

Advanced Biology Summer Assignment 2020

This course is designed to be the equivalent of a two-semester introductory biology course usually taken in the first year of college. Throughout the course, you will become familiar with major recurring themes that persist throughout all topics and material. The major themes are:

- I. Science as a Process
- II. Evolution
- III. Energy Transfer
- IV. Continuity and Change
- V. Relationship of Structure and Function
- VI. Regulation
- VII. Interdependence in Nature
- VIII. Science, Technology and Society

To successfully complete the course and meet all of the required objectives, you are required to do independent work both during the summer and throughout the school year. The major themes will be reviewed in Chapter I. I also chose Chemistry for you to cover over the summer because it will serve as a review of what you should know from having already taken Chemistry, and will allow us to get right into Biological Processes at the beginning of the year.

For the year, you will be using the 7th edition of *Biology* by Campbell and Reece. Because of the current health situation, you will not need to come to the school to get the textbook. In place of the textbook there will be matching PowerPoint slides for each of the three assignments.

PowerPoint 1: Basic Chemistry Review will go with Guided Reading Assignment 1 (1-68).

PowerPoint 2: Water and pH goes with Guided Reading Assignment 2 (69-141).

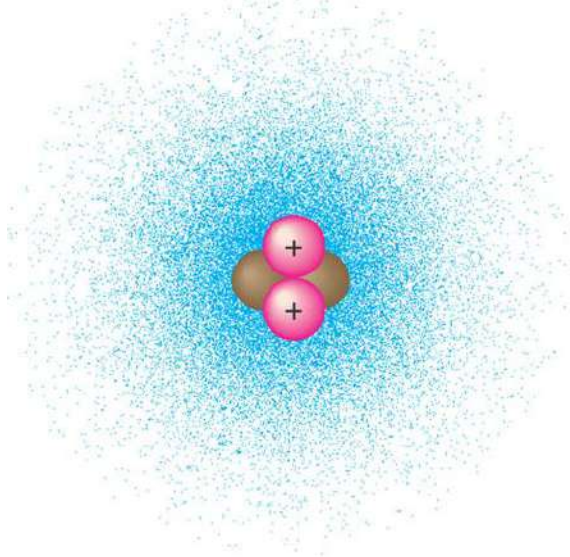
PowerPoint 3: Organic Chemistry goes with Guided Reading Assignment 3 (142-196).

Assignments will be due on the first day of class. You may email them to me (tpinto@msgmccclancy.info) when they are finished.

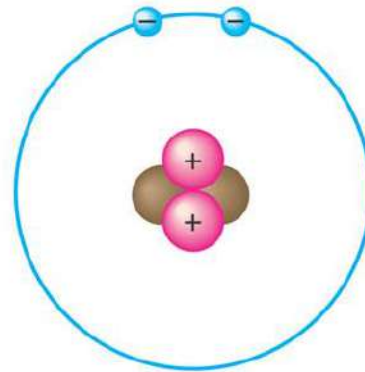
Guided Reading Assignment #1 (Slides 1-68)

This chapter is a review of basic chemistry – we will be going through this chapter very quickly. If you have any problems – please see me before school for additional help.

1. Contrast the term element with compound.
2. Label the diagram below and define the terms that you label.



(a)



(b)

3. Contrast the terms atomic mass and atomic number.
4. What is the difference between the terms atomic mass and atomic weight?
5. What is an isotope and what is "special" about radioactive isotopes?

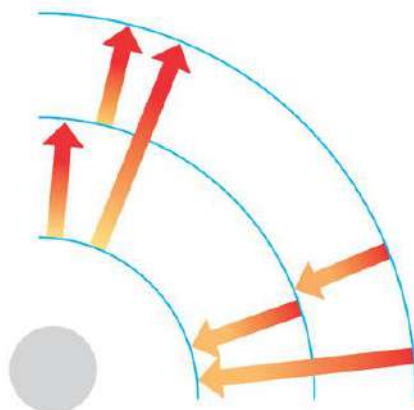
6. Explain how radioactive tracers are used in science?

7. Explain how the movement of electrons relates to the concept of potential energy – use the diagram below to help answer the question.

