

KARACHI EDU • CHEMISTRY CHAPTER 4

Biochemistry

Comprehensive coaching notes on carbohydrates, proteins, lipids, nucleic acids, and vitamins for Class X.

Introduction to Biochemistry

Branch of chemistry dealing with chemical compounds and processes occurring in living organisms.



Biological Molecules

Essential organic compounds synthesized by plants and animals required for structural integrity and metabolic function.



Metabolic Pathways

Enzyme-catalyzed chemical reactions governing energy production, storage, and genetic information transfer.

Carbohydrates

Polyhydroxy aldehydes or ketones, or substances yielding them upon hydrolysis.

Monosaccharides

Simple sugars like glucose and fructose. Sweet taste, water-soluble, non-hydrolyzable.

Oligosaccharides

Yield 2–10 monosaccharide units on hydrolysis. E.g., sucrose, lactose, maltose.

Polysaccharides

Complex polymers like starch, glycogen, and cellulose. Tasteless and insoluble.

Proteins & Amino Acids

High molecular weight nitrogenous macromolecular polymers of amino acids.

Peptide Linkage

Amide bond formed between the carboxyl group of one amino acid and the amino group of another with loss of water.

-CO-NH- bond formation

Biological Importance

Essential for growth, tissue repair, enzymatic catalysts (enzymes), hormones, and structural components in muscle and skin.

Found in pulses, meat, eggs, fish

Lipids (Fats and Oils)

Esters of fatty acids with glycerol, serving as concentrated energy reserves.

Fats vs Oils

- **Fats:** Solid at room temperature, saturated fatty acid esters.
- **Oils:** Liquid at room temperature, unsaturated fatty acid esters.

Functions & Saponification

Provide insulation, protect vital organs, and act as solvent for fat-soluble vitamins (A, D, E, K). Alkaline hydrolysis yields soaps.

High energy fuel source (9 kcal/g)

Nucleic Acids (DNA & RNA)

Polynucleotides responsible for hereditary information storage and protein synthesis.

DNA (Deoxyribonucleic Acid)

Double helix structure containing deoxyribose sugar, phosphate, and nitrogenous bases (A, T, G, C). Stores genetic code.

RNA (Ribonucleic Acid)

Single-stranded molecule containing ribose sugar and uracil instead of thymine. Directly translates genetic code into proteins.

Vitamins

Organic compounds required in small amounts for normal growth and metabolic regulation.

Fat-Soluble Vitamins

Vitamins A, D, E, and K. Soluble in fats and oils, stored in liver and fatty tissues. Excess can cause toxicity.

Water-Soluble Vitamins

Vitamins B-complex and C. Soluble in water, not stored in the body, requiring daily dietary intake.

Key Takeaways

- **Carbohydrates:** Primary energy source categorized into mono, oligo, and polysaccharides.
- **Proteins:** Macromolecules built from amino acids via peptide bonds.
- **Lipids:** High-energy esters of glycerol and fatty acids.
- **Nucleic Acids:** DNA and RNA govern heredity and protein synthesis.