, gelatin, gum ghatti, karaya, larch gum, mannitol, propylene glycol, tragacanth, furcellaran

Food Additives

[Table 2](#) provides a listing of food additives, their function and the foods they are used in.

Table 2. Food Additives			
Additive	Function	Action	Food Uses
Alginate, Propylene Glycol Alginate	Thickening agents; foam stabilizer	Alginate derived from kelp seaweats maintains the desired texture in dairy products, canned frosting, and other manufactured foods. Propylene glycol alginate, a chemically-modified algin, thickens acidic foods (soda pop, salad dressing) and stabilizes the foam in beer.	Ice cream, cheese, candy, yogurt
Alpha Tocopherol (vitamin E)	Antioxidant, nutrient	Vitamin E is abundant in whole wheat, rice germ, and vegetable oils. Vitamin E prevents oils from becoming rancid.	Vegetable oil
Artificial Coloring	BLUE No. 1		Beverages, candy, baked goods
	BLUE No. 2		Pet food, beverages, candy
	CITRUS RED No. 2	The dye does not seep through the orange skin into the pulp.	Skin on some Florida oranges only
	GREEN No. 3	This dye is rarely used.	Candy, beverages
	RED No. 3		Cherries in fruit cocktail, candy, baked goods
	RED No. 40	The most widely used food dye.	Soda pop, candy, gelatin desserts, pastry, pet food, sausage
	YELLOW No. 5 (Tartrazine)	The second most widely used coloring can cause allergic reactions, primarily in aspirin-sensitive persons. This dye is the only one that must be labeled by name on food labels.	Gelatin dessert, candy, pet food, baked goods
	YELLOW No. 6		Beverages, sausage, baked goods, candy, gelatin
Artificial Flavoring	Flavoring	Hundreds of chemicals are used to mimic natural flavors. Most flavoring chemicals also occur in nature and are safe.	Soda pop, candy, breakfast cereals, gelatin desserts; many others
Ascorbic Acid (Vitamin C), Erythorbic Acid	Antioxidant, nutrient, color stabilizer	ASCORBIC ACID helps maintain the red color of cured meat and prevents the formation of nitrosamines (from sodium nitrite). It helps prevent loss of color and flavor by reacting with unwanted oxygen. It is used as a nutrient additive in drinks and breakfast cereals. SODIUM ASCORBATE is a more soluble form of ascorbic acid. ERYTHORBIC ACID (sodium erythorbate) serves the same functions as ascorbic acid, but has no value as a vitamin.	Oily foods, cereals, soft drinks, cured meats
Aspartame	Artificial sweetener	ASPARTAME, made up of two amino acids (phenylalanine and aspartic acid). People with PKU	Drink mixes, gelatin desserts, other foods