(a)



(b)



8. What determines interactions between atoms? Why are valence electrons important?

9. Define the following terms:

- a. Chemical bond
- b. Covalent bond
- c. Single bond
- d. Double bond
- e. Valence
- f. Electronegativity
- g. Nonpolar covalent bond
- h. Polar covalent bond

10. What is the difference between a structural and molecular formula?

11. How do ionic bonds compare with covalent bonds?

12. Compare and contrast hydrogen bonds and van der Waals interactions.

13. Based on the reading, what is an example, in a living system, of how molecular shape is critical?

14. Define a dynamic chemical equilibrium in terms of quantities of reactants and products. This is a critical concept!

Guided Reading Assignment #2 (69-141)

This chapter is a review from your previous biology class – these concepts are critical and repeated throughout the year. If you have not covered this material previously or need additional assistance with the concepts please schedule time to see me.

1. Why is water considered a polar molecule?

2. For each of the below listed properties of water – briefly define the property and then explain how water’s polar nature and polar covalent bonds contribute to the water special property. Include an example in nature of each property also.
 - a. Cohesion

 - b. Adhesion

 - c. Surface tension

 - d. High specific heat

 - e. Heat of vaporization

 - f. Evaporative cooling

3. What is special about water and density?

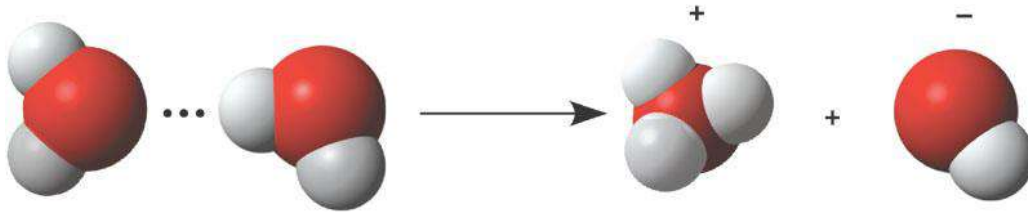
4. Define the following terms:
 - a. Solute

 - b. Solvent

 - c. Aqueous solution

- d. Hydrophilic
- e. Hydrophobic
- f. Colloid
- g. Hydration shell
- h. Molarity

5. Label the diagram below to demonstrate the dissociation of the water molecule and then relate this diagram to pH.

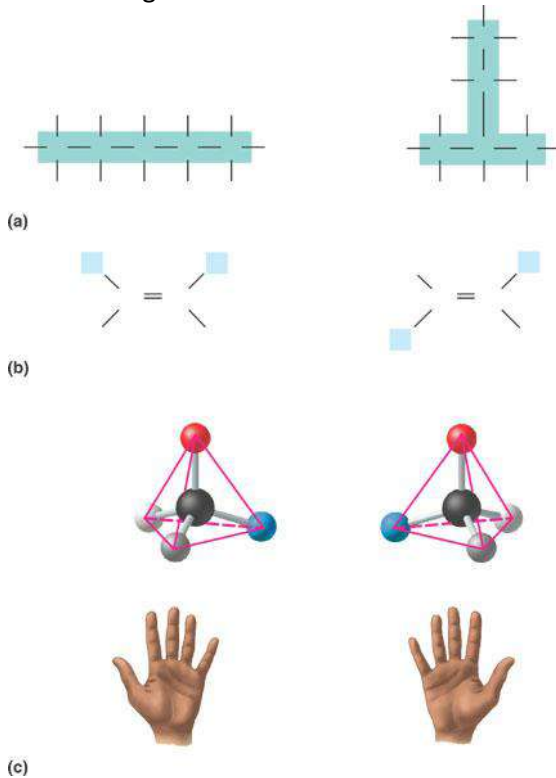


- 6. What defines an acid and a base?
- 7. Why are “apparently” small changes in pH so important in biology?
- 8. What is a buffer and write and explain the carbonic acid buffer system in human blood – yes we are back to the equation AGAIN!
- 9. What is acid precipitation and why is it important to living organisms?

Guided Reading Assignment #3 (Slides 142-196)

Again, this chapter is a review of previously covered material. We will be moving through the material very quickly, please see me for extra assistance if needed.

1. Why is organic chemistry so important in the study of biology?
2. Why was the Urey-Miller experiment so important?
3. What is special about carbon that makes it the central atom in the chemistry of life?
4. Use the diagram below to label and contrast the three types of isomers.



5. Create a table below: after each functional group – draw the structure, name the compound, write and example and note the functional properties – (doesn't this look like great quiz material?)

a. Hydroxyl

b. Carbonyl aldehyde

c. Carbonyl ketone

d. Carboxyl

e. Amino

f. Sulfhydryl

g. Phosphate