**AP Biology Biochemistry Study Guide**

**Water Chemistry**

1. Draw a Bohr model of water. Label the atoms, type of bond, polarity
2. Why is water considered to be a polar molecule?
3. Draw 4 water molecules hydrogen bonded together. Label the H bonds and polarity of the water molecules.
4. How does the polar nature of water help to determine its properties? (Keep this in mind as you explain the following properties of water)

Cohesion

Adhesion

Less dense as a solid

High specific heat

High heat of vaporization

Surface tension

Capillary action

Versatile solvent

1. Explain the pH scale. (focus on ion concentration, how the scale is logarithmic, you may want to draw a picture showing the change in ion concentration, what numbers are acidic, basic neutral)
2. What is a solution? Explain the difference between a solute and a solvent.
3. What is a suspension?
4. What is an ion?
5. Explain the difference between ionic, covalent and hydrogen bonds.
6. How are 4 of the properties of water mentioned in #4 are significant to living organisms?

**Carbon Chemistry**

1. Why is the carbon atom the backbone of organic compounds? (focus on valence electron shell)
2. Name the four groups of large macromolecules.
3. Draw glucose, a generalized amino acid, a generalized fatty acid chain, ribose, glucose
4. How are the amino acid and the fatty acid chain similar?
5. How are glucose and ribose similar?
6. Explain Dehydration synthesis. Give an example.
7. Explain hydrolysis. Give and example.
8. Fill in the following chart on macromolecules

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Macromolecule | monomer | functions | Bond to form polymer | Examples |
|  |  |  |  |  |
|  |  |  | Ester bond | Butter, oil, fat,  phospholipids |
| PROTEIN |  |  |  |  |
|  |  |  | Phosphodiester bond | DNA. RNA |

1. In the following chemical reaction, label the reactants and the products. Which enzyme catalyzes this reaction?

2H2O2🡪2H2O + O2

1. What is a catalyst? Describe the properties of enzymes?
2. How does an enzyme lower activation energy? How does this speed up reactions?
3. What is the active site?
4. Draw three pictures depicting 1) substrate and the enzyme, 2) enzyme substrate complex, 3) products and enzyme. Explain what is happening in each picture.
5. Explain how the relationship between enzymes and substrates is like a lock and key.
6. Explain the induced fit model of enzyme/ substrate interactions?
7. Explain how the following factors can affect enzyme activity.

Substrate concentration

Enzyme concentration

Temperature

pH

Salinity

1. What does it mean when a protein has been denatured?
2. Explain the difference between a competitive and noncompetitive inhibitor. (You may want to draw a diagram to help you explain the difference.)