FTI NEWSLETTER

Food Technology®

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Frying- "An Interesting Process"

Frying is an interesting process in Food Technology where the temperature of oil is raised to high levels around 200°C for fully frying the product to get the desired texture and flavour. If the heat stability of the oil is low, temperature as low as 165°C can also be used to get a fully cooked end product.

It is always a dilemma of a chef as to what temperature he must use to prepare a product to reduce as much as possible oil uptake by the end product, consideing that the market price of oil can vary enormously. Ideally every chef would like to use like olive oil but it is not practical because of the high cost of this oil. Many choose palm /palmolein oil which is considered the cheapest oil in the globe.

The oil used in frying process can degrade in quality, the rate of spoilage being proportional to the extent of unsaturated fats present in it and the severity of temperature deployed for frying. To some extent these undesirable changes can be prevented by using modern equipment like vacuum fryers or pressure fryers which needs higher investments. The deterioration will be more severe if the oil is repeatedly heated and cooled over a period of time. Oxygen present in the air reacts with the unsaturated fatty acid creating highly reactive oxy radicals and other undesirable artifacts, some of which have been proved to be toxic.

High frying temperature can also break down fats into smaller molecules which cause many other problems like excessive foaming. Polar compounds and polymerized products of oxidation have been proved to be injourious to human health. Frying of starch containing foods is known to produce carcinogenic artifact **acrylamide.** In view of these evidences, oils are not allowed to be used repeatedly for frying and discarding them after using it in the fryer is always considered a wise policy.

Snack food industry dispose of the heated oil which is supposed to end up as waste. In reality this does not happen as oil is a high value material in great demand and used oil invariably find new options i.e oil refinery and biofuel industry.

"Herbs and Spices-naturally occuring antimicrobials"

Naturally occuring substances that have been shown to have antimicrobial activity giving stability to some foods against attack by microorganism are characterized as natural antimicrobial. Numerous naturally occuring antimicrobials agents are present in animals and plants tissue, where they probably evolved as part of their hosts' defense mechanism against invasion by microorganism. **Natural antimicrobial can be derived from bark, stem, leaves, flowers and fruits of plants, various animal tissues or from microorganism. Sources of natural antimicrobials are herbs, spice, fruits, milk, egg and lactic acid bacteria used in food fermentation.**

Spices provide important preservation qualities. Though salting, smoking, or pickling were used in middle-age Europe to inhibit spoilage spices were preferred. **The most effective antimicrobial spices includes garlic, Onion, cinnamon, cloves, thymes, sage, cloves, which have a high essential oil content, contain eugenol. Allicin, present in garlic, also act as an antimicrobial agents, as the allyl isothiocyanate present in mustard. Thymol, present in thyme, oregano and sage, is also noted for its antimicrobial properties.**

Antimicrobial compounds present in foods can extend shelf life of unprocessed or processed foods by reducing microbial growth rate or viability.

Essential (volatile) plant oil occur in edible medicinal and herbal plants, which minimize questions regarding their safe use in food products**. Essential oils and their constituent have been widely used as flavouring agent in foods.** The composition, structure, as well as functional groups of the oil play an important role in determining their antimicrobial activity. **Usually compounds with phenolic groups are more effective. Among these oils the oils of cloves, oregano, rosemary, thyme, sage and vanillin have been found to be most consistentently effective against microorganism.** They are generally more inhibitory against gram -positive than against gram negative bacteria. There are some which are effective against both groups i.e Oregano, cloves, cinnamom and citral.

"Artificial Sweetners" Bane or Boon in Food Industry

Artificial sweeteners are added to processed foods and beverages to impart taste without adding calories. These sweetners when used alone or in combination may permit such labelling as 'low calorie', 'reduced calorie','light' 'Sugar-free' and 'dose not promote tooth decay'. Many people believe that sugar is fattening and causes obesity.

Food Technologies now have more sweetners to choose than ever before. These sweetners fall into basic categories, those that are essentially calories free, often referred to as low-calories or intense sweetners, and those which are significantly reduced in calories, which may be referred to as reduced calories-sweeteners, bulk sweeteners or sugar replaces.

