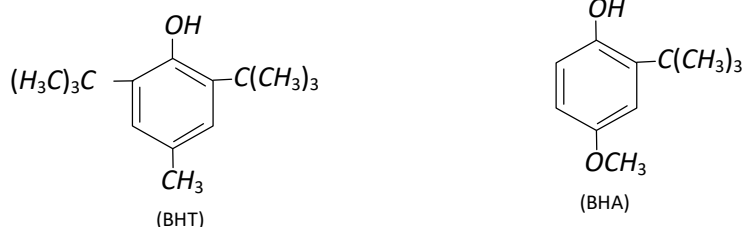


Chemicals in food.

Many chemicals are added to food for their preservation and enhancing their appeal. These include flavourings, sweeteners, dyes, antioxidants, fortifiers, emulsifiers and antifoaming agents. With the exception of the preservatives, fortifying agents, antioxidants and artificial sweeteners, the remaining classes of chemicals mentioned above are added either for ease in processing or for cosmetic purposes, in the real sense these have no nutritive value.

(1) **Antioxidants:** Antioxidants are the important and necessary food additives. These compounds retard the action of oxygen on the food and thereby help in its preservation. These act as sacrificial materials, i.e., these are more reactive towards oxygen than are the materials they are protecting. They also reduce the rate of involvement of free radicals in the aging process. The two most familiar antioxidants used are butylated hydroxy toluene (BHT) and butylated hydroxy anisole (BHA). The addition of BHA to butter increases its storage life from months to years. The two have the following structures.



Sometimes BHT and BHA are added in combination with citric or ascorbic acids to produce a more active synergistic effect. Sulphur dioxide and sulphite are useful antioxidants for wine and beers, sugars syrups and cut peeled or dried fruits and vegetables.

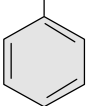
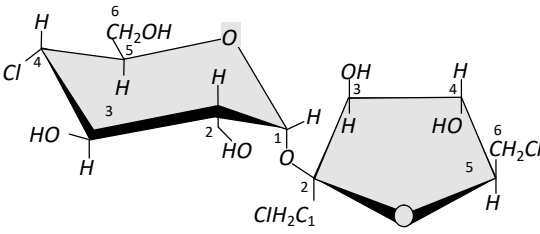
(2) **Preservatives:** The preservatives prevent spoilage of food due to microbial growth. The most common preservative used is sodium benzoate, C_6H_5COONa . It is metabolized by conversion to hippuric acid, $C_6H_5CONHCH_2COOH$ which ultimately is excreted in the urine. Salts of propionic acid and sorbic acid are also used as preservatives.

(3) **Artificial sweetener:** The artificial sweeteners are another type of food additives. The first popular artificial sweetener was saccharin. It was marketed as its water soluble sodium or

calcium salt. Saccharin is approximately 300 times sweeter than cane sugar. It has proved to be a lifesaver for countless diabetics and is of great value to people who need to control intake of calories.

Besides saccharin, the other commonly marketed artificial sweeteners are described here.

Aspartame is unstable at cooking temperatures, limiting its use as a sugar substitute to cold foods and soft drinks. Alitame is more stable than aspartame during cooking. One potential problem with alitame and similar type of high-potency sweeteners is the difficulty in controlling sweetness of food. Sucralose is predicted to become a great commercial success.

Artificial Sweetner	Structural Formula	Sweetness value in comparison to cane sugar
Aspartame	$ \begin{array}{cccccccc} O & H & H & O & H & H & O & \\ & & & & & & & \\ HO-C & -C & -C & -C & -N & -C & -C & -O-CH_3 \\ & & & & & & & \\ H & NH_2 & H & H & H & H & H & \end{array} $ <p>From  From phenylalanine methyl ester</p>	160
Sucralose		650
Alitame	$ \begin{array}{cccccccc} O & H & H & O & CH_3 & H & & \\ & & & & & & & \\ HO-C & -C & -C & -C & -N & -C & -C & -N-C-H \\ & & & & & & & \\ H & NH_2 & H & H & H & O & & S \\ & & & & & & & \\ & & & & & & & C \\ & & & & & & & / \backslash \\ & & & & & & & CH_3 \quad CH_3 \end{array} $	2000

(4) **Edible colours:** Edible colours used for food are essentially dyes. The use of food dyes is extremely wide spread. They are used to colour everything from meat to fruit. For example, dyes are used to dye orange peels so that oranges retain their colour. Colour is one of the ingredients in fruit juices. There is a great deal of controversy over the potential harm the dyes may cause. This controversy becomes more meaningful particularly keeping in view the fact that food dyes add nothing to the nutritive value of food. The use of azo dyes has raised considerable anxiety in that some of them are dangerous for young children and asthma patients. Tetrazine, a very widely used dye is especially a suspect. However, natural

dyes like Carotene are safe food edible colours. For protection of consumer interests, the government of India have passed Prevention of Food Adulteration act (PFA).