		need to avoid it. Unstable to heat.	
Acesulfame K	Artificial sweetener	Sweetens cold or powdered products. Stable to heating (baking).	Drink mixes, tabletop sweetener.
Beta Carotene	Coloring; nutrient	Used as an artificial coloring and a nutrient supplement. The body converts it to Vitamin A, which is required by the light-detection mechanism of the eye.	Margarine, shortening, non-dairy whiteners, butter
Brominated Vegetable Oil (BVO)	Emulsifier, clouding agent	BVO keeps flavoring oils in suspension and gives a cloudy appearance to citrus-flavored soft drinks.	Soft drinks
Butylated Hydroxyanisole (BHA)	Antioxidant	BHA retards rancidity in fats, oils, and oil-containing foods.	Cereals, chewing gum, potato chips, vegetable oil
Butylated Hydroxytoluene (BHT)	Antioxidant	BHT retards rancidity in oils.	Cereals, chewing gum, potato chips, oils, etc.
Caffeine	Stimulant		Coffee, tea, cocoa (natural); soft drinks (additive)
Calcium (or Sodium) Propionate	Preservative	CALCIUM PROPIONATE prevents mold growth on bread and rolls. The calcium is a beneficial mineral; the propionate is safe. SODIUM PROPIONATE is used in pies and cakes, because calcium alters the action of chemical leavening agents.	Bread, rolls, pies, cakes
Calcium (or Sodium) Stearoyl Lactylate	Dough conditioner, whipping agent	These additives strengthen bread dough so it can be used in bread-making machinery; leads to more uniform grain and greater volume. They act as whipping agents in dried, liquid, or frozen egg whites and artificial whipped cream. SODIUM STEAROYL FUMARATE serves the same function.	Bread dough, cake fillings, artificial whipped cream, processed egg whites
Carrageenan	Thickening and stabilizing agent	Carrageenan is obtained from seaweed. It is used to thicken fluid products and to prevent liquids from separating.	Ice cream, jelly, chocolate milk, infant formula
Casein, Sodium Caseinate	Thickening and whitening agent	Casein, the principal protein in milk, contains adequate amounts of all the essential amino acids.	Ice cream, ice milk, sherbet, coffee creamers
Citric Acid, Sodium Citrate	Acid, flavoring, chelating agent	CITRIC ACID is versatile, widely used, inexpensive, and safe. It is an important metabolite in virtually all living organisms; especially abundant in citrus fruits and berries. It is used as a strong acid, a tart flavoring, and an antioxidant. SODIUM CITRATE is a buffer that controls the acidity of gelatin desserts, jam, ice cream, candy, and other foods.	Ice cream, sherbet, fruit drink, candy, carbonated beverages, instant potatoes
Corn Syrup	Sweetener, thickener	Corn syrup is a sweet, thick liquid made by treating cornstarch with acids or enzymes. It may be dried and used as CORN SYRUP SOLIDS in coffee whiteners, and other dry products.	Candy, toppings, syrups, snack foods, imitation dairy foods
Dextrose (Glucose, Corn Sugar)	Sweetener, coloring agent	Dextrose is an important chemical in every living organism. A sugar, it is a source of sweetness in fruits and honey. Dextrose turns brown when heated and contributes to the color of bread crust and toast.	Bread, caramel, soda pop, cookies, many other foods
EDTA	Chelating agent	EDTA (ethylenediamine tetraacetic acid) traps metal impurities, which would otherwise promote rancidity	Salad dressing, margarine, sandwich

