

Polysaccharides

They are long straight or branched chains resulting from the bonding of one type of one or more repeating monosaccharide units by a glycosidic bond with the deletion of a water molecule. The polysaccharides are divided into two parts based on their chemical structure:

1- Homopolysaccharides

They are long chains made of one type of monosaccharides

1. Pentosans such as xylan and araban

2-hexoses

A- Glucosinolates such as vegetable starch (repeated units of glucose) and glycogen (starch). Animal (Dextrin and Cellulose)

B- Fructoses such as inulin

C-calactans

2-Heteropolysaccharides

They are long chains that contain two or more types of monosaccharides such as pectin, gum and vegetable jelly(mucilages)

3- Containing nitrogen, such as chitin

Compounds related to sugars

Include the following:

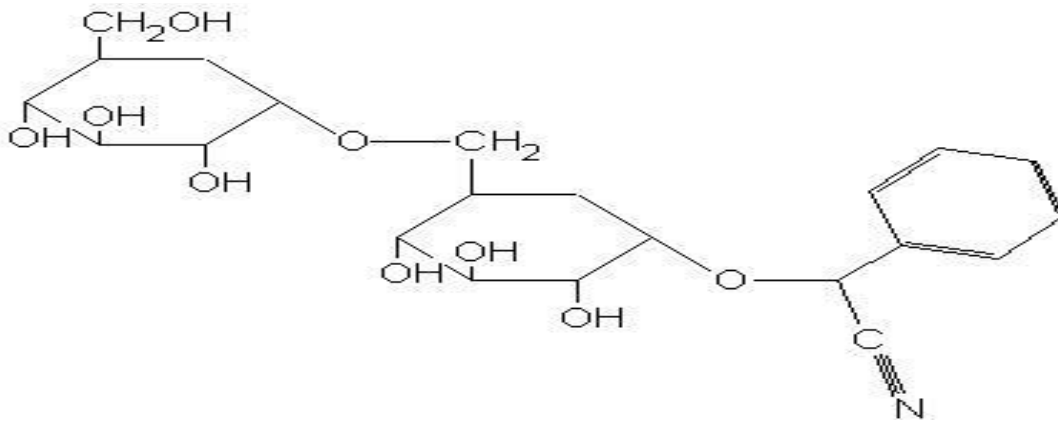
1-amio sugar : like glucose amine, which is replaced by a group

The hydroxyl located on the second carbon atom with an amino group. be amino sugars is usually in the form of multiple high molecular weight chains as chitin

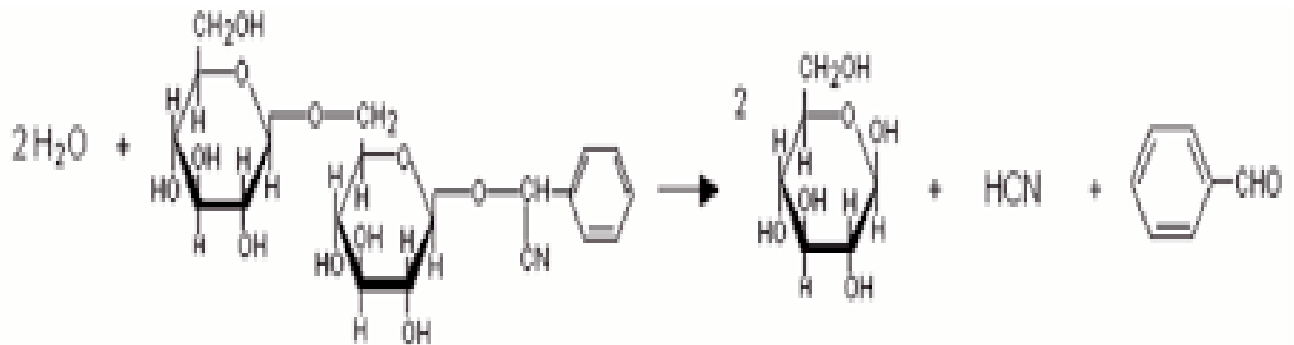
2- Glycosides: which are sugars in which an atom has been replaced

