

S.4 FOODS AND NUTRITION NOTES ON SUGAR

SUGAR

This is a carbohydrate composed of sucrose which is a disaccharide. Sucrose can be broken down into glucose and fructose which are monosaccharides. It is a concentrated form of energy.

Sugar is basically made from sugar canes and sugar beet. Sugar has many culinary roles and it's a very important ingredient in baking.

Production of sugar.

- **Harvesting:** sugar beet or sugar canes are harvested and taken to the processing plant.
- **Washing and slicing:** The sugar beet is washed and then sliced.
- **Soaking:** The slices are soaked in hot water and the sugar diffuses from the cells of the sugar beet by osmosis to form a sugar solution. After this process, the beet slices are dried and processed into animal feeds
- **Purifying:** The sugar solution includes many impurities and it's usually black in colour. The sugar solution is mixed with lime and Carbondioxide which causes the impurities to precipitate out.
- **Filtering and boiling:** The impurities are filtered off and the juice is boiled to evaporate much of the water bringing the sugar solution to about 60% concentration.
- **Crystallisation:** The sugar is crystallised by further evaporation in special vacuum pans.
- **Centrifuging:** The crystals are separated from the remaining liquid by centrifuging the mixture 3 or more times in a perforated drum. The juice which runs out is known as molasses and is used in the manufacture of animal feeds and alcohol.
- **Bleaching and drying:** The sugar is bleached with charcoal and then finally dried in hot air cylinders.
- **Packaging and distribution:** The sugar is then packaged in to the desired kilograms

Varieties of sugar/ Categories of sugar

- **Caster sugar**

Also known as caster or bar sugar, this sugar has the smallest crystal size of white granulated sugars. It is generally used in making delicate or smooth desserts, such as mousse or puddings. Because the crystals are so fine, they dissolve easily, even in cold drinks.

- **Granulated sugar**

This is what you typically find in your sugar bowl. It's the most common sugar called for in recipes when cooking and baking. "Regular" sugar granules are fine because small crystals are ideal for bulk handling and not susceptible to caking.

- **Brown sugar**

Brown sugars are either made by directly boiling a brown sugar syrup or mixing white sugar with various amounts of molasses. Light brown sugar is often used in sauces and most baked goods. Dark brown sugar has a deeper color and stronger molasses flavor than light brown sugar—the rich, full flavor makes it ideal for gingerbread, baked beans, barbecuing and other full-flavored foods. Brown sugars tend to clump because they contain more moisture than white sugars, allowing baked goods to retain moisture well and stay chewy.

- **Icing sugar:** This is processed from granulated sugar which has been milled into a very fine powder.
- **Golden syrup and treacle**
- **Glucose**
- **Cubed sugar:** This is processed from moist granulated sugar and then moulded into cubes and dried.
- **Liquid Sugar**

Liquid sugar is white granulated sugar that has been dissolved in water. Simple syrup is liquid sugar with a 1:1 ratio of sugar and water. Liquid sugar is often used in drinks. Amber liquid sugar is darker in color and can be used when brown color is desired.

- **Invert Sugar**

Inversion is the process in which sugar is split into its two component sugars, glucose and fructose, and the resulting product is invert sugar, a liquid sugar with equal parts glucose and fructose. Because fructose is sweeter than sucrose or glucose, invert sugar is sweeter than white sugar.

Sugar fortification

It is not common but in some parts of the world since sugar is almost part of everybody's diet, sugar maybe fortified with vitamins like A. Vitamin A can exist as a powder and this ensures it's homogeneous distribution in sugar.

Nutritive value of sugar

- Sugar is a pure carbohydrate with its biggest percentage being the disaccharide sucrose which almost takes 99.9%. Sucrose can be broken down into its small components ie fructose and glucose during digestion.
- Sugar lacks proteins, fats, vitamins and mineral salts
- Sugar contains some water from its crystals.

Dietetic value of sugar

- Sugar can be used in a variety of recipes

- Sugar can be used to provide energy value to all age groups.
- People with obesity and heart diseases are not supposed to over indulge in sugar containing foods.

