

## Chapter 2

### Basic Chemistry Prerequisite Review

Use your text, as well as any other useful resources to complete the following. When answering, get to the point and do not focus on the number of sentences. There is no minimum or maximum number. Words shown in **bold** are key words used by AP Central. This packet is due on the first day of class, have it completed and ready!!! See you in August, Mr. Kirkham

1. Fill in the following chart.

Element symbol	Element name	No. of protons	No. of electrons	No. of neutrons	No. of valence electrons	Is it stable? or unstable?
Al						
H						

2. How does the number of electrons in an atom's valence shell illustrate its stability?

3. **Define** and give an example of the following terms:

Matter

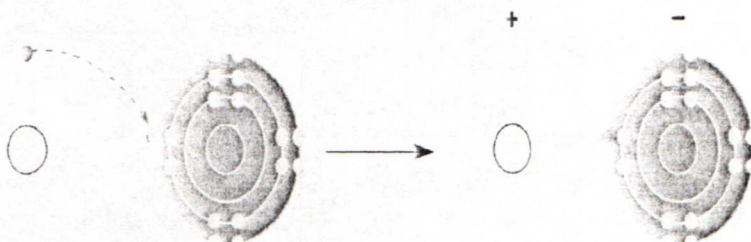
element

compound

4. How is electronegativity used to determine the type of bond that will form between atoms?

5. **Explain** the difference between a *nonpolar covalent bond* and a *polar covalent bond*.

6. Another bond type is the *ionic bond*. **Explain** what is happening in the figure below (identify using actual element names too):



7. **Define** *anion* and *cation*. In the preceding example, which is the anion?
8. Here is a list of the types of bonds and interactions. Define each.

Hydrogen bonds

Covalent Bonds

Ionic Bonds

Van Der Waals Interactions

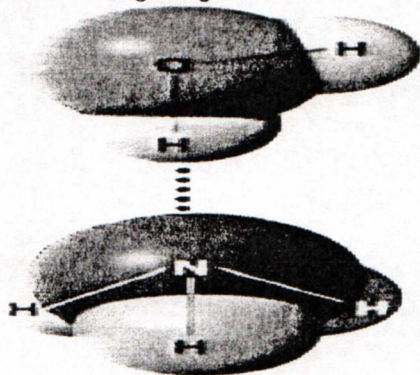
9. What is polarity?
10.  $O_2$  (Oxygen) and  $NH_3$  (Ammonia) are both small covalent molecules found in cells. Ammonia is extremely soluble in the aqueous environment of the cell, while oxygen is relatively insoluble. What is the basis for this difference in solubility between the two molecules?
11. **Explain** what would happen to a molecule of NaCl if it were placed in water (or similarly ice tea mix, coffee, or anything that dissolves in water). **Explain** in terms of polarity.
12. It is stated that cohesion and adhesion collectively is one characteristic of water that permits life on earth. Explain this. **Distinguish** between *cohesion* and *adhesion*.



13. Ice floats.... explain what this has to do with permitting life on earth.
14. How can freezing water cause rocks to split and the pavement to crack?
15. Study the water molecules at the left. On the central molecule, label oxygen (O) and hydrogen (H).



16. Why is water considered polar?
17. To the figure below, add + and - signs to indicate the charged regions of *each* molecule. Then, indicate the hydrogen bonds.
18. What is a *hydrogen bond*? Indicate where the hydrogen bond occurs in this figure.



### CH. 3: Water and the Fitness of the Environment

1. Review and **define** these terms:

solvent

solution

solute

2. Consider coffee to which you have added sugar. Which is the solvent? The solute?
3. You already know that some materials, such as olive oil, will not dissolve in water. In fact, oil will float on top of water. **Explain** why oil does not dissolve in water.
4. **Discuss** the properties of water and **identify** how each is important for life to exist.
5. Water is neutral with a pH of 7, has an equal number of  $H^+$  and  $OH^-$  ions. Now, define:  
Acid  
Base
6. Your BFF doesn't understand what all the fuss is about with acid rain? So, the water falling is a little acidic. After all the change in pH from 6.5 to 5.5 is only 1, which couldn't be harmful, right? **Explain** to your friend why what seems like a change of pH by 1 could be harmful.
7. Exercise will result in the production of  $CO_2$ , which will acidify the blood. **Explain** the buffering system that minimizes blood pH changes.