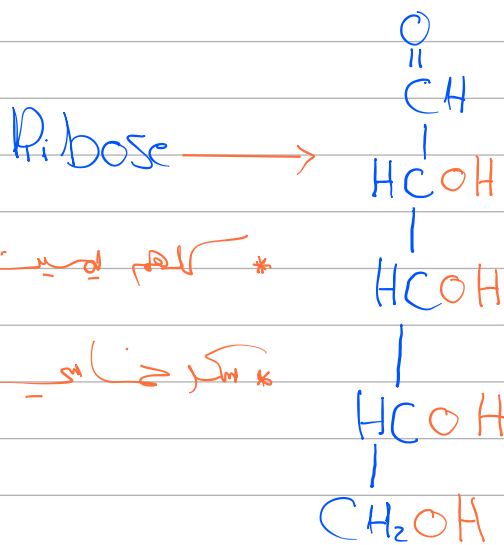
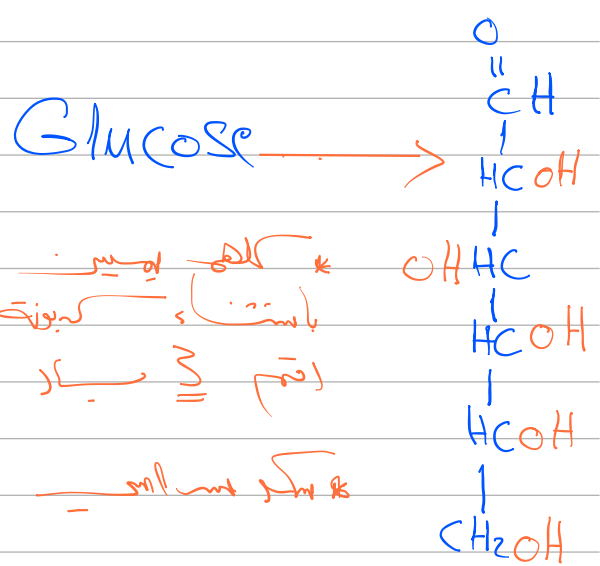


