**Lesson Plan**

**Teacher: Holland Sloan**

**Subject: Chemistry**

**Lesson: Lewis Dot Structures, polarities, molecular shapes**

**Standards:** CHEM1.PS1.14. Use Lewis dot structures and electronegativity differences to predict the polarities of simple molecules (linear, bent, trigonal planar, trigonal pyramidal, tetrahedral). Construct an argument to explain how electronegativity affects the polarity of basic chemical molecules.

SEP: Developing and Using Models

CCC: Structure and Function

DCI: Matter and Its interactions: Structure and properties of matter

**Objectives:** Students will develop and use models in order to predict the polarity of simple molecules highlighting the relationship between molecular structure and the polarities of compounds.

**Materials and Resources:** The students be working hands-on with a building molecules activity. Students will need Internet to watch videos. Handout will be given by instructor.

**Student Handout:**

VESPR Theory attachment **H Brewer**

<https://docs.google.com/document/d/1Bdx8H3mH7BZIBE-YFeTqx-W7Nrlj9WVTUA5dBPI2aXo/edit>

**Instructional Procedure:**

Beginning:

To begin the lesson, a demonstration where acetone dissolves a Styrofoam cup provides an opportunity for students to discuss the relationship between molecular structure and physical and chemical properties in a compound. Draw the Lewis structures for acetone and water on the board. Have students discuss with partners two similarities and two differences in the molecules. Have students share these observations. Use two pie pans or glass pans and pour 100 mL of distilled water into one pan and 100 mL of acetone into the other. Have students make observations about the two liquids before completing the demonstration. Place a Styrofoam cup in the pan with acetone. Students will make observations that the acetone dissolves the Styrofoam. (This is because the acetone contains nonpolar segments, and therefore, it dissolves the nonpolar monomer of the Styrofoam). Then, repeat the experiment using the distilled water using a second Styrofoam cup. (Nothing happens this time because water is a polar molecule, while the Styrofoam is nonpolar). Instructor will then explain the difference in polar and nonpolar molecules and the effect of molecular shape and electronegativity differences on the polarity of molecules.

Middle:

Use the following links for students to watch videos over the VESPR Theory.

<https://www.youtube.com/watch?time_continue=5&v=nxebQZUVvTg>

<https://www.youtube.com/watch?v=cdo6FtSU_k8>

<https://www.youtube.com/watch?time_continue=2&v=Qcy-TjJ10xk>

Students will watch the following videos to fill out the VESPR Theory model sheet. Students will use these to help dissect the model activity.

End/Closure:

Teacher will distribute copies of student activity and have students choose randomly a molecule. The students will be in pairs, one student will have a polar molecule and the other will have a nonpolar molecule. Students will complete the activity by drawing the Lewis structure of their compound, identifying the elements within the compound, the shape of compound, and the electronegativity. Students will then create a model of their compound using a molecule model kit. Students will then take this information and compare both models between the groups. Together the partners will determine if the compounds are polar or nonpolar based on the information collected.

**Grouping:** Students will be in groups of two based upon heterogeneous mixtures.

**Exit Ticket:** Determine which of the following are polar or nonpolar:

a. Carbon Tetrafluoride (CF4)

b. water (H2O)

c. Sulfur Dioxide (SO2)

d. Phosphorus Pentachloride (PCl5)

e. Hydrogen Sulfide (H2S)