Chemistry: Matter and Change

Activity 8.5 Polarity in Covalent Bonds

Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Purpose: To see how polarity occurs in covalent bonding.

Background Information: Covalent bonding is when 2 or more atoms share electrons to completely fill their valence orbit. However, in covalent molecules, there can sometimes be uneven distribution of electrons between the atoms. It all depends on electronegativity. Electronegativity is the attraction of electrons to the atom, or the tendency to form negative ions. One example is fluorine, which has a high electronegativity. Other elements, however, have lower numbers, such as lithium. When the electronegativity between 2 atoms in a covalent bond is uneven, or the numbers don't form a difference of zero, the molecule will become slightly offset, thus forming a polar molecule.

Materials: 1 yellow dot, 1 blue dot, glue, pencil, felt-tip pen

Procedure:

1. Read all directions before beginning this activity.

2. Glue the yellow dot on top of the blue dot, exactly as I show you.

3. Label the blue dot with chemical symbol for chlorine. (as this is what the blue dot represents)

4. Label the yellow dot with the chemical symbol for hydrogen.

5. Go over it in felt-tip black.

6. Write the electronegativity for chlorine and hydrogen on the dots below the symbol. You can find this information in your books.

7. Clean up all materials on your desk. Make sure any glue has been wiped up and your desks are free of any marker marks.

Conclusion:

1. What is a covalent bond?

2. What holds the molecule together?

3. What is a molecule?

4. What are 2 types of covalent bonds?

5. What does it mean for a covalent molecule to be polar?

6. What is electronegativity?

7. What are 2 examples of elements with high electronegativity?

8. What happens to electronegativity as you move down a group?

9. Why might this be?

10. How is electronegativity related to ionization energy?

11. In hydrogen chloride, which element has the greater electronegativity?

12. In hydrogen chloride, which element has the least electronegativity?

13. What is the difference between fluorine's electronegativity and hydrogen's electronegativity?

Show math.

14. Determine whether the following molecules are polar or nonpolar.

a. Boron trifluoride (BF3) \_\_\_\_\_\_\_\_\_\_

b. Hydrogen peroxide (H2O2) \_\_\_\_\_\_\_\_\_\_

c. Water (H2O) \_\_\_\_\_\_\_\_\_\_

d. Carbon dioxide (CO2) \_\_\_\_\_\_\_\_\_\_

The actual diagram will be worth 5 points - 2 points for each atom and 1 point for correct electronegativity.