

Name: _____ period: _____

3- Dimensional Models of Covalent Molecules ~ "Building a Molecule"

Background Information: A single covalent bond is formed when two atoms share a pair of electrons. Traditionally each atom provides one of the electrons to be shared in the bond. If the two atoms are alike the bond is a non-polar bond... if the two atoms are different (one atom exerting a greater attraction for electrons) it is a polar bond. Combinations of elements can also share more than one pair of electrons which explains the existence of double and triple covalent bonds such as those that exist in Oxygen (O_2) and Nitrogen (N_2). Any group of atoms held together by a covalent bond is called a molecule.

Although we represent molecules on paper as 2 dimensional drawings these molecules exist in a three dimensional plane. The building of these molecules will give you a better understanding of how these molecules bond as well as their shapes and polarity.

Purpose: Build three-dimensional models of covalent molecules to help predict their shapes and polarities.

Procedure:

1. Obtain a molecular model kit. Refer to the key at your lab station to familiarize yourself with the representations of the elements in the kit.
2. Construct models and complete the data charts on the following pages.

Conclusion Questions: complete these after you have completed your data charts

1. Which molecules were non-polar because ALL of the bonds were non-polar?

diatomics ~ O_2 , N_2 , H_2

2. Which molecules had polar covalent BONDS... but were non polar MOLECULES?

CO_2 , C_2H_2 , C_2H_4 , CCl_4

3. What piece of information helps you determine if a molecule is polar or non-polar?

Symmetry "SNAP" Symmetrical Nonpolar Asymmetrical polar

4. Which 2 shapes seem to ALWAYS produce polar molecules?

bent, pyramidal Covalent!

5. Name two types of substances that DO NOT contain molecules with covalent bonds.

Metallic + Ionic

Name:

period:

Formula of the molecule	Electron - Lewis dot diagram	Ball and Stick model	Electronegativity differences between bonds	Type of bond in molecule	shape of molecule	Polarity of molecule (SNAP)
CH_3Cl			$\text{C}-\text{H} = 0.4$ $\text{C}-\text{Cl} = 0.6$	P	tetrahedral	P
HCl			$\text{H}-\text{Cl} = 1$	P	linear	P
H_2S			$\text{H}-\text{S} = 0.4$	P	bent	P
NH_3			$\text{H}-\text{N} = 0.8$	P	pyramidal	P
CCl_4			$\text{C}-\text{Cl} = 0.6$	P	tetrahedral	NP
H_2			\emptyset	NP	linear	NP

Name: _____

period: _____

THREE-DIMENSIONAL MODELS OF COVALENT MOLECULES

Formula of the molecule	Electron - Lewis dot diagram	Ball and Stick model	Electronegativity differences between bonds	Type of bond in molecule	shape of molecule	Polarity of molecule (SNAP)
O ₂			0	NP	Linear	NP
N ₂			0	NP	Linear	NP
CO ₂			0.8	P	Linear	NP
C ₂ H ₂			C-C = 0 C-H = 0.4	C-C = NP C-H = P	Linear	NP
C ₂ H ₄			C-C = 0 C-H = 0.4	C-C = NP C-H = P	double linear bent	NP