

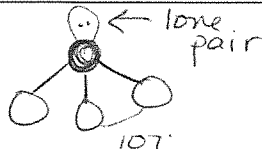
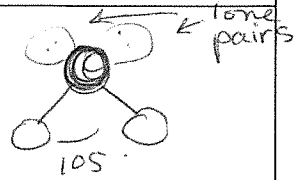

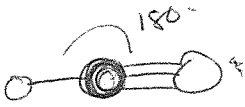
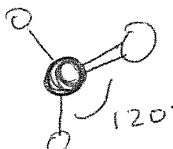


Molecule Building Simulation

Name Key

Period _____

- 1) Find the website for pHET simulations.
- 2) Open the program entitled "Molecule Shapes" under Chemistry Programs.
- 3) Build the Lewis structure of the following molecules before building them on the computer.
- 4) Build the molecules on the simulation (make sure to include lone pairs of electrons on the central atom)
- 5) Check the boxes for "Molecule Geometry" and "Show bond angles" and fill in the following chart. Give a brief sketch of what the model looks like in the final box.

Molecule	Lewis Drawing	Bond ^o	Shape Name	3-D Sketch
H ₂	$H-H$	180	linear	
CH ₄	$\begin{array}{c} H \\ \\ H-C-H \\ \\ H \end{array}$	109.5	tetrahedral	
NH ₃	$\begin{array}{c} \cdot\cdot \\ \\ H-N-H \\ \\ H \end{array}$	107	trigonal pyramidal	
H ₂ O	$\begin{array}{c} \cdot\cdot \\ \\ H-O-H \\ \\ \cdot\cdot \end{array}$	105	bent	
CO ₂	$\cdot\cdot O=C=O \cdot\cdot$	180	linear	 notice we don't consider lone pairs of peripheral
HCN	$H-C \equiv N \cdot\cdot$	180	linear	
CH ₂ O	$\begin{array}{c} H \\ \\ C=O \\ \\ H \end{array}$	120	trigonal planar	

Directions Continued:

- 1) Next, open the simulation titled "Molecule Polarity."
- 2) Click on the tab "Real Molecules."
- 3) Click the boxes under "Bond Dipoles" to see if the compounds you built had polar bonds (a gray arrow will show up if yes)
- 4) Click on the box under "Molecular Dipole" to see if the compound you built is a polarity molecule (a red arrow will show up if yes)
- 5) Make a prediction as to what the Intermolecular force will be for that molecule.

Molecule	Bond Polarities (show work for solving and for each type of bond)	Molecule Polarity (overall)
H ₂	H-H: 2.1 - 2.1 = 0	nonpolar
CH ₄	C-H: 2.5 - 2.1 = 0.4	nonpolar
NH ₃	N-H: 3.0 - 2.1 = 1.1 polar	polar!
H ₂ O	H-O: 3.5 - 2.1 = 1.4 polar	polar!
CO ₂	O-O: 1.0 (polar)	nonpolar - (cancels out)
HCN	C-H: 0.4 nonpolar C-N: 0.5 polar	polar!
CH ₂ O	C-H: 0.4 nonpolar C-O: 2.5 - 3.5 = 1.0 polar	polar!

Predict the following shapes and angles (surrounding the central atoms) for the following. Determine what type of polarities are present.

