



CHEMISTRY • CLASS 12

CHAPTER 10

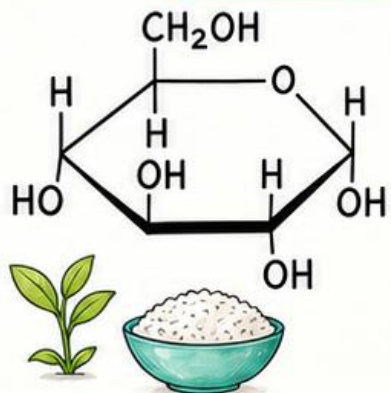
Biomolecules

CHAPTER NOTES

BIOMOLECULES - THE CHEMISTRY OF LIFE

- Living systems coordinate chemical reactions to grow, repair and reproduce.
- Major molecular families: carbohydrates, proteins, lipids, nucleic acids and vitamins; mineral ions also support function.
- Carbohydrates often supply/store energy; proteins build and catalyse; nucleic acids store and express genetic information; vitamins assist metabolism.
- A molecule's structure controls its biological role.

1. CARBOHYDRATES

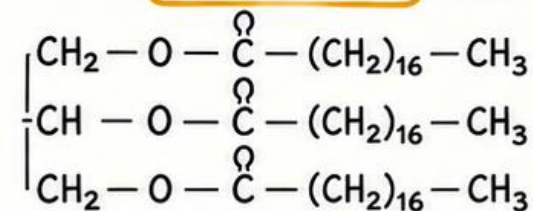


Example: α -D-glucose (monosaccharide)

Function:

- Immediate energy
- Energy storage (starch, glycogen)
- Structural roles (cellulose, chitin)

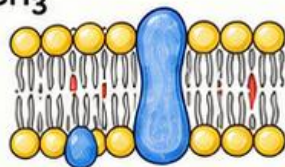
3. LIPIDS



Example: triglyceride (fat)

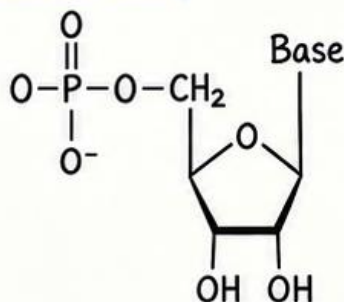
Function:

- Long-term energy storage
- Insulation and cushioning
- Cell membranes (phospholipids, cholesterol)



4. NUCLEIC ACIDS

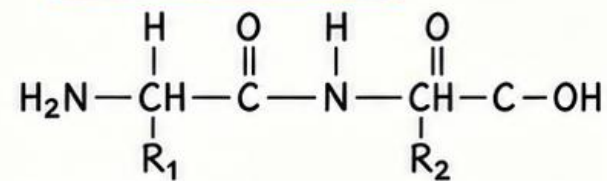
DNA (double helix)



Function:

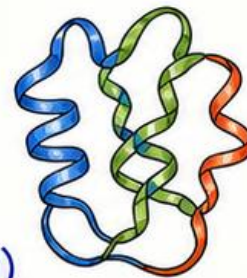
- Store genetic information
- Direct protein synthesis
- Some nucleic acids carry out catalysis (RNA)

2. PROTEINS



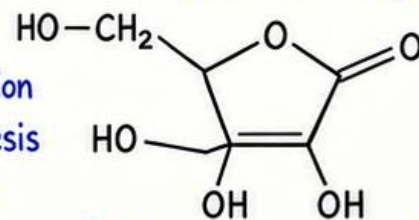
Function:

- Build and repair tissues (structural)
- Catalyse reactions (enzymes)
- Transport, signalling, immune defence, movement



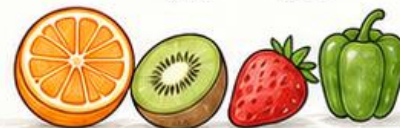
5. VITAMINS

Example: Vitamin C (ascorbic acid)



Function:

- Assist metabolism as coenzymes
- Antioxidant protection
- Support immunity
- Essential in small amounts