		and the breakdown of artificial colors.	spreads, mayonnaise, processed fruits and vegetables, canned shellfish, soft drinks
Ferrous Gluconate	Coloring, nutrient	Used by the olive industry to generate a uniform jet-black color. It is a source of iron.	Black olives
Fumaric Acid	Tartness agent	A solid at room temperature, inexpensive, highly acidic, it is the ideal source of tartness and acidity in dry food products. However, it dissolves slowly in cold water, a drawback cured by adding DIOCTYL SODIUM SULFOSUCCINATE (DSS).	Powdered drinks, pudding, pie fillings, gelatin desserts
Gelatin	Thickening and gelling agent	Gelatin is a protein obtained from animal bones, hoofs, and other parts. It forms a thermoreversible gel when cooled in solution.	Powdered dessert mix, yogurt, ice cream, cheese spreads, beverages
Glycerin (Glycerol)	Maintains water content	Glycerin forms the molecular backbone of fat and oil molecules. The body uses it as a source of energy or as a starting material in making more complex molecules.	Marshmallow, candy, fudge, baked goods
Gums: Guar, Locust Bean, Arabic, Furcelleran, Ghatti, Karaya, Tragacanth	Thickening agents, stabilizers	Gums are derived from natural sources (bushes, trees, or seaweed). They are used to thicken foods, prevent sugar crystals from forming in candy, stabilize beer foam (arabic), form a gel in pudding (furcelleran), encapsulate flavor oils in powdered drink mixes, or keep oil and water mixed together in salad dressings.	Beverages, ice cream, frozen pudding, salad dressing, dough, cottage cheese, candy, drink mixes
Heptyl Paraben	Preservative	Heptyl paraben - short for the heptyl ester of para-hydroxybenzoic acid - is a preservative.	Beer, non-carbondated soft drinks
Hydrogenated Vegetable Oil	Source of oil or fat	Vegetable oil, usually a liquid, can be made into a semi-solid by adding hydrogen. This also increases the stability.	Margarine, many processed foods
Hydrolyzed Vegetable Protein (HVP)	Flavor enhancer	HVP consists of vegetable (usually soybean) protein that has been chemically broken down to the amino acids of which it is composed. HVP is used to bring out the natural flavor of food.	Instant soups, frankfurters, sauce mixes, beef stew
Invert Sugar	Sweetener	Invert sugar, a 50-50 mixture of two sugars, dextrose and fructose, is sweeter and more soluble than sucrose (table sugar). Invert sugar forms when sucrose is split in two by an enzyme or acid.	Candy, soft drinks, many other foods
Lactic Acid	Acidity regulator	This acid occurs in almost all living organisms. It inhibits spoilage in Spanish-type olives, balances the acidity in cheese-making, and adds tartness to frozen desserts, carbonated fruit-flavored drinks, and other foods.	Spanish olives, cheese, frozen desserts, carbonated beverages
Lactose	Sweetener	Lactose is a carbohydrate found only in milk. One-sixth as sweet as table sugar, it is added to food as a slightly sweet source of carbohydrate. Milk turns sour when bacteria convert lactose to lactic acid. Many non-Caucasians have trouble digesting lactose.	Whipped topping mix, breakfast pastry
Lecithin	Emulsifier, antioxidant	A common constituent of animal and plant tissues, it is a source of the nutrient choline. It keeps oil and water from separating, retards rancidity, reduces spattering in a frying pan, and leads to fluffier cakes. Major sources are egg yolk and soybeans.	Baked goods, margarine, chocolate, ice cream

Mannitol	Sweetener, other uses	Not quite as sweet as sugar and poorly absorbed by the body, it contributes only half as many calories as sugar. Used as the "dust" on chewing gum, it prevents gum from absorbing moisture and becoming sticky.	Chewing gum, low-calorie foods
Mono- and Diglycerides	Emulsifier	Makes bread softer and prevents staling, improves the stability of margarine, makes caramels less sticky, and prevents the oil in peanut butter from separating.	Baked goods, margarine, candy, peanut butter
Monosodium Glutamate (MSG)	Flavor enhancer	This amino acid (glutamic acid) brings out the flavor of protein-containing foods.	Soup, seafood, poultry, cheese, sauces, stews; many others
Phosphoric Acid; Phosphates	Acidulant, chelating agent, buffer, emulsifier, nutrient, discoloration inhibitor	PHOSPHORIC ACID acidifies and flavors cola beverages. Phosphate salts serve many purposes. CALCIUM and IRON PHOSPHATES act as mineral supplements. SODIUM ALUMINUM PHOSPHATE is a leavening agent. CALCIUM AND AMMONIUM PHOSPHATES serve as food for yeast in bread. SODIUM ACID PYROPHOSPHATE prevents discoloration in potatoes and sugar syrups.	Baked goods, cheese, powdered foods, cured meat, soda pop, breakfast cereals, dehydrated potatoes
Polysorbate 60	Emulsifier	POLYSORBATE 60 is short for polyoxyethylene - (20) - sorbitan monostearate. It and its close relatives, POLYSORBATE 65 and 80, work the same way as mono- and diglycerides, but smaller amounts are needed. They keep baked goods from staling, keep dill oil dissolved in bottled dill pickles, help coffee whiteners dissolve in coffee, and prevent oil from separating out of artificial whipped cream.	Baked goods, frozen desserts, imitation dairy products
Propyl Gallate	Antioxidant	Retards the spoilage of fats and oils and is often used with BHA and BHT, because of the synergistic effects these additives have.	Vegetable oil, meat products, potato sticks, chicken soup base, chewing gum
Quinine	Flavoring	This substance is used as a bitter flavoring in a few soft drinks.	Tonic water, quinine water, bitter lemon
Saccharin	Synthetic sweetener	Saccharin is 350 times sweeter than sugar.	"Diet" products
Salt (Sodium Chloride)	Flavoring	Salt is used in many foods for flavoring, suppression of yeast growth and as a preservative. Other additives contribute additional sodium.	Most processed foods: soup, potato chips, crackers
Sodium Benzoate	Preservative	Manufacturers have used sodium benzoate for over 70 years to prevent the growth of microorganisms in acidic foods.	Fruit juice, carbonated drinks, pickles, preserves
Sodium Carboxy-Methylcellulose (CMC)	Thickening and stabilizing agent	CMC is made by reacting cellulose with a derivative of acetic acid. CMC prevents sugar from crystallizing.	Ice cream, beer, pie fillings, icings, diet foods, candy
Sodium Nitrite	Preservative, coloring, flavoring	Nitrite can prevent the growth of bacteria that cause botulism poisoning. Nitrite also stabilizes the red color in cured meat and gives a characteristic flavor.	Bacon, ham, frankfurters, luncheon meats, smoked fish, corned beef
Sorbic Acid, Potassium	Sorbate	Prevents growth of mold SORBIC ACID occurs naturally in many plants.	Cheese, syrup, jelly, cake, wine, dry fruits
Sorbitan Monostearate	Emulsifier	Like mono- and diglycerides and polysorbates, this additive keeps oil and water mixed together. In chocolate candy, it prevents the discoloration that normally occurs when the candy is warmed up and	Cakes, candy, frozen pudding, icing

