

pharmacology.....lecture6Carbohydrates:2- A-Photosynthetic of carbohydrate in the plants. B-medicinal plants which contain carbohydrate and their uses

Photosynthetic **البناء الضوئي** organisms, like plant, can make carbohydrates from CO₂ and water. They synthesize glucose, sucrose, and other carbohydrates by reducing CO₂ with the consumption of energy (ATP).plants can use CO₂ as the source of all the carbon atoms required for biosynthesis of cellulose and starch, lipids and proteins and all of the components of plant cells.

the conversion of CO₂ into carbohydrates, a process called CO₂ fixation, or carbon fixation. Plants convert these simple products of photosynthesis into more complex biomolecules, including sugars, polysaccharides.

The first stage in the fixation of CO₂ into organic compounds is its reaction with ribulose-1,5-bisphosphate to form two molecules of 3-phosphoglycerate. In the second stage the 3-phosphoglycerate is reduced to glyceraldehyde-3-phosphate. In the third stage, five of the six molecules of glyceraldehyde-3-phosphate are used to regenerate three molecules of ribulose-1,5-bisphosphate, the starting material.

List of drugs containing the Carbohydrates: acacia **صمغ الاشجار**, tragacanth **الكثيراء**, agar, starch **نشاء**, guar gum **صمغ الغرغرة**, pectin **الغشاء المشطي**, isabgol, honey **العسل**

1-Acacia:

Synonym **الاسم المرادف**: gum acacia, gum Arabic.

biological source: it is the dried gummy obtained from stem **السيقان** and branch **الفروع** of *acacia Arabica* which belong to a family of *leguminosae* **الفصيلة القرنية**.

Cultivation **الزراعة** : The gum is collected from wild grown plant. Made free of bark **اللحاء** and foreign organic matter. It is odourless **بدون رائحة**. the taste is mucilaginous **صمغي**. the size and shape is irregular brown tears



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دموع بنية اللون of varying size. Solubility: it is **soluble** in water and **not** soluble in alcohol

Chemical constituent: Arabic acid hydrolyzed in to arabinose, rhamnose and galactose

Uses: demulcent ملطف , suspending agents, emulsifying agents, binding agents, and used in preparation of microencapsulation.

2-Tragacanth الكثيراء :

Synonym: gum Tragacanth, Tragacantha

biological source: it is the dried gummy exudate obtained from incision شق from stems السيقان and branches فروع of *Astragalus gummifer* which belong to the family of *leguminosae*.



Cultivation: the gum is formed as a result of transformation of pith لب سيقان الاشجار in to gummy substance. The incision is made on the stems and branches and fluid which oozes ينضح out of collected. It is found in ribbon مثل الشريط like appearance.

Chemical constituent : 1-Tragacanthin (8-10%) which is water soluble and Bassorin (60-70)% water insoluble. On hydrolysis it gives galactouronic acid, galactopyranose, arabinose, rhamnose and xylopyranose

Use: as demulcent ملطف, emollient مزيت, thickening مثنخ agent, suspending agents, emulsifying agent, adhesive لاصق

3-Agar:

Synonym: Japanese isinglass غراء السمك , vegetable gelatin

biological source: it is the dried gelatinous substance obtained from *gelidium amansii* belongs to family of *gelidaceae*



Cultivation: they are algae's طحالب are grown on bamboos الخيزران .

Chemical constituent : polysacharride like agarose and agarpectin

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The agarose is responsible for the gel strength.

Use: as laboratory culture media, emulsifying agent, bulk laxative ملين and in the preparation of jellies .

4-Starch:

Synonym: amylum

biological source: it is the polysaccharide granules obtained from grain of maize الذرة (*zae mays*) and rice الرز (*oryza sativa*), wheat (*triticum aestivum*) belong to the family of *Graminae* النجيليات or from potato which belong to *solanaceae* الباذنجانية

Chemical constituent : 1-polysacharride like amylose(water soluble and give blue color with iodine) and amylopectin (water insoluble which gives bluish black color)

Use: as nutritive, demulcent, binding agent, disintegrant, and finally used as starch after treated with diluted Hcl

5-pectin

Synonym: pectin

biological source: it is a purified carbohydrate obtained by acid hydrolysis from inner portion of the rind of citrus peel قشور الحمضيات of *Citrus aurantium* النارج belongs to the family of *Rutaceae* الحمضية.