The ideal sweeteners should be at least as sweet as sucrose and provide the same properties to a product as sucrose, with processing parameters similar to those of sucrose so that existing equipment could be used. It should be colourless, odourless, and noncariogenic, with a clean pleasant taste and have immediate onset and not much lingering. Solubility and stability are important. It must be compatible with a wide range of Food Ingredients because sweetness is but one element of a complex food flavour system. There are some advantages to have a number of sweetners available. With several available, food manufacturer can use sweeteners in the application for which they are best suited and limitation of individual sweetener can be overcome by using them in blend. It is important to remember that in developing low calorie product, low calorie sweeteners can't be simply substituted for sugar. Products must be reformulated. The various sweeteners interact differently with other food ingredients, so the flavouring acid/sweetness ratio may require modification and low calorie sweeteners do not provide bulk. **Artificial sweetener unlike table sugar lack the browning, tendering and moisture retaining properties**. Specially formulated recipes are often needed to make a product with acceptable texture and appearance when using artificial sweeteners.

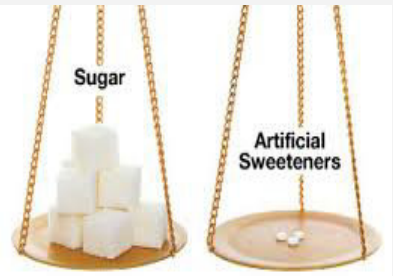
Need of Artificial Sweeteners

Honey and cane sugar have been used as sweeteners for thousands of years. **Most of the consumers do not regard sugar as an ingredient to avoid. However, a sizable section of the population is compelled to restrict sugar to treat or control diabetes and obesity.**

Reduction in sugar can be accomplished by its replacement with alcohols, commonly referred to as polyols. **Reduction of dextrose yields Sorbitol and mannose gives mannitol. After consumption, these ingredients do not raise the blood sugar level to the same extent as sugar, making them good substitutes for insulin deficient individuals.** Therefore, polyols are commonly used for sweetening of confectionary and ice-cream for diabetes. The sugar alcohols are not metabolized by oral bacteria and are therefore anti-cariogenic (prevent tooth decay). Most of the polyols have a laxative effect if their consumption is high.
Sweetners are grouped into two categories, based on the difference in the amount of energy provided by them

1. **Nutritive or caloric sweeteners-**
   These contains calories, hence have nutritive value. These include sugar sweeteners (e.g. refined sugar, fructose, honey, maltose and sugar alcohols.

2. **Nonnutritive or non-caloric sweet-**
   These have no nutritive value as they contain no calories. They have been developed artificially, hence also called artificial sweeteners. As the sweet with little volume, they may also be referred to as high intensity sweeteners. They have been developed for obese or diabetics, for whom sugar consumption is harmful. Some Sweeteners are considered as 'Generally Recognised as Safe' (GRAS) ingredient.



Some important artificial/low calorie sweeteners:

- **Saccharin:** Saccharin is the first artificial sweeteners which was discovered accidently by Constantine Fahlberg in 1879. It is the most widely used artificial sweeteners. **It is sold under the trade name Sweetex.** Saccharine is a white, crystalline, sparingly soluble solid with a m.p. 227°C. It is heat stable and is 300-400 times sweeter than sucrose by weight in aqueous solution. **It is advised that pregnant women avoid saccharin.**

- **Sucaryl Sodium:** It is also a sulfonamide and is 30 times sweeter than sucrose.

- **Monellin:** This protein sweeteners is present in the sap of serendipity berries, fruit of a western African plant, *Dioscoreophyllum cumminsii.* This sweet protein is composed of two noncovalently associated polypeptide chain and is 200 times as sweet as sucrose.

- **Aspartame:** This is an essentially noncaloric, sugar- free sweeteners being commercially used. Aspartame is a synthesize dipeptide containing aspartic acid (Asp) and the methyl ester of phenylalanine (phe**). Aspartame is marketed under the trade name Nutrasweet and Equal. It is about 180 times sweeter than sucrose by weight.** Aspartame has a shelf life of 6 months, after which it breaks down into its component and loses its sweetening power. Also it splits at high temperature (which means that it can't be used in hot or baked item). Aspartame is widely used in drink and food industry, eg, soft drinks, cold cereals, puddings, etc. Because Aspartame is made from phenylalanine, people with phenylketonuria should avoid aspartame.

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