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Assignment 1 - Biochemistry

Instructions: Define the following terms:

1. Element

2. Atom

3. Proton

4. Neutron

5. Electron

6. For the following elements listed in the Periodic Table of the Elements, label **ALL** of the following: atomic number, element symbol, molar mass.

1	_____
H	_____
1	_____

7	_____
N	_____
14	_____

6	_____
C	_____
12	_____

8	_____
O	_____
16	_____

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7. Calculate the number of protons, neutrons, and electrons in atoms of the following elements using the periodic table of the elements.

Element	Protons (p^+)	Neutrons (n^0)	Electrons (e^-)
Hydrogen			
Carbon			
Nitrogen			
Oxygen			

8. Draw Lewis diagrams for atoms of the elements listed below. Label **ALL** of the following: protons, neutrons, electrons, valence shell.

Hydrogen

Carbon

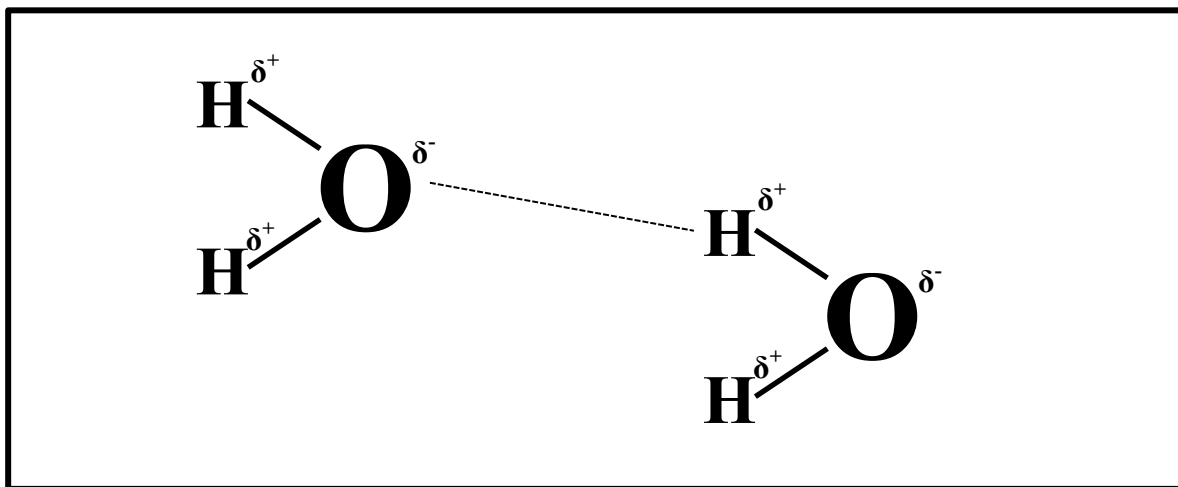
Nitrogen

Oxygen

9. Use the following T-chart to contrast characteristics of ionic and covalent bonds.

Ionic bonds	Covalent bonds
-Atoms having a _____ charge and _____ charge are held together by _____ interactions. -Two charged atoms held together by an ionic bond form a new chemical and is referred to as a _____. -Ionic bonds may be easily broken using _____. List 3 examples of ionic compounds: 1. 2. 3.	-Atoms held together by covalent bonds must _____ atoms in their valence shell. -Two atoms held together by a covalent bond form a new chemical and is referred to as a _____. -Covalent bonds may be broken by extreme heating under acidic conditions, or by using proteins that catalyze hydrolysis of the covalent bond. These proteins are called _____. List 3 examples covalent molecules: 1. 2. 3.

10. Below are listed two water molecules. Label ALL of the following in the diagram: hydrogen atom, oxygen atom, covalent bond, hydrogen bond, partial positive charge, partial negative charge.



11. Compared to covalent bonds, hydrogen bonds are _____ (weak/strong) bonds.

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12. Explain why is water known as the “universal solvent”?

13. Compare and contrast the adhesive and cohesive properties of water. How are these properties different? How are they similar?

Cohesive property of water	Adhesive property of water
Define the cohesive property of water.	Define the adhesive property of water.
Compare the adhesive and cohesive properties of water. What similarities do they share? • • •	

14. Explain why trees rely on the adhesive and cohesive properties of water.

Instructions: Define the following terms:

15. pH

16. Buffer

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17. Acidic solutions have a _____ amount of hydrogen cations and _____ pH, while basic solutions have a _____ amount of hydrogen cations and _____ pH. Conversely, acidic solutions have a _____ amount of hydroxyl anions and a _____ pH, while basic solutions have a _____ amount of hydroxyl anions and a _____ pH.

18. List examples of acidic, basic and neutral solutions.

Acidic	Neutral	Basic
Hydrochloric acid	Distilled water	Blood

Instructions: Define the following terms:

19. Monomer

20. Polymer

21. Contrast dehydration synthesis and hydrolysis by explaining how they are different.

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Instructions: Complete the table for the following biomolecules.

Carbohydrates	
What is the monomer of carbohydrates?	Monosaccharides
Draw the chemical structure of glucose.	
What is the polymer of carbohydrates?	P _____
List examples of monosaccharides.	• Glucose • F _____ • R _____
List two examples of disaccharides.	• _ u _ _ _ _ e • L _ c _ _ _ e
List examples of polysaccharides found in plants.	• Amylose • Amylopectin • C _ _ _ _ _ _ _
List examples of polysaccharides found in animals.	• G _ _ _ _ _ _ _ • C _ i _ _ _
What is the name of the bond formed between two monosaccharides?	• G _ _ c _ _ _ _ _ c b _ n _

Proteins	
What is the monomer of proteins?	Am _ _ _ a _ _ _ _
Draw the generic structure of an amino acid.	
What type of bond is formed between two amino acids?	P _ _ _ _ _ bond
How many essential amino acids are needed in the human diet?	
List examples of proteins lodged in the plasma membrane that assist with movement of substances in/out of the cell.	• Aquaporin proteins – channel protein allowing movement of water into/out of cells • Channel proteins – allow for channel-mediated facilitated diffusion of substances down their

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	concentration gradient • Carrier proteins – allow for carrier-mediated facilitated diffusion of substances down their concentration gradient
List an example of a structural protein found in cells.	• Tu _ _ _ _ n
List an example of a peptide hormone.	• In _ _ _ _ _
What is the name of a protein that catalyzes chemical reactions?	• En _ _ _ _