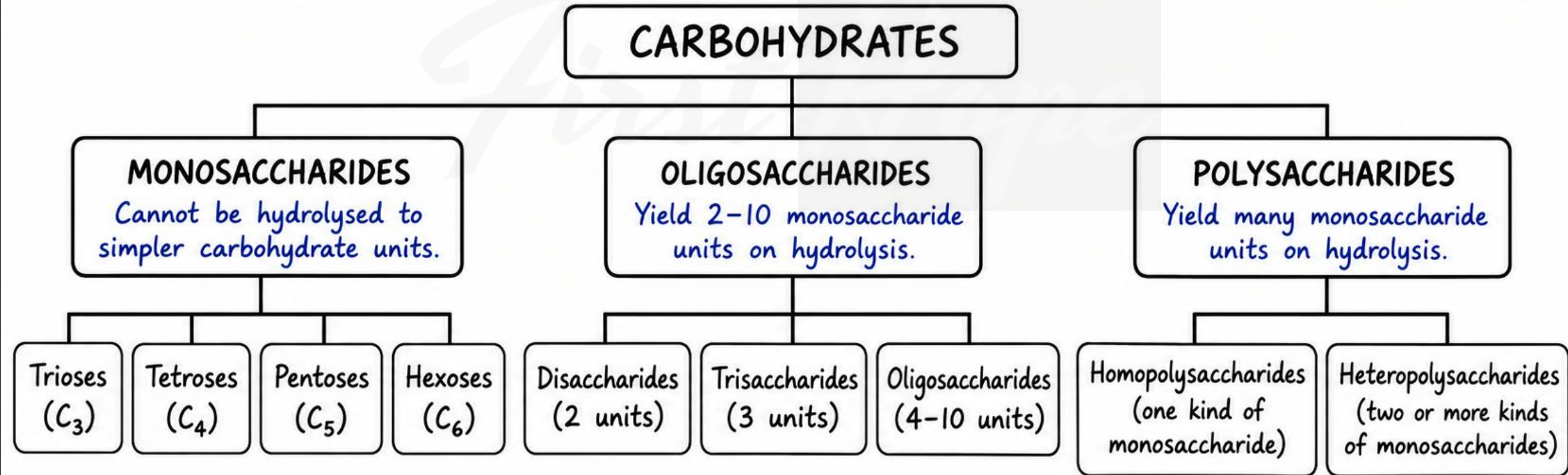


CARBOHYDRATES – DEFINITION & CLASSIFICATION

PART 1 OF 2

Carbohydrates are polyhydroxy aldehydes or ketones, or compounds that yield such units on hydrolysis.

CLASSIFICATION OF CARBOHYDRATES



CARBOHYDRATES – REDUCING SUGARS & ROLES

PART 2 OF 2

REDUCING SUGARS

- Have a free reducing (anomeric) centre under the test conditions.
- Can open to a reactive aldehyde or ketone form.
- Give positive Tollens', Fehling's and Benedict's tests.
- Examples: glucose, fructose, lactose, maltose.

NONREDUCING SUGARS

- Do not have a free reducing (anomeric) centre under the test conditions.
- Cannot open to a reactive aldehyde or ketone form.
- Do not give positive Tollens', Fehling's or Benedict's tests.
- Examples: sucrose, trehalose.

ROLES OF CARBOHYDRATES



IMMEDIATE ENERGY

Glucose is rapidly oxidised in cells to release energy for life processes.



ENERGY STORAGE

Glycogen in animals and starch in plants store energy for future needs.



STRUCTURAL MATERIAL

Cellulose supports plant cell walls. Chitin supports fungi and arthropod exoskeletons.

MONOSACCHARIDES AND CARBON COUNT

- Aldoses contain an aldehyde in the open-chain form;
- Ketoses contain a ketone.

CARBON COUNT	GENERAL TERM	ALDOSE TERM	KETOSE TERM
3	triose	aldotriose	ketotriose
4	tetrose	aldotetrose	ketotetrose
5	pentose	aldopentose	ketopentose
6	hexose	aldohexose	ketohexose
7	heptose	aldoheptose	ketoheptose

GLUCOSE

→ glucose is an aldohexose.

FRUCTOSE

→ fructose is a ketohexose.

RIBOSE

→ ribose is an aldopentose.



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