

ADDITIVES FOR BEVERAGES

A food additive is a substance which is basically added to food and is involved in its production, processing, packing and/or storage without being a major ingredient.

The major function of food additives are-

1. Improve nutritive value of food

Additives such as vitamins, minerals, amino acids derivatives are utilized to increase the nutritive value of food

2. Enhancement of sensory quality of food

Taste, odour, colors, and consistency or texture are important for the acceptability of any food product as they are perceived by senses which can be enhanced by using additives.

3. Extension of shelf life

The extension of shelf life involves protection against microbial spoilage, for example by using additives that inhibit/retard the growth of microbes, and additive also suppress and retard undesired chemical and physical changes in foods.

4. Processing aids

Certain additives are added to facilitate various processing operations during beverage manufacture. These comprise enzymes, emulsifiers, and stabilizing agents.

Beverage Additives

A wide range of ingredients are required in their formulation of beverages. Additives like sugar or sweeteners which are added in higher amounts whereas additives like preservatives are added in small quantity. Hence additives may be grouped as Major and Minor additives.

Major additives

Apart from fruit juice, sugar and acid constitutes the major percentage of the beverage formulation, hence these two belongs to the category of major beverage additives

.1 Sugar

Sugars are added to impart the sweetness in the beverages. Sugar performs many functions in beverages.

- They improve the palatability of certain fruits & vegetables
- They provide bulk and enhance mouthfeel
- They alter the freezing point and control viscosity
- They also modify the osmotic pressure and check spoilage

Sweeteners may be classified as: nutritive or nonnutritive, natural or synthetic, regular or low calorie/dietetic.

1. Natural and Synthetic Sweeteners

The sweeteners derived from the food sources are natural. Example: Crystal sugar obtained from cane sugar or beet root, glucose syrups manufactures from maize starch, honey etc.

The sweeteners which are manufactured by chemical synthetic processes are known as synthetic sweeteners. Example saccharin, sucralose aspartame, acesulfame-K etc.

2. Nutritive and Non-Nutritive Sweeteners

Some sweeteners are metabolized in body and produce energy, hence are termed as nutritive and caloric sweeteners. Example- Traditional sweeteners

Sweeteners that are metabolized but do not provide energy significantly are called as non-nutritive or non-caloric sweeteners. Example-synthetic ones belong to non-nutritive sweeteners.

Regular or High-intensity Sweeteners

The classification of sugars on the basis of quantity required to give equivalence sweetness give rise to two categories i.e. regular or high-intensity.

High-intensity sweeteners required a less amount for yielding the similar sweetness intensity.

All low calorie sweeteners are considered as high-intensity sweeteners

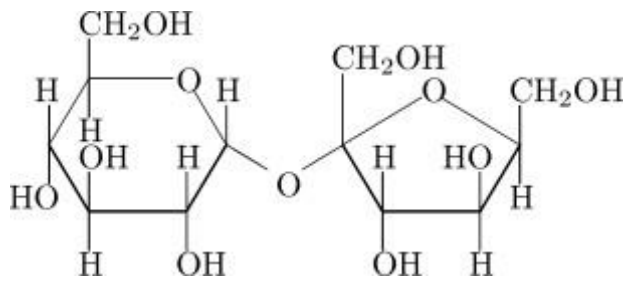
Sweeteners	Sweetness Relative to sucrose
Sugar (Sucrose)	1
High-fructose corn syrup	1-1.5
Fructose	1.2-1.7
Invert sugar	1.3
Glucose	0.75
Sorbitol	0.5-0.7
Mannitol	0.7
Xylose	0.4
Maltose	0.32
Galactose	0.32
Raffinose	0.23
Lactose	0.16
Saccharin	300
Cyclamate	30
Aspartame	200
Acesulfame K	200

Relative sweetness of various sweeteners

Various classes of sugars

a) Sucrose

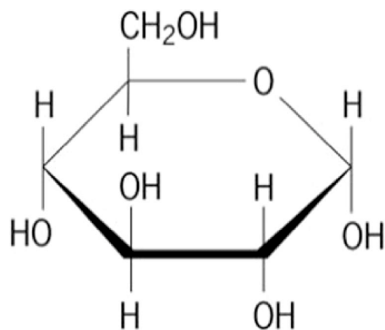
Obtained from cane sugar or beetroot and may be used either in dry form or as syrup (65-70% strength) in beverage. In beverage manufacture normally the cane sugar obtained by carbon refining process is preferred as it does not cause blackening of content. In carbonated (Cola type) or malt beverages brown sugar may also be used.



b) Glucose Syrup

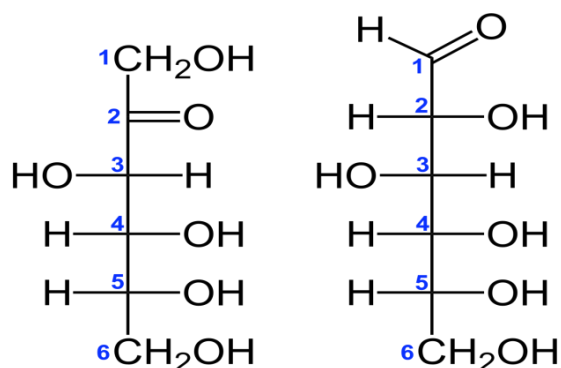
Corn starch is hydrolyzed by using acid or enzymes to produce corn syrup and these syrups are available in different Dextrose Equivalent (DE) values.

