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TOPIC 6: FOOD ADDITIVES

Food additives are substances added to food to preserve flavor or enhance its taste, appearance, or other qualities. For example- preserving food by pickling (with vinegar), salting, as with bacon.

• Some of the foods we eat are fresh. They are not processed.

• Most foods, however, are processed.

• In food processing, small amounts of certain chemicals are often added.

These are called food additives.

• Any substance that becomes part of a food product either directly or indirectly during some phase of processing, storage or packaging. Need for additives in present degree of urbanization, it's impossible to maintain distribution network without adding preservatives. Great demand for convenience/ready to eat foods and heat and serve products. Essential to prevent rancidity of oils and for maintaining the shelf life of high moisture containing foods. Food additives must not be used to disguise faulty processing and handling techniques to cheat customers.

Importance of food additives

• Foods are subjected to many environmental conditions, such as temperature changes, oxidation and exposure to microbes, which can change their original composition.

• Food additives play a key role in maintaining the food qualities and characteristics that consumers demand, keeping food safe, wholesome and appealing from farm to fork.

Uses and some of the common functions food additives

Use	Function
Preservative	These help in preservation of food by increasing its storage life, e.g. Preservative like sodium benzoate in squashes.
Taste	Food additives improves the taste or appearance of any food product, e.g. grazing agents on fruits.
Quality	These improve the quality or stability of the food, e.g. humectants added to mixed dried foods.(Provide moisture)
Colour & Flavour	These provide the right colour and improve the flavour, e.g. commercially available colouring agents.

5.1 Preservatives

A preservative is a substance or a chemical that is added to products such as food, beverages, pharmaceutical drugs, paints, biological samples, cosmetics, wood, and many other products to prevent decomposition by microbial growth or by undesirable chemical changes.

5.2 Coloring agents

Food coloring, or color additive, is any dye, pigment or substance that imparts color when it is added to food or drink. They come in many forms consisting of liquids, powders, gels, and pastes. Food coloring is used both in commercial food production and in domestic cooking. Food colorants are also used in a variety of non-food applications including cosmetics, pharmaceuticals, home craft projects, and medical devices.

Natural:

A growing number of natural food colorings are being commercially produced, partly due to consumer concerns surrounding synthetic colorings. Some examples include:

• Caramel coloring, made from caramelized sugar, used in cola products and also in cosmetics.

• Annatto, a reddish-orange dye made from the seed of the Achiote.

• A green dye made from chlorella algae.(plant grow on water, find it in USA)

• Cochineal, a red dye derived from the cochineal insect, Dactylopiuscoccus.

• Betanin extracted from beets.

• Turmeric

• Saffron

• Paprika

• Elderberry (flowering plant) To ensure reproducibility, the colored components of these substances are often provided in highly purified form, and for increased stability and convenience, they can be formulated in suitable carrier materials (solid and liquid).

Synthetic:

The colours below are known as “Primary Colours”, when they are mixed to produce other colours, those colours are then known as “Secondary Colours”.

• Brilliant Blue, E133 (Blue shade)

• Indigotine, E132 (Dark Blue shade)

• Fast Green, E143 (Bluish green shade)

• Allura Red AC, E129 (Red shade)

• Erythrosine, E127 (Pink shade)

• Tartrazine, E102 (Yellow shade)

• Sunset Yellow, E110 (Orange shade)

Dyes and Lakes

Colour additives are available for use in food as either “dyes” or “lakes”. Dyes dissolve in water, but are not soluble in oil. Dyes are manufactured as powders, granules, liquids or other special purpose forms. They can be used in beverages, dry mixes, baked Goods, confectionery, dairy products, pet foods and a variety of other products. Lakes are the combination of dyes and insoluble material. Lakes tint by dispersion. Lakes are not oil soluble, but are oil dispersible. Lakes are more stable than dyes and are ideal for colouring products containing fats and oils or items lacking sufficient moisture to dissolve dyes. Typical uses include coated tablets, cake and donut mixes, hard candies and chewing gum.