Hydrogen located on the first carbon atom with an alkyl group to form acetal. Decompose Alglycosides by acids and enzymes, but they are stable towards the bases. After turning sugar to acetal, it loses its

reducing properties. Glycosides are broken down into glycosides or glycosides It is the non-diabetic part of the glucoside. For example, the compound aglycon and glycon Responsible for the bitter taste in almonds. The part of the sugar called amygdain is called amygdain The complete hydrolysis of amygdalin benzaldehyde to gentiobiose results in gentiobiose glucose and hydrocyanic acid



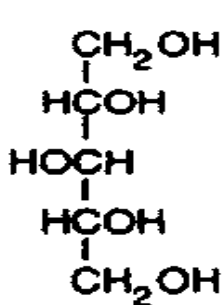
Amygdalene



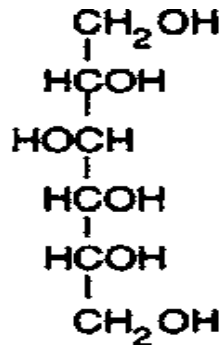
Water + amygdalin → 2 glucose + cyanide + benzaldehyde

Other glycosides are a group called flavonoids found in citrus fruits Hesperidin and naringenin The glycoside in mustard is called sinigrin

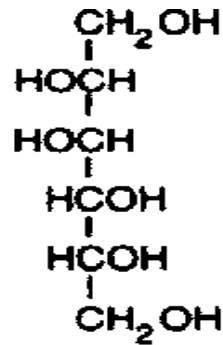
3- Sugar alcohols: They are found naturally in fruits and can be produced industrially and used in many food components. Alcoholic sugars are prepared by reducing free sugars By means of sodium complements, the resulting compound has a sweetness like sugars, but it is slowly absorbed so Sugar alcohols are used as sweeteners in foods for people with diabetes. . The resulting compound is called Reduction of glucose by sorbitol Widely used alcoholic sugar xylitol



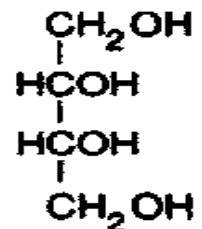
Xylitol



Sorbitol



D-Mannitol



Erythritol

4- Anhydro sugars: It is found in the form of polysaccharides in herbs marine like agar and alginate.

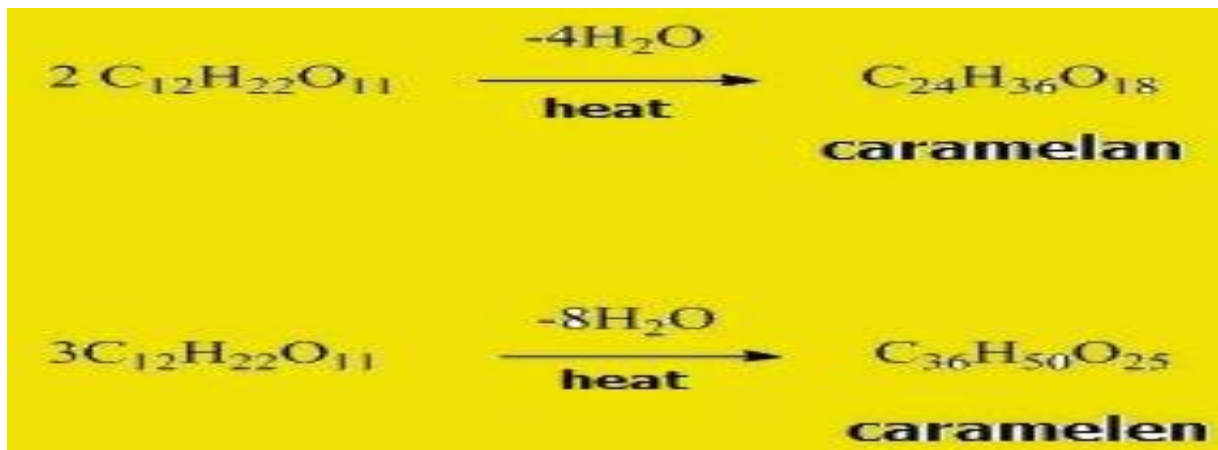
caramelization

The formation of caramel dye is a non-enzymatic brown reaction, when sugars are exposed to heat In a medium containing water or when concentrated solutions of sugars are heated, a series of The reactions lead to the formation of caramel