The percentage of dextrose in the mixture of is termed as DE. It also indicates the sweetness. High DE value reflects more sweetness.



c) **High Fructose Corn Syrup (HFCS)**

HFCS is manufactured by first hydrolyzing the corn starch to dextrose and then dextrose is enzymatically converted into fructose. HFCS is mainly used in USA.



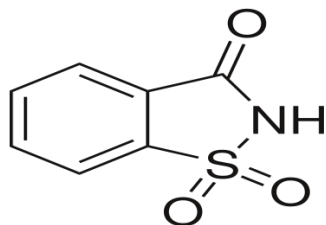
d) **Invert Sugar Syrup**

Invert sugar syrup is obtained by acid or enzymatic hydrolysis of the sucrose (Cane Sugar) into its constituents sugars i.e. glucose and fructose.

Synthetic Sweeteners (Artificial)

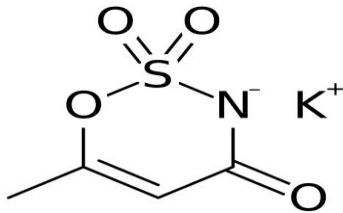
e) **Saccharin**

Saccharin is the most widely used non-nutritive sweetener worldwide, has been used as food additive since the early 1900s. Saccharin is white, crystals or a white crystalline powder, odorless, or has a faint aromatic odor.



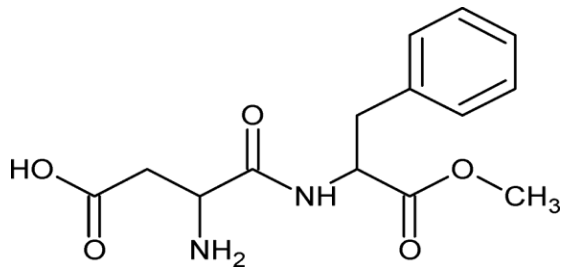
f) Acesulfame K

Acesulfame K has a sweet taste 200 times as potent as sucrose. Acesulfame potassium occurs as a colorless to white-colored, is odorless crystalline powder with an intensely sweet taste. It dissolves readily in water, even at room temperature.



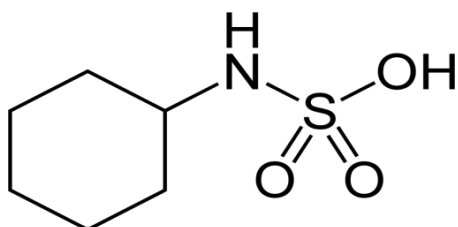
g) Aspartame

Aspartame was approved in 1981 for use in dry beverages and in 1983, in liquid soft drinks in USA. However, in India application of these artificial sweeteners was permitted in certain food stuffs including beverages.



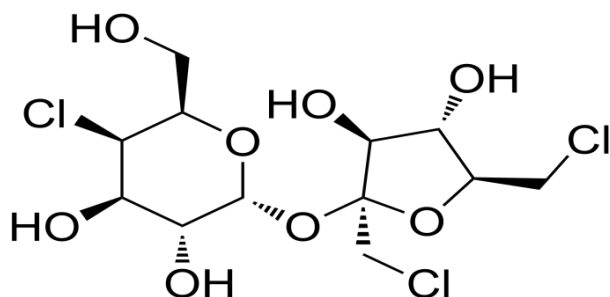
h) Cyclamates

Cyclamates were discovered in the mid-1950s. It is 30 times sweeter than sucrose and has been particularly useful in fruit products. In 1969, it was banned because of some carcinogenic effect by FDA.



i) Sucralose

Sucralose occurs as anhydrous, white, crystalline, needle-like crystals with an intensely sweet taste. It is a chlorinated sucrose derivative that is 500 to 600 times sweeter than sucrose.



Sugar substitutes

Sugar substitutes are those compounds that are used like sugars for sweetening, but are metabolized without influencing of insulin and producing much calorie.

Polyols (sugar alcohols or polyalcohol) are chemically reduced carbohydrates. These compounds are important sugar substitutes because they are absorbed more slowly from digestive tract than is sucrose. Example- Sorbitol, Mannitol, Xylitol etc