Preparation : the fresh lemon peel are heated for 30 minute with water at 90 C with lactic acid and isopropanol and finally the pectin is precipitated

Chemical constituent :pectin yield galactouronic acid, galactose, and arabinose

Use: as adsorbent in the treatment of diarrhea, emulsifying agent, gelling agent, encapsulating agent in the preparation of sustained released capsule

6-Isapgol : (isap = horse, chol ear)

Synonym: ispaghula, indian psyllium , isabgol



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biological source: it consist of dried seed and husk قشور of the plant known as *Plantago ovate* belongs to the family of *plantaginaceae* الحمليات

Chemical constituent : pentosan, aldobionic acid in hydrolysis it yield xylose, arabinose, galacoutonic acid, rhamnose

Use: as laxative ملين , emollient, demulcent

7-Honey العسل :

Synonym: madhu, mel

biological source:it is sugar secretion deposited in honey comb مشط by the bee *Apis mellifera* فصيلة النحل and other species of *Apis* belongs to the family *Apidae* النحل

preparation: Nectar رحيق of flowers contain 25% sucrose and 75% of water. The worker bee suck this nectar **and** by the enzyme invertase the nectar converted in to invert sugar then after extraction from the bee it is heated to 80 C to ovoid fermentation

Chemical constituent : glucose 35%, fructose 45%, sucrose 2%, maltose, invertase, crystalline dextrose resorcinol

Use: sweetening agent, antiseptic so can be applied on the burn or wounds and vehicle for several agents.

8-Guar gum

Synonym: Guar flour دقيق الغار , Jaguar gum

biological source:it is powder of endosperm السويداء of seed of *cymopsis tertagonolobus* belong to the family *leguminosae*

preparation: the endosperm is separated from the seed by pulveriser ماكينة تفشير and then the cotyledons النباتات are separated and finally the crude guar gum is separated with the help of sieves

Chemical constituent :Guaran 85% which converted on hydrolysis in to galactose and mannose



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Use: binding agents, disintegrating agent , emulsifying agent, bulk laxatives , and in the treatment of peptic ulcer

Name	Synonym	Source	Genes	Family	Chemical constituent	Use
Acacia	gum acacia, gum Arabic	stem and branch	<i>acacia Arabica</i>	<i>Leguminosae</i>	arabinose, rhamnose galactose	Demulcent, suspending agents, emulsifying agents, binding agents, and used in preparation of microencapsulation
Tragacanth	gum Tragacanth, Tragacantha	stems and branches	<i>Astragalus gummifer</i>	<i>Leguminosae</i>	galactouronic acid, galactopyranose, arabinose, rhamnose and xylopyranose	demulcent, emollient, thickening agent, suspending agents, emulsifying agent, adhesive
Agar	Japanese isinglass, vegetable gelatin	gelatinous substance	<i>gelidium amansii</i>	<i>Gelidaceae</i>	agarose and agaropectin	as laboratory culture media, emulsifying agent, bulk laxative and in the preparation of jellies
Starch	Amulym	polysaccharide granules	<i>zae mays, oryza sativa, triticum aestivum</i>	<i>Graminae, solanaceae</i>	Amylose, amylopectin	nutritive, demulcent, binding agent, disintegrant, and finally used as starch
Pectin	Pectin	citrus peel	<i>Citrus aurantium</i>	<i>Rutaceae</i>	galactouronic acid, galactose, and arabinose	diarrhea, emulsifying agent, gelling agent, encapsulating agent
Isapgol	ispaghula, indian psyllium , isabgol	dried seed and husk	<i>Plantago ovate</i>	<i>Plantaginaceae</i>	xylose, arabinose, galacoutonic acid, rhamnose	laxative, emollient, demulcent
Honey	madhu, mel	honey comb	<i>Apis mellifera</i>	<i>Apidae</i>	glucose 35%, fructose 45%, sucrose 2%, maltose, invertase, crystalline dextrose resorcinol	sweeting agent, antiseptic so can be applied on the burn or wounds and vehicle for several agents.
Guar gum	Guar flour, Jaguar gum	Endosperm	<i>cymopsis tertagonolobus</i>	<i>Leguminosae</i>	galactose and mannose	binding agents, disintegrating agent , emulsifying agent, bulk laxatives , and in the treatment of peptic ulcer