

GRADE 10 | 2024

Life Sciences: Chemistry of Life

Life Sciences

CAPS ALIGNED

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1. Organic Molecules in Living Organisms

- Carbohydrates: energy source, made of C, H, O, examples: glucose, starch, cellulose
- Proteins: made of amino acids; functions include enzymes, antibodies, structural proteins
- Lipids (fats and oils): long-term energy storage; made of fatty acids and glycerol
- Nucleic acids: store and transmit genetic information; DNA and RNA

2. Enzymes

Enzymes are biological catalysts that speed up chemical reactions in the body. They are specific to their substrate.

FORMULA: Enzyme + Substrate -> Enzyme-Substrate Complex -> Products + Enzyme
(Lock and key model)

Factors Affecting Enzyme Activity

- Temperature: increases activity up to optimum; denatures above optimum
- pH: each enzyme has an optimum pH; extreme pH denatures enzyme
- Substrate concentration: more substrate increases rate until all active sites are occupied

3. Cell Division

Mitosis

Mitosis produces 2 identical daughter cells. Used for growth and repair.

- Prophase: chromosomes condense and become visible
- Metaphase: chromosomes line up at equator
- Anaphase: chromosomes pull apart to opposite poles
- Telophase: nuclear membrane reforms; two nuclei form
- Cytokinesis: cytoplasm divides to form two cells

Meiosis

Meiosis produces 4 genetically unique cells with half the chromosome number. Used for sexual reproduction (gametes).

4. DNA Structure

DNA (deoxyribonucleic acid) is a double helix made of nucleotides. Each nucleotide has a sugar (deoxyribose), phosphate group, and nitrogen base.

FORMULA: Base pairing rules: A pairs with T; C pairs with G
(Adenine-Thymine, Cytosine-Guanine)