# Carbohydrates



\* كالكه لبيسي

\* سكر حلو

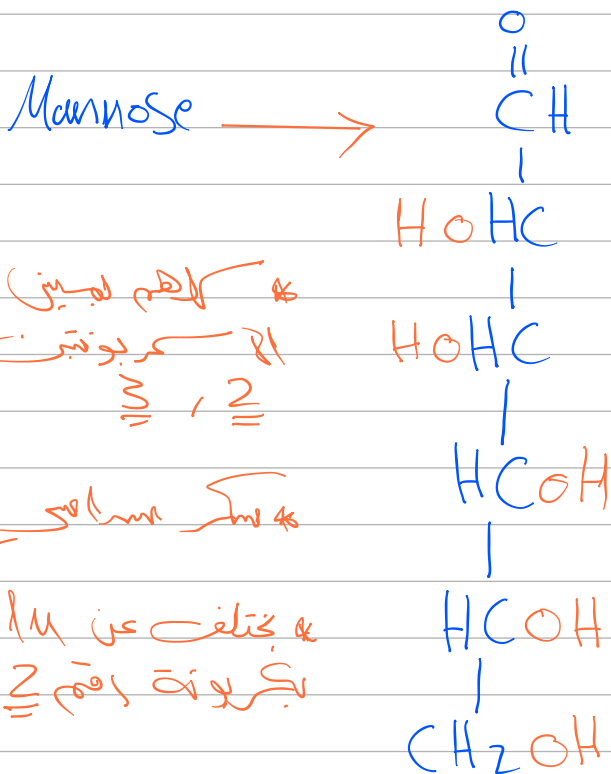


\* كالكه لبيسي

باستثناء كربون

رقم 3

\* سكر حلو

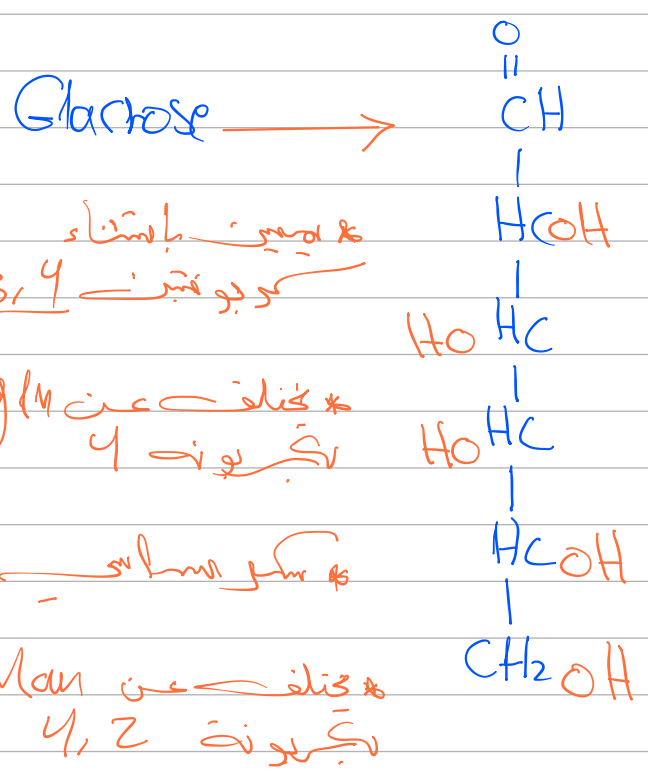


\* كالكه لبيسي

السكرين  
رقم 2, 3

\* سكر حلو

\* يختلف عن glu  
بكربون رقم 2



\* كالكه لبيسي

كربونين 3, 4

\* يختلف عن glu  
بكربون رقم 4

\* سكر حلو

\* يختلف عن Man  
بكربون رقم 4, 2

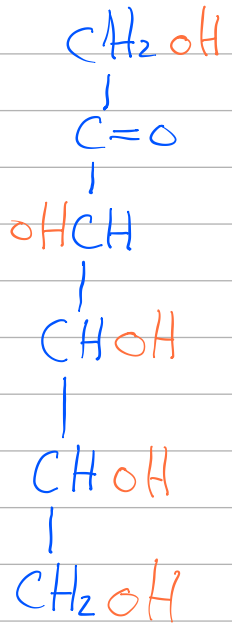
\* ملحظة ← كربون رقم 1 يتغير اتجاهها  
فتسمى ال Anomer (α, β)

\* جميعهم Aldose

\* بناء على ما سبق والعلاقة بين glu, Man و glu, gla  
\* والعلاقة بين Man, gla

Epimers ← glu, Man و glu, gla  
diastereomer ← Man, gla

fructose



عنا كربون 3  
جوانحه ليه

ketose

\* عائلة fructose بالسكرات - المثلثه  
في Aldose (glu, gla, Man)

Constitutional isomers

\* تاني كاربون في عرصة الكربون (C=O)  
عبر عرصة حريفية في Aldose  
وتكون دائما مع الكربون رقم 2 في  
Ketose.

All of those are monosaccharides

## Oxidation

\* glucose oxid. of carbon 1 → gluconate

\* تقبل اكسمة الكربون الاولي  
تحتاج weak oxidizing agent  
"خطوة واحدة"

\* glucose oxid. of carbon 6 → glucuronate

gluconic acid → strong oxidizing agent يتأكسد الي الكربونين  
\* في حال حينا تاكسد الكربون 6 بس، بتبين الجزء.

\* زيب ما تعرف الكيتونات ما يعرف الالهيا تاكسد، بس الالهيا بتحول كيتون عن  
حريفية علية electron rearrangement ويحدث بتا كسد، مع المرحلة انواع يش  
التفاعل ene-diol and intermediate substance.

- \* Vitamin C is an unsaturated lactone.
- \* Air oxidation of it, followed by hydrolysis of ester bond lead to loss its activity.
- \* Scurvy: severe lack of Vitamin C.