		then cooled down (chocolate "bloom").	
Sorbitol	Sweetener, thickening agent, maintains moisture	Sorbitol occurs naturally in fruits and berries and is a close relative of the sugars. It is half as sweet as sugar. It is used in non-cariogenic chewing gum because oral bacteria do not metabolize it well. Large amounts of sorbitol (2 oz. for adults) have a laxative effect, but otherwise it is safe. Diabetics use sorbitol, because it is absorbed slowly and does not cause blood sugar to increase rapidly.	Dietetic drinks and foods; candy, shredded coconut, chewing gum
Starch, Modified Starch	Thickening agent	Starch, the major component of flour, potatoes, and corn, is used as a thickening agent. However, it does not dissolve in cold water. Starches may be chemically modified to improve their solubility, stability to freezing and thickening capabilities. These modified starches are added to some foods to improve their consistency and keep the solids suspended.	Soup, gravy, baby foods, pie fillings, puddings
Sugar (Sucrose)	Sweetener	Sucrose, ordinary table sugar, occurs naturally in fruit, sugar cane, and sugar beets.	Table sugar, sweetened foods
Sulfur Dioxide, Sodium Bisulfite	Preservative, bleaching agent	Sulfiting agents prevent discoloration (dried fruit, some "fresh" shrimp, and some dried, fried, and frozen potatoes) and bacterial growth (wine).	Dried fruit, wine, processed potatoes
Vanillin, Ethyl Vanillin	Substitute for vanilla	Vanilla flavoring is derived from a bean, but VANILLIN, the major flavor component of vanilla, is cheaper to produce synthetically. A derivative, ETHYL VANILLIN, comes closer to matching the taste of real vanilla. Both chemicals are safe.	Ice cream, baked goods, beverages, chocolate, candy, gelatin desserts

Additives no longer permitted for food use:

- DULCIN 1950 artificial sweetener
- SAFROLE 1960 root beer flavoring
- GREEN No. 1 1966 coloring
- COBALT SULFATE 1966 beer foam stabilizer
- CYCLAMATE 1970 artificial sweetener
- VIOLET No. 1 1973 coloring
- RED No. 2 1976 coloring
- ORANGE B 1978 coloring