Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Molecule Building Simulation**

1. Access the following website and download the simulation titled, **“Molecule Shapes”**.
   1. <https://phet.colorado.edu/en/simulation/molecule-shapes>
2. Once downloaded, click on the **“Model”** simulation.
3. Draw the Lewis structure of the following molecules **BEFORE** building on the computer simulation.
4. Build the molecules on the simulation - be sure to show 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. Provide a 3-D sketch of what the model looks like in the final box.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Molecule** | **Lewis Structure** | **Bond °** | **Shape *(MG)* Name** | **VSEPR Term** | **3-D Drawing** |
| **H2** |  |  |  |  |  |
| **CH4** |  |  |  |  |  |
| **NH3** |  |  |  |  |  |
| **H2O** |  |  |  |  |  |
| **CO2** |  |  |  |  |  |
| **HCN** |  |  |  |  |  |
| **CH2O** |  |  |  |  |  |

1. At the bottom of the simulation, click on **“Real Molecules”**.
2. Look at the following molecules on the simulation. These compounds break the octet rule by either expanding or reducing their octet. Sketch (3-D) the compound and explain how the compound has broken the octet rule.

|  |  |  |
| --- | --- | --- |
| **Compound** | **Sketch (3-D)** | **Explain how the Octet Rule is broken** |
| **PCl5** |  |  |
| **BF3** |  |  |
| **SF6** |  |  |

1. Next, access and download the simulation titled **“Molecule Polarity”**.
   1. <https://phet.colorado.edu/en/simulation/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 polar molecule (a **RED/ORANGE** arrow will show up if yes).
5. In the table below, write **YES** if polar bonds exist or write **NO** if the molecule is non-polar.

|  |  |  |
| --- | --- | --- |
| **Molecule** | **Bond Polarity *(Polar?)*** | **Molecular Polarity *(Polar?)*** |
| **H2** |  |  |
| **CH4** |  |  |
| **NH3** |  |  |
| **H2O** |  |  |
| **CO2** |  |  |
| **HCN** |  |  |
| **CH2O** |  |  |