NB:

The following groups should make use of non-sugar sweeteners

- Diabetics
- People on slimming diets
- People with coronary heart diseases

Culinary value of sugar

- Sugar is used as a sweetener in a variety of beverages.
- Sugar can be used as a colourant. Caramel got from burnt sugar can be used to provide varying brown colours in cakes and other products.
- Sugar can be used as a preservative. High concentrations of sugar of about 60% or more inhibits the growth of microorganisms like the yeasts and moulds. Sugar can be used to preserve squashes, jams and other products.
- Sugar can be used to make syrups and glazes.
- Sugar is useful in trapping air during creaming of cakes as fat and sugar form an emulsion which traps air making the cake light. Sugar is also useful in trapping air when making whisked cake products, soufflé's and meringues. Sugar helps the whisked eggs to trap and retain air otherwise the whisked products would collapse.
- Sugar provides food to the yeast during bread making hence it's very essential when making yeast products like bread.
- Sugar when moistened, softens the gluten in flour making a more elastic dough. This is useful in making cakes and other products.
- Sugar aids moisture retention
- It gives a tenderizing effect in many baked products
- Used as a stabilizer: It gives a stabilizing effect on egg white foam when whisked with eggs, this is useful in preparation of dishes like meringues
- Used in icing of cakes. It forms the main ingredient in cake icing.
- Sugar aids moisture retention in foods because of its hygroscopic tendency. Treacle and golden syrup contain fructose because of the inversion process which is useful in absorbing moisture.

Effects of heat on sugar

- **Moist heat** causes it to dissolve into the cooking liquid to form a thick, sticky liquid known as a syrup. Further heating causes the sugar syrup to darken in colour

- **Dry heat** makes the sugar to melt and form a brown colored molten liquid called **caramel**. This process is known as **Caramelisation**.

Overheating will make sugar develop a bitter unpleasant taste.

Further heating will lead to burning and forming a black mass known as **carbon/ charcoal**.

Non sugar sweeteners

- Glucose
- Honey: This is made by bees from the nectar of flowers
- Saccharin: This is a synthetic substance produced from coal tar. It has no carbohydrate content but it's over 300 times sweeter than sucrose. It's useful in slimming diets. It was used to overcome the taste of medicines and was used better than sugar for this purpose because sugar tends to crystallise and clog up the screw of bottles. Saccharin leaves an after taste.
- Cyclamate: This is a sweetener based on sodium cyclamate but not used in many countries because it's linked to be a cause of some types of cancer.
- Sorbitol: This is a bulk sweetener made from glucose and it's about half as sweet as sugar. It's not useful in slimming diets but may be important in diabetic diets. It can also be naturally found in fruits such as apples, berries, pears and plums. Sorbitol is stable at high temperatures.
- Aspartame: This is a mixture of two amino acids, aspartic acid and phenylalanine and it has a sweetness that is about 200 times greater than sucrose. It is used to sweeten soft drinks. It does not leave an after taste. It's however unsuitable for people with phenylketonuria as they cannot metabolize phenylalanine.

Choice of sweeteners

- Intense sweeteners such as saccharin are good for people on weight reduction diets
- Bulk sweeteners like sorbitol are good for diabetics
- Aspartame is not good for people with phenyl ketonuria

Use of sweeteners

- When using sweeteners add very little at a time so that products are not over sweetened.
- Some sweeteners are not heat stable and they will change to a different product on cooking hence they should be added towards the end of the cooking time.
- Some sweeteners leave an after taste hence a person should choose one that suits him or her.

Other alternatives to sugar and sweeteners

- Use of dried fruits such as dates, figs, prunes and apricots in cakes and other recipes

- Making use of fresh fruits like bananas as a sweet spread for sandwiches, and also as an ingredient in cake products.
- Replacing sugary deserts with fresh fruit salads
- Making use of unsweetened fruit drinks
- Making use of young vegetables like carrots and parsnips for sweetening.

ACTIVITY

- 1a) Give any two diseases directly related to excessive sugar consumption
- b) How can each of those diseases be prevented?
- 2a) Give the examples of non-sugar sweeteners and give where they are got from.
- b) What factors can you consider when choosing non-sugar sweeteners?
- 3a) What are the effects of the following forms of heat on sugar
 - i. Moist heat
 - ii. Dry heat
- b) Give the products we can get after applying heat to the sugars in 3a) and explain where each of those products can be used in food production.
4. With examples, explain the various uses of sugar in cookery and food production
- 5 a. Explain the stages of sugar production from its sources
- b. Classify the various forms of sugar.