

Unit 1

Biochemistry Review

CHAPTER 1:

Main Topics in Section 1.1 (Basic Chemistry):

- Isotopes: What they are; How they differ from radioactive isotopes; the uses of radioactive isotopes
- Difference between ionic and covalent bonding
- Different types of covalent bonds (i.e. polar vs. non polar); electronegativity.
- Understand how to determine if a molecule is polar based on its shape and electronegativity
- Difference between inter- and intramolecular bonds
- Understand Hydrogen bonds and how they can influence the properties of water
- Describe why water is a universal solvent; its ability to absorb heat etc.

Main Topics in Section 1.2 (Macromolecules):

- What are the monomer subunits of each macromolecule (carbohydrate, lipids, protein and nucleic acid)
- Know what type of bonds are formed between each monomer subunits in the macromolecules (i.e. glycosidic bond, peptide bond, ester bond, phosphodiester bond)
- The difference between monosaccharide, disaccharide and polysaccharide.
- Explain the difference between α -glucose and β -glucose and the reasons why β -glucose cannot be digested by the human body.
- What are isomers? What are the three isomers of monosaccharides?
- Why are polysaccharides insoluble in water?
- What is the difference between a saturated and unsaturated fat? Which is more likely to be solid at room T and which is better for your health?
- What are the subunits of a phospholipid and how do they affect its solubility in water?
- What two functional groups are found in every amino acid and how does it relate to a protein's primary structure?
- Understand the four levels of Organization in a protein and how it affects its overall shape.
- What are the three main difference between DNA and RNA?
- How are DNA and RNA interconnected? What are their roles within a cell?

- Know how many hydrogen bonds are found between the base pairs and how the nucleotide sequences are held together in DNA.

Main Topics in Section 1.3 (Biochemical Reactions):

- The difference between an acid and base and how to identify them within a reaction.
- What is a pH scale? How does the H⁺ concentration change as you move up or down the pH scale?
- What is a neutralization reaction? What is the purpose of it?
- What are buffers? Which buffer plays an important role in the human body?
- Understand how carbonic acid (H₂CO₃) and hydrogen carbonate (HCO₃⁻) are formed and can help alter the pH in the blood
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- Understand the difference between a condensation and hydrolysis reaction.
- Review the condensation hydrolysis quiz and how products are formed.
- What is an enzyme and what is its role in the human body?
- How are enzymes able to speed up chemical reactions?
- Label an enzyme using these key words: enzyme, substrate, enzyme-substrate complex, products
- What are 4 factors that can effect enzyme activity? How do they affect enzyme activity?
- What is the difference between competitive and non-competitive inhibition?
- Explain and illustrate allosteric regulation of an enzyme.
- Explain and illustrate feedback inhibition.

CHAPTER 2:

Main Topics in Section 2.1 (Cellular Biology):

- Know how to label an animal and plant cell
- What is the endomembrane system? What organelles are involved?
- Where are proteins and lipids made and processed?
- Know the function and location of the following organelles: nucleus, ER, golgi, lysosome, mitochondria, chloroplast, vesicle, cilia, flagella, cytoskeleton
- Understand and explain the Fluid Mosaic Model
- What molecules are found in the lipids bilayer and what are their functions?
- What 3 factors affect membrane fluidity?

Main Topics in Section 2.2 (Cell Transport):

- What are the main differences between passive and active transport?
- Understand the following terms: down concentration gradient, concentration gradient, dynamic equilibrium.
- What type of molecules can cross the membrane through simple diffusion? Why?
- Why do large, polar and charged molecules require additional help to cross the lipid bilayer?
- What mutation contributes the symptoms of cystic fibrosis?
- Explain what will happen to an animal cell if it is placed in the following environments: isotonic, hypotonic, hypertonic. Explain your reasoning.
- Understand the structure of a channel protein and how it enables it to embed in the lipid bilayer while still allow polar or charged molecules to cross through.
- What is the difference between a channel and carrier protein in facilitated diffusion?
- Active transport required energy to move molecules across the concentration gradient. What molecules provides that energy and how?
- Explain the process used to transport sodium and potassium across the cell.
- Explain the process of secondary active transport.
- Name and explain the difference between: phagocytosis, pinocytosis and receptor-mediated endocytosis.
- How does exocytosis differ from endocytosis?



Textbook Review Questions:

p.81: # 1, 3, 4, 6, 9, 10, 12

p.89 : # 3,4,9, 10, 11, 12, 14, 15, 17, 19, 21, 22, 23, 27, 28, 59

p. 99: # 2-12, 14, 15, 16, 17, 18, 19, 25, 36,40