CCEA GCE AS BIOLOGY: UNIT 1

MOLECULES

- Molecules
  - Water
    - Solvent properties
    - Roles in metabolism and transport
  - Inorganic Ions
    - Potassium, calcium, magnesium, iron, hydrogencarbonate, nitrate, phosphate
    - Functions:
      - Components of compounds (e.g. ATP, chlorophyll, haemoglobin)
      - Osmotic and buffering systems
  - Carbohydrates
    - Monosaccharides: α-glucose, β-glucose, fructose
    - Disaccharides: maltose, sucrose
    - Polysaccharides:
      - Cellulose (β-glucose, structural)
      - Starch, glycogen (α-glucose, storage)
    - Glycosidic bonds
    - Pentoses in nucleic acids and ATP
  - Lipids
    - Fats and oils
    - Triglycerides: glycerol + fatty acids (condensation)
    - Saturated vs unsaturated fatty acids
    - Phospholipids: key to membranes
  - Proteins
    - Amino acids: general structure
    - Peptide bonds (condensation)
    - Structures:
      - Primary: amino acid sequence
      - Secondary: α-helix, β-sheet (H-bonds)
      - Tertiary: folding via H-, ionic, disulfide bonds, hydrophobic interactions
      - Quaternary: multiple polypeptides
    - Protein types:
      - Fibrous (e.g., collagen)
      - Globular (e.g., enzymes)
      - Conjugated (e.g., haemoglobin)
    - Prions: misfolded proteins causing diseases (e.g., CJD)
  - Nucleic Acids
    - DNA & RNA: polymers of nucleotides
    - Nucleotide: sugar, base, phosphate
    - DNA: double helix, antiparallel strands, base pairing
    - RNA: single strand, ribose
  - DNA Replication
    - Semi-conservative process
    - DNA helicase and polymerase
    - Meselson–Stahl experiment
  - Practical Work
    - Biochemical tests: iodine, Benedict's, Biuret
    - Paper chromatography: amino acids, Rf values