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Theme of the seminar:

CARBOHYDRATES AND THEIR METABOLISM. DIGESTION OF CARBOHYDRATES.

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Specialty cipher: “5B011200 – Chemistry”

PLAN:

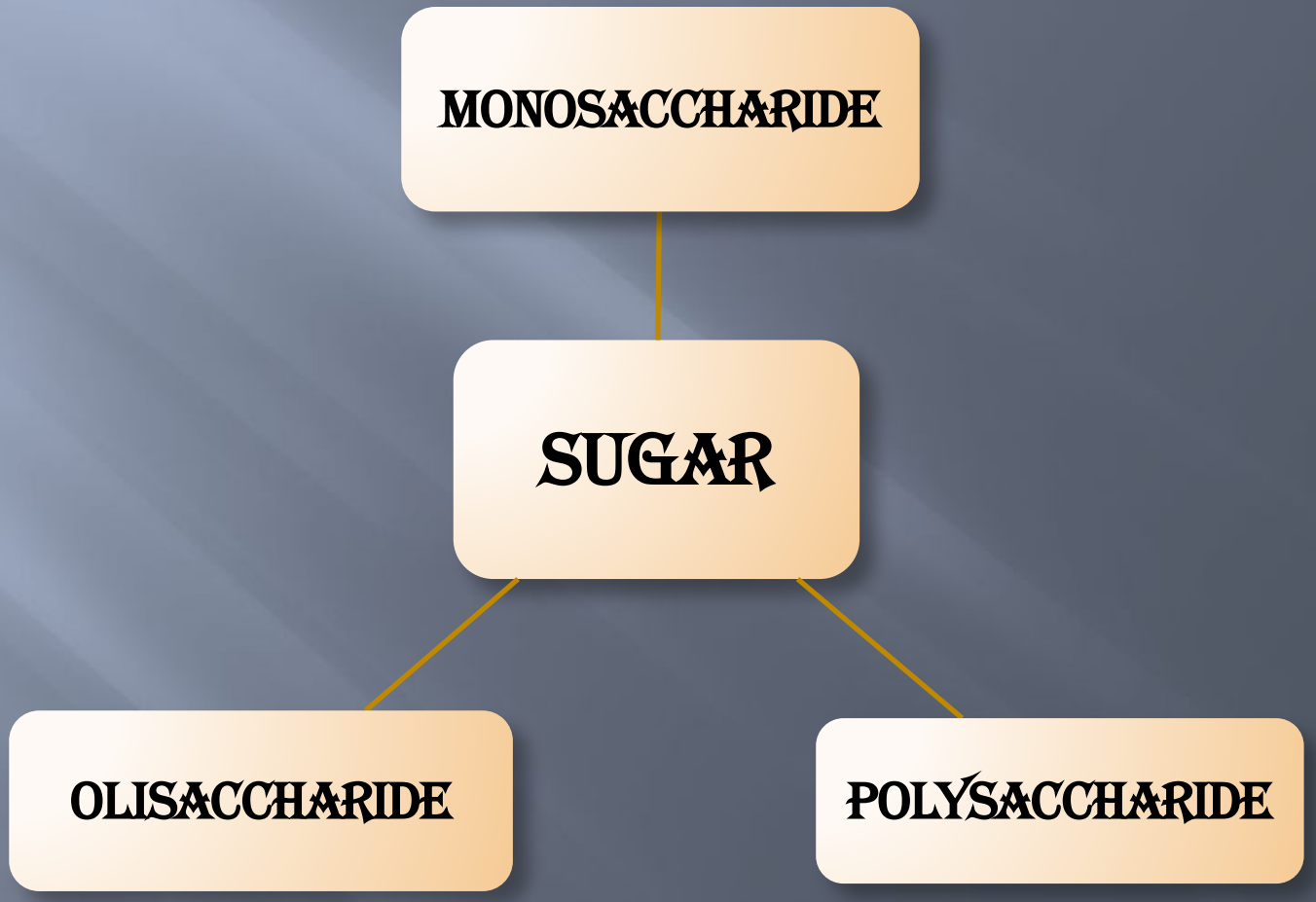
- Carbohydrates
- Classification of carbohydrates
- The biological function of carbohydrates
- Metabolism of carbohydrates
- Digestion of carbohydrates

What is carbohydrates?