5.3 Flavoring agents

Flavouring agents are key food additives with hundreds of varieties like fruit, nut, seafood, spice blends, vegetables and wine which are natural flavouring agents. Besides natural flavours there are chemical flavours that imitate natural flavours.

Natural:

These flavoring substances are obtained from plant or animal raw materials, by physical, microbiological, or enzymatic processes. They can be either used in their natural state or processed for human consumption, but cannot contain any nature-identical or artificial flavoring substances. Natural flavors are created from substances extracted from these plant or animal sources:

- Spices
- Fruit or fruit juice
- Vegetables or vegetable juice
- Edible yeast, herbs, bark, buds, root leaves or plant material
- Dairy products, including fermented products
- Meat, poultry or seafood
- Eggs

Artificial:

These are not identified in a natural product intended for human consumption, whether or not the product is processed. These are typically produced by fractional distillation and additional chemical manipulation of naturally sourced chemicals, crude oil, or coal tar. Although they are chemically different, in sensory characteristics they are the same as natural ones.

5.4 Essences

Flavorant or essence is defined as a substance that gives another substance flavor, altering the characteristics of the solute, causing it to become sweet, sour, tangy, etc. Of the three chemical senses, smell is the main determinant of a food item's flavor. The food essence is appreciated across the globe for its natural aroma and purity. Due to the high cost or unavailability of natural flavor extracts, most commercial essences are nature-identical, which means that they are the chemical equivalent of natural flavors but chemically synthesized rather than being extracted from the source materials.

5.5 Sweetening agents Natural:

Common natural sweeteners -sugar, corn syrup, stevia, monk fruit, Nectar and honey. Artificial:

5.6 Humectant

A humectant is a hygroscopic substance used to keep things moist;a humectant attracts and retains the moisture in the air nearby via absorption, drawing the water vapor into or beneath the organism's or object's surface. Examples of some humectants include:

Natural:

• Aloe vera gel

• Egg yolk and egg white

• Honey • Molasses Artificial

• Propylene glycol, hexylene glycol, and butylene glycol

• Alpha hydroxy acids such as lactic acid

• Glyceryl triacetate

• Lithium chloride

• Polymeric polyols such as polydextrose

• Quillaia

• Sodium hexametaphosphate E452

• Sugar alcohols (sugar polyols) such as glycerol, sorbitol, xylitol, maltitol

• Urea

5.7 Bleaching agents

A bleaching agent is used to lighten or whiten a substrate through chemical reaction. The bleaching reactions usually involve oxidative or reductive processes that degrade color systems. A food bleaching agent is simply used for the purpose of decolorizing food. For example, food manufacturers usually add flour bleaching agent to flour in order to make it appear whiter and to oxidize the surfaces of the flour grains and help with developing of gluten.

Usual bleaching agents are:

• Organic peroxides, namely benzoyl peroxide

• Calcium peroxide

• Nitrogen dioxide

• Chlorine • Chlorine dioxide

• Azodicarbonamide

• Atmospheric oxygen, used during natural aging of flour

5.8 Thickeners

A thickening agent or thickener is a substance which can increase the viscosity of a liquid without substantially changing its other properties. Edible thickeners are commonly used to thicken sauces, soups, and puddings without altering their taste; thickeners are also used in Food thickeners are classified into two main categories. These are,

• Polysaccharides (starches, vegetable gums, and pectin)

• Proteins

Anticaking agents

An anticaking agent is an additive placed in powdered or granulated materials, such as table salt or confectionaries to prevent the formation of lumps (caking) and for easing packaging, transport, and consumption. Since most products caking come from moisture, anti-caking agents either act to absorb moisture or act as a sealant or repel water and oil. Like most other food additives and preservatives, the majority come from sources that are hard for human bodies to break down over time. There are some natural ways to keep moisture out of your products as well, like introducing grains such as rice that will absorb moisture. Here is a list of common anti-caking agents:

● Sodium alumino silicate - a man-made product

● Sodium ferrocyanide

● Potassium ferrocyanide

● Calcium carbonate

● Magnesium carbonate

● Calcium silicate

● Silicon dioxide - the principle constituent of sandstone

● Hydrophobic silica.