

Chapter One: Life and Chapter Two: Water

Learning Objectives

After reading these chapters, reviewing materials presented in class and doing the practice exercises and homework you should be able to:

Chapter One

1. Recognize each of the biochemically important functional groups shown in figure 1-2 on page 6 of your text.
2. State the key differences and similarities between prokaryotic and eukaryotic cells
3. List the functions of each of the major organelles in eukaryotic cells.
4. Describe important properties of water and understand why these properties are unique based on the chemical structure and properties of water.
5. Define ionic, van Der Waals, and hydrophobic interactions and be able to recognize the chemical groups that would participate in these types of interactions.
6. Define hydrogen bonding and be able to recognize and give examples of groups that would participate in these types of interactions.
7. Recognize potential noncovalent bonding/interactions with a given compound. (In other words, looking at the groups that are present on a molecule, identify the types of noncovalent interactions that that group could participate in and with what other groups.)
8. Relate the differences between osmosis and diffusion

Chapter Two

1. What are the unique properties of water
2. Work out pH exercises similar to those in the practice and homework exercises.
3. Be able to identify weak acids and conjugate bases for a given system. Be able to calculate pH's and ratios of conjugate bases to weak acids using the HH equation. But, don't forget the pH and the K_w expressions. Remember the contributions of water.
4. Use and write the Henderson Hasselbalch equation
5. Work out buffer exercises similar to those done in class, in the practice and homework exercises. You need to calculate the pH of a buffer given the concentrations of weak acid, conjugate base and pKa. Note if you have a polyprotic acid the pKa that will dominate at a given pH.
6. Be able to calculate the concentrations of weak acid and conjugate base.

7. Carry out the above calculations leading to descriptions of how to prepare a buffer of a given pH.
8. Recall the principles of acid-base chemistry, weak acids (and their conjugate bases), the importance of K_a and pK_a and the importance of the ionization of a weak acid in water.
9. Be able to calculate the effects of added acid or base on the pH of a given buffer system.
10. Note examples of monoprotic, diprotic and polyprotic acids. Be able to sketch a titration curve for a polyprotic acid and determine pK_a from that curve.
11. Define buffer, buffering range and buffering capacity. Note the effects of buffer concentration on buffering capacity. Note the effects of pH on buffering capacity.
12. Given pK_a 's, recognize the buffering ranges for various buffers and how to choose a buffer for a particular situation.
13. Describe the means by which blood is buffered.
14. Know a number of respiratory and metabolic conditions that affect physiological pH.
15. Predict the results of respiratory and metabolic disease on physiological pH