- Carbohydrates are chemical compounds that contain only oxygen, hydrogen and carbon. They are made up of joined-up sugars. Sugars have the general formula Cm(H2O)n, and are also known as saccharides.

- Certain carbohydrates are an important storage and transport form of energy in most organisms, including plants and animals.

CLASSIFICATION OF CARBOHYDRATES



MONOSACCHARIDE

- Monosaccharide are carbohydrates which can not be hydrolyze to small molecoles.
- Monosaccharides containing three (3) to seven (7) carbon with functional aldehyde or keto group.
- Most common of monosaccharides are

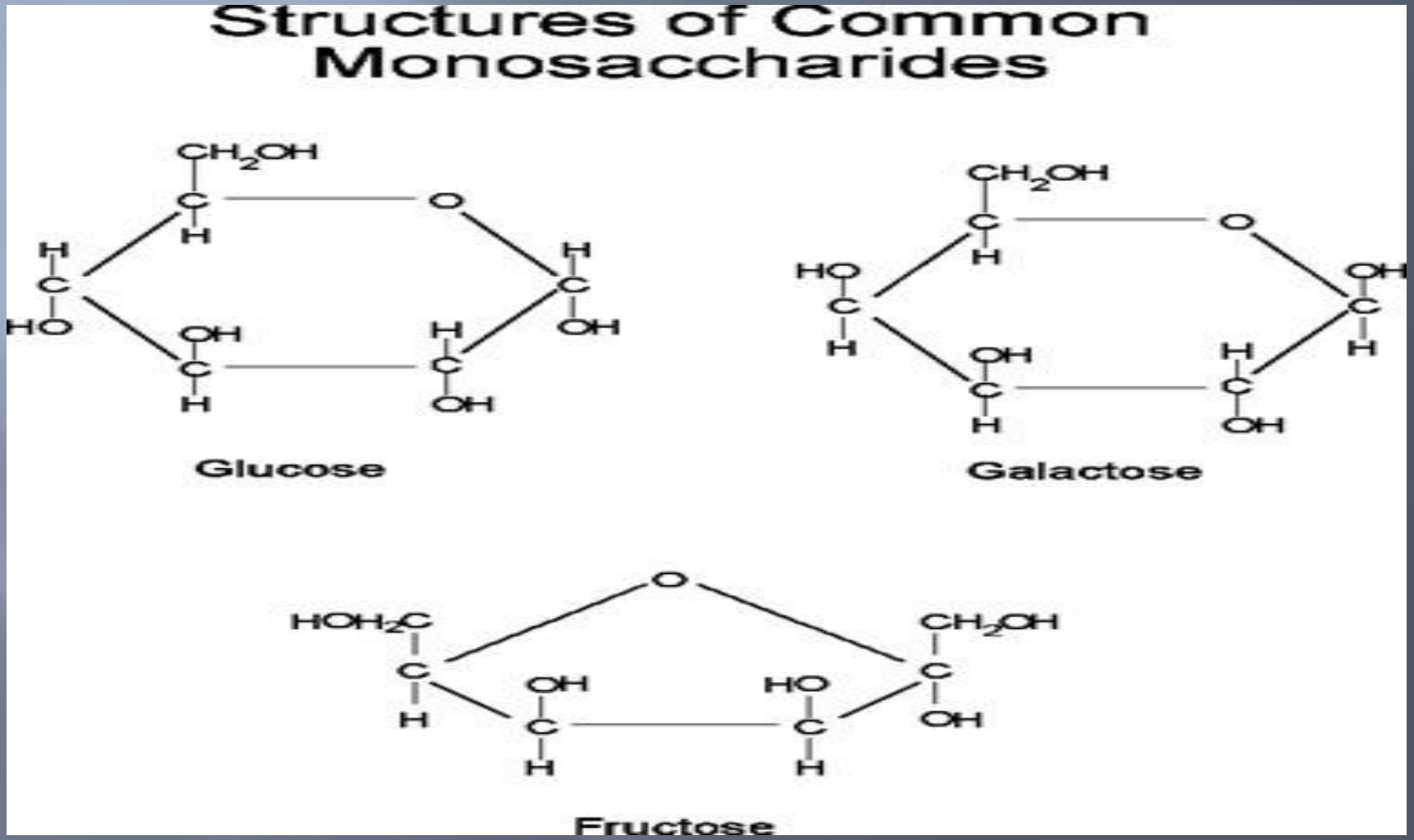
Aldoses-

Aldotirose,Aldotetrose,Aldopentose,Aldohexose,Aldoheptose

Ketoses-

Keto tirose, Keto tetrose,Ketopentose, Ketohexose,Ketoheptose

Simple sugars



- Glyceraldehyde and dihydroxy acetone are aldotriose and ketotriose are respectively.The phosphorylated forms are metabolic entermediate.

