**Name: Date:**

**Using Molecular Models To Predict Polarity**

**Purpose:**

To build molecular models of covalent compounds to solidify understanding of Lewis Dot, to use molecular modeling to predict the shape of a molecule and to learn how to associate shape with polarity.

**Introduction:**

A molecule is a group of atoms help together by covalent bonds. One molecule represents the smallest unit of a substance that has all the properties of that substance. The atoms in a molecular substance are held together by covalent bonds.

Covalent bonds form when two atoms share electron. A single covalent bond share one pair, a double covalent share two pairs and a triple covalent bond shares three pairs. Covalent bonds may also be describes as polar and non-polar. When the two atoms exert the same attraction for electrons in the bond (electronegativity), then the bond is non-polar. When one of the atoms exerts a stronger attractive force (electronegativity) on the bonded electrons, it is called a polar covalent bond.

Molecules have different three-dimensional shapes that depend upon the number of atoms in the molecule and how they are bonded. A molecule may also be considered polar or non-polar. If the molecule has a symmetrical distribution of charge, it is non-polar. If the molecule has an asymmetrical distribution of charge, it is polar. By constructing a variety of three-dimensional models of molecular compounds, the polarity and shape of the molecule can be determined.

**Materials :**

Molecular Modeling Kit

**Safety :**

**Procedure:**

1. Obtain a molecular modeling kit and determine the color code for the various atoms you will work with.
2. Follow the bonding rules for connecting atoms
   1. Single bonds- one stick connecting (represents a bond with two electrons)
   2. Double bonds- two sticks connecting (each stick represents a bond with two electrons for a grand total of four electrons shared.
   3. Triple bonds- three sticks connecting (each stick represents a bond with two electrons for a grand total of six electrons shared.
3. Construct models for the substances listed in the data table. Make a few at a time and fill in the information. Have the models checked by your teacher before taking them apart.
4. Use these models to predict the molecular geometry of each molecule based on symmetry and polarity.
5. When finished, take apart the molecules and place all pieces back into the modeling kit.

**Questions:**

1. Define the following words
   1. Polar Covalent Bond
   2. Nonpolar Covalent Bond
   3. Polar Molecule
   4. Non-polar Molecule
   5. Electronegativity
   6. Symmetry
2. How do you determine if a covalent bond is polar or non-polar?
3. How do you determine if a molecule is polar or non-polar?
4. Which molecules were non-polar because all the bonds were non-polar? Write out names and formulas.
5. Which molecules had polar covalent bonds but were nonpolar because of symmetry? Write out names and formulas.
6. Which two molecular geometry shapes appear to only produce polar molecules?
7. Which molecular geometry shapes appear to produce both polar and non-polar molecules?
8. How does bonding affect molecular geoemetry?