# Reduction

1) عن طريق اضافة (H)  
 \* يرجع السكر، السكر ← Poly alcohol

\* Examples: Sorbitol, mannitol, xylitol

2) عن طريق حذف (O)  
 \* one or more hydroxyl group replaced by Hydrogen.

\* Example  $\Rightarrow$  Ribose  $\longrightarrow$  2-Deoxyribose (in DNA)

6-Deoxy D-glactofuranose  $\longrightarrow$  L-Fucose  $\leftarrow$  (3) كحلوى

# Disaccharide

\* The carbon involve in the linkage (C<sub>1</sub>, C<sub>2</sub>, C<sub>4</sub>, C<sub>6</sub>)

\* We depend on first sugar to determine  $\alpha$ ,  $\beta$

anomeric C. reducing or non  $\leftarrow$  sugar is free or not  
 \* free C<sub>1</sub> is non-reducing, not free C<sub>1</sub> is reducing

1) sucrose  $\longrightarrow$  Glucose + Fructose  $\alpha$  (1, 2) non-reducing

2) lactose  $\longrightarrow$  Glucose + Galactose  $\beta$  (1, 4) reducing

3) Maltose  $\longrightarrow$  Glucose + Glucose  $\alpha$  (1, 4) reducing

\* Lactose  $\longrightarrow$  Lactulose  
 ↓  
 Glucose  $\longrightarrow$  Fructose

- create Constipation
- Immune system
- fatty acid  $\uparrow$ , toxic ammonia
- growth of health gut bacteria

\* Sacralose  $\Rightarrow$  sucrose with some modifications "adding C1"  
 $\rightarrow$  in splenda "as artificial sweetener"

## \* Milk problems :-

- 1) Lactose intolerance :-
- Deficiency in enzyme lactase
  - producing  $H_2$ ,  $CO_2$  and organic acid
  - Digesting problem (bloating) and diarrhea

- 2) Galactosemia :-
- Missing galactose metabolizing enzyme
  - Non-metabolizing glucose accumulate in cell and converted into hydroxy sugar galactitol which can't escape cell
  - Swelling cell, then cell damage
  - Brain retardation and Cataract

## Oligosaccharide

1) Raffinose :- found in beans and vegetables like: cabbage, brussels, sprouts, broccoli and asparagus

• Made up of  $\Rightarrow$  galactose + glucose + fructose.

• Human lack alpha-galactosidase enzyme that needed to break down raffinose, but intestinal bacterium can ferment it into hydrogen, methane, and other gases

- 2) as a drugs :-
- streptomycin and erythromycin (antibiotics)
  - Doxorubicin (cancer chemotherapy)
  - Digoxin (cardiovascular disease)

## Polysaccharide

1) Glycogen  $\rightarrow$  storage form of sugar in Animal cell

- Its monomer is glucose  $\times$  (1,4) linkage
- branch occur in  $C_6$

2) Starch: amylose (10-20%), amylopectin (80-90%)

- Its monomer is glucose "as a dimer  $\Rightarrow$  (Maltose)  $\times$  (1,4) linkage
- Branch occur in  $C_6$

\* Glycogen is more highly branched than Amylopectin


3) Dextran :-  
• Storage  
• yeast and bacteria  
• the monomer is glucose  $\alpha$  (1,6)  
• Branches : 1-2 , 1-3 or 1-4

4) cellulose :-  
• Building up from glucose  $\beta$  (1,4) linkage  
• structural  $1\text{gln} + 1\text{gln} \Rightarrow$  Cellulodiose

5) Chitin :-  
• exist in exoskeleton  
• Building up of N-Acetyl glucosamine  $\beta$  (1,4) linkage.

6) pectin :-  
• found in cell wall of many fruit and vegetables and gelling agent  
• its precursor galacturonic acid.  
• hetero polysaccharide.

• overall they are non-reducing.

اذكروني بدعوة و بالتوفيق لكم 

The end of slide 64

By Lujain Ahmad