- Aldepentose and ketopentose are ribose and ribulose respectively. Ribose is contituent of nucleic acids. Ribulosephosphate is metabolic intermadiate.
- Monosaccharides- Glocose, galactose, glycerose, erythrose, ribose,ribulose, fructose.

OLISASACCHARIDE

Olisaccharides are polymerized monosaccharides, which contain more or two to ten residues on hydrolysis. They are classified as disaccharide, trisaccharides and tetrasaccharide.

Olisaccharides- maltose, lactose,sucrose,raffinose,stachyose

Disaccharides consist two monosaccharide on hydrolysis. Disaccharides are of two types-reducing disaccharides(ex. Maltose) and non-reducing disaccharide(ex.sucrose)

Trisaccharide are found in sugar beet and cotton seed.Ex.raffinose

Tetrasaccharide yield four monosaccharide on hydrolysis.Ex. stachyose

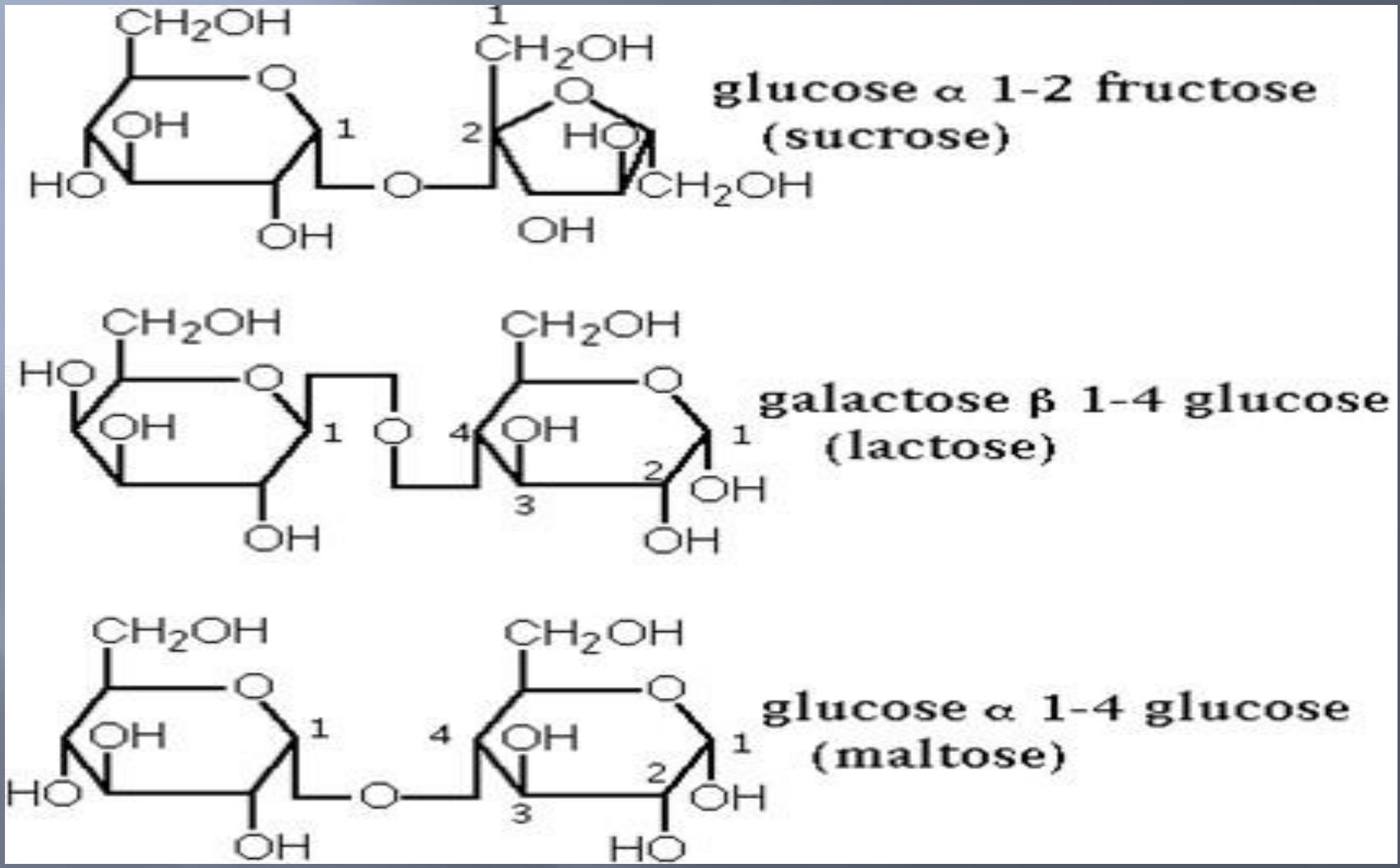
DISACCHARIDE

Disaccharides are formed by the union of two monosaccharide with the elimination of one molecule of water

General molecular formula is $C_{12}H_{22}O_{11}$

Name	Composition	Linkage	Source
Lactose	Glucose+Glucose	Alfa (1-4)	Malt,barley
Maltose	Glucose+Galactose	Betta (1-4)	Milk
Sucrose	Glucose+Fructose	Alfa,Betta(1-2)	Sugarcane,honey, fruit juices

Disaccharides



POLYSACCHARIDE

- *Polysaccharide* are polymeric anhydrides of monosaccharides. Polysaccharide are of two types based on their function and composotion. Based on function, polysaccharides of two types storage and structural.
- Storage polysaccharides - starch
- Structural polysaccharides - cellulose

