Bio 137 Worksheet 2 **Chemistry of Life** **Total Points: 100**

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1. What two particles are located in the nucleus of an atom? (2 pts). **The two particles that make up the nucleus of an atom are the neutrons and protons.**

2. Why is an atom neutrally charged? (2 pts) **Atoms are neutrally charged because atoms have the same amount of protons and electrons which means the atom has an equal but opposite charge.**

3. What compound is formed when two parts of hydrogen combines with one part of oxygen? (2 pts)
    When two parts of hydrogen combines with one part of oxygen H2O(Water) is formed.

4. What is an atomic number? (2 pts) **An atomic number is the number of protons inside the nucleus.**

    Calculate the following (Show your work where applicable):

5. How many atoms of hydrogen are present in one molecule of table sugar, $C_{12}H_{22}O_{11}$? (2pts)
    There are 1.3244 hydrogens presents in one molecule of table sugar

6. What is the atomic mass (mass number) of an atom of phosphorus (P) which contains 15 protons and 16 neutrons within its nucleus? *Show your work* (2pts)
    Atomic mass of phosphorus is 30.99, but when you round it up it's 31. 31-15= 16.

7. What is the atomic mass (mass number) of an atom of nickel (Ni) which contains 28 protons and 31 neutrons within its nucleus? *Show your work* (2 pts)
    The atomic mass number of nickel is 58.69, but when you round it up it's 59. 59-28=31.

8. What is the atomic mass (mass number) of an atom of sulfur (S) which contains 16 protons and 16 neutrons within its nucleus? *Show your work* (2 pts) **The atomic mass number of sulfur is 32.05, but because the number behind the decimal is over 5 it remains the same, which keeps it at 32. So 32-16=16.**

9. What is the number of protons in an atom with atomic number 12 and mass number 22? (2 pts) **The number of protons is 12.**

10. What is the number of electrons in an atom with atomic number 12 and mass number 22? (2 pts) **The number of electrons in the atom is 12**

11. The mass number for oxygen (O) is 16 and it has 8 protons. Calculate the number of neutrons. *(show your work*) (2 pts) **16-8= 8 neutrons**

12. The mass number for bromine (Br) is 80 and it has 35 protons. Calculate the number of neutrons. *(show your work)* (2 pts) **80-35=45 neutrons**

13. The mass number for magnesium (Mg) is 24 and it has 12 protons. Calculate the number of neutrons. *(show your work)* (2 pts) **24-12=12 neutrons**

Valance Electrons: the number of electrons in the outermost shell of an atom.

14. Refer to the periodic table and determine the number of valance electrons for each of the following elements: (4x 2 =8pts)
A. Calcium (Ca)**2**   B. Phosphorus (P)**5**

   C. Sodium (Na) **3** D. Chlorine (Cl) **1**

15. If an atom gains 3 electrons, what is the net charge? (2pts) **Negatively charged -3**
16. If an atom loses 2 electrons, what is the net charge? (2pts)   **Positively charged +2**
17. If an atom gains 1 electron, what is the net charge? (2pts) **Negatively Charged -1**
18. If an atom loses 1 electron, what is the net charge? (2 pts) **Positively Charged +1**
19. What is the charge of an atom? (2pts) **The charge of an atom is 0.**

20. Refer to the Periodic Table of Elements and determine the number of protons and electrons that comprise the following atoms and ions. (24 pts)

A. Protons in a sodium atom (Na) **11 Protons** Electrons in a sodium atom (Na) **11 Electrons**

B. Protons in a sodium ion (Na⁺) **11** Electrons in a sodium ion (Na⁺) **11**

C. Protons in a chlorine atom (Cl) **17** Electrons in a chlorine atom (Cl) **17**

D. Protons in a chloride ion (Cl⁻) **17** Electrons in a chloride ion (Cl⁻) **18**

E. Protons in a calcium atom (Ca)**20** Electrons in a calcium atom(Ca) **20**

F. Protons in a calcium ion (Ca⁺⁺) **20** Electrons in a calcium atom(Ca⁺⁺) **20**

21. In this equation: $2Cu_2O + C \rightarrow 4\ Cu + CO_2$
              (reactants)   (products)
A) How many of each atom are on the **left**? (6 pts)   Cu= <u>4</u>   O= <u>2</u> C=<u>2</u>
B) How many of each atoms are on the **right**?(6pts) Cu=<u>4</u>   O=<u>8</u> C=1
22. Match the chemical equation to its name. (5x2=10 pts)

==**D. Photosynthesis** $6CO_2 + 6H_2O$ ------> $C_6H_{12}O_6 + 6O_2$==

 A. Hydrolysis
                    Sunlight energy

 ==**B. Acid Base Reaction** $C_6H_{12}O_6 + 6O_2 \rightarrow 6H_2O + 6CO_2 +$ Energy==

 B. Acid-base Reaction

 ==E. **Oxidation Reduction** HCl + NaOH $\rightarrow$ NaCl   + H_2O==

C. Dehydration Synthesis

D. Photosynthesis

E. Oxidation Reduction

23. Why is water considered as a polar molecule? Explain. (10 pts)

Water is considered a polar molecule because of its shape. Being as though it bends it changes one of the molecules' sides, which makes each side different charges.