Sucrose caramelizes at a temperature of about 200°C, and at a temperature of 160°C, sucrose dissolves To be glucose and fructose and when the temperature is raised to 200 C, it occurs A series of reactions that take place in three phases dependent on time. When sucrose is heated to 200 For 35 minutes, this results in a weight loss estimated at 4.5% as a result of losing one water molecule for the sucrose molecule consists of a compound called isosaccharosan

When heating for an additional 55 minutes, the amount of weight loss is 9%, and the pigment formed is called caramel. It dissolves in water and ethanol and has a bitter taste.

When heating for another additional 55 minutes, the amount of weight loss is 14%, and this decrease is equivalent to losing 8 water molecules from every 3 sucrose molecules, and then caramelin is produced. It only dissolves in water



Caramelization of sucrose (table sugar) leading to the formation of caramelan and caramelen

When heating continues, it produces a very dark dye that does not dissolve in water, and its chemical composition is called humene or caramelin. Helps give a special flavour. for caramel Several compounds are produced from the fermentation of sugar and the removal of water from it. These compounds include acetic acid, Formoin, diacetyl and formic acid.

Crystal formation: is one of the important properties of sugars in terms of commercial production, as crystallization is One of the important steps in the purification of sugars. There is a direct relationship between the ease of the crystallization process and the purity Non-reducing oligosaccharides. Short-chain polysaccharides crystallize There are many isomers of sugars more readily than reduced, due to the presence of isomers Reductive which makes it impure so to speak. The presence of only one type of sugar in a solution It leads to crystallization more easily compared to the presence of several types of sugars in the solution.

Crystallization is undesirable in some cases, such as crystallization of lactose sugar in sweetened condensed milk And ice cream. Factors affecting the formation of sucrose crystals are the degree of supersaturation of the solution

The temperature and relative velocity of the solution and crystals, and the nature of the crystal surface

corn sweeteners:

The sugars resulting from the decomposition of cornstarch play an important role in the food industry, as it is possible to analyze Concentrated solutions of corn starch mediated by acids and enzymes. As a result, the starch breaks into pieces. small first and then produces glucose (dextrose) as the final compound

The degree of production of dextrose units and depolymerization You can appreciate the dextrose, which It is defined as the amount of total reducing sugar as a percentage of the total dry matter. that process The conversion of starch to dextrose by the mediation of acids has a dextrose equivalent value of 55. It was found that Obtaining a dextrose equivalent higher than 55 with acids causes a change in the color of the solution To dark and the emergence of bitter taste.

known **glucose syrup**: It is a saturated solution of sugars from starch Which has a dextrose equivalent of 20 or more and is called a product whose dextrose equivalent is lower of 20 maltodextrins

Starch

Starch consists either of an unbranched chain called amylose or of a branched chain called amylopectin

The length of the amylose chain is 400 glucose units in some types of corn to 200 glucose units in one Potatoes. Amylose is 17-30% of the total starch in corn, rice and potatoes, either in some varieties For corn and pea varieties, amylose is 75% of the total starch.