Name of the polysaccharide	Composition	Occurrence	Function
Starch	Polymer of glucose containing a straight chain of glucose molecules and a branched chain of glucose molecules	In several plant species as main storage carbohydrate	Storage of reserve food
Glycogen	Polymer of glucose	Animals (eq.of starch	Storage of reserve food
Callose	Polymer of glucose	Different regions of plant, in sieve tubes of phloem	Formed often as a response to wounds
Insulin	Polymer of fructose	In roots and tubers	Storage of reserve food
Cellulose	Polymer of glucose	Plant cell wall	Cell wall matrix
Hemi cellulose	Polymer of pentoses and sugar acids	Plant cell wall	Cell wall matrix

BIOLOGICAL FUNCTION OD CARBOHYDRATES

- Carbohydrates are defined as poly hydroxy alcohols function aldehyde or keto group.
- Function:

1.They are major energy source for man.

2. They function as reserve food material in man and plants.

3.They are components of connective tissues,bone,cartilage,skin, membrane and nerve tissue.

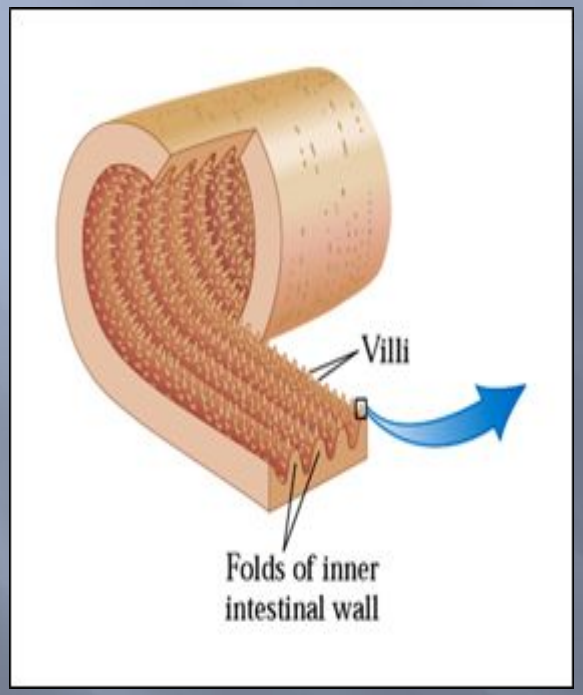
4. They are components of blood group substances,nucleic acids.

5. Carbohydrate derivates are vitamins, antibiotics and drugs.

METABOLISM OF CARBOHYDRATES

- METABOLISM The entire spectrum of chemical reactions, occuring in the living system are referred as “Metabolism”. Types of metabolic pathways Anabolic pathways: Protein synthesis. Catabolic Pathways: Oxidative phosphorylation. Amphibolic pathways: Citric acid cycle.

Metabolism



Section of the small intestine, showing its folds and the villi that cover the inner surface of the folds.