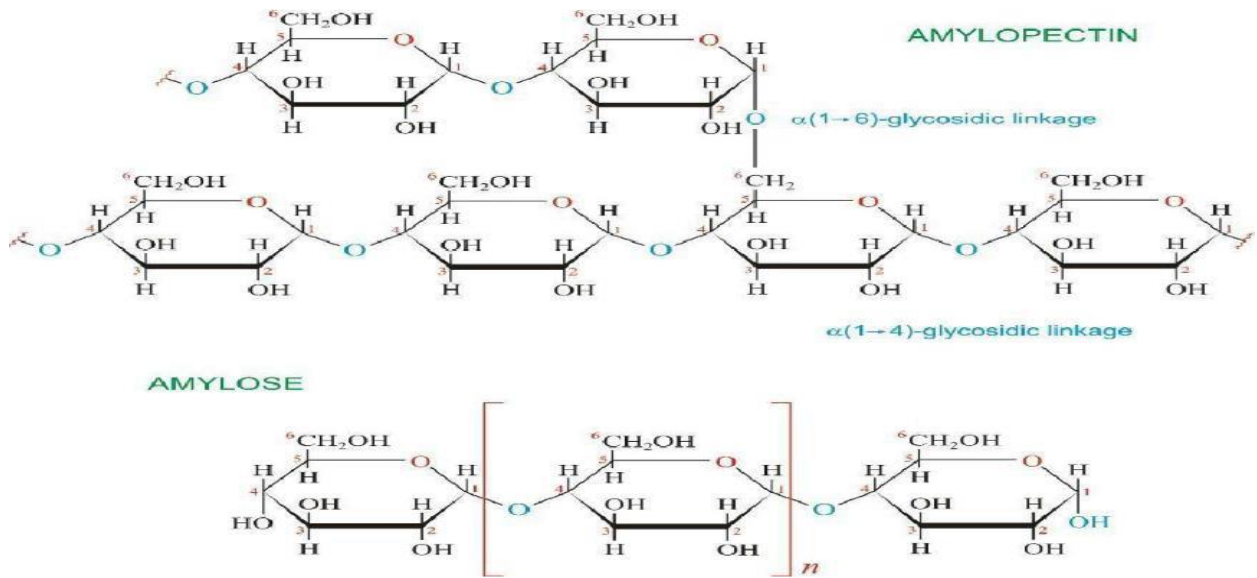
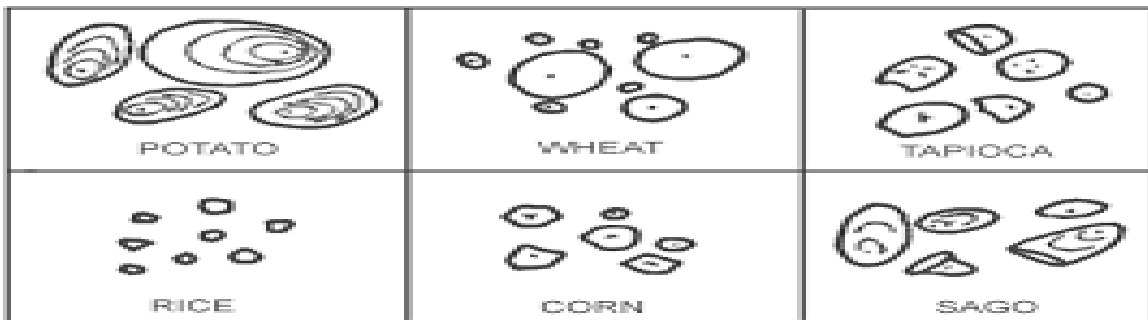
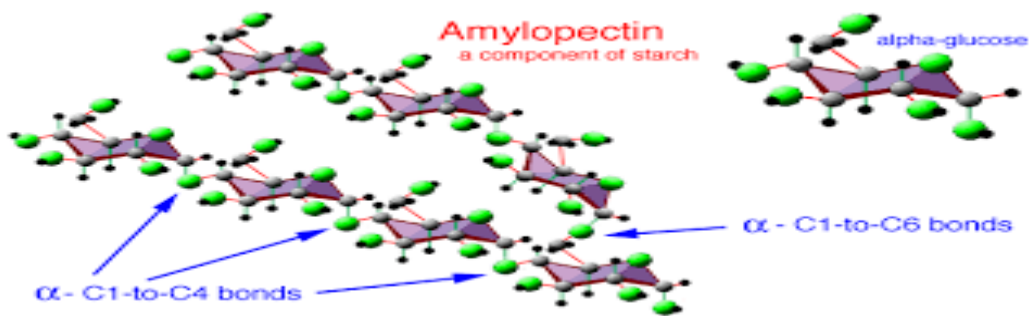
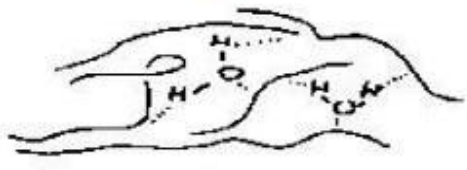


Fig 3 Amylose and amylopectin structure



Forms of starch granules from different sources.

starch + water



gelatinization



retrogradation

