**Lesson Plans for October 4th – October 14th**

**AP Chemistry 2013-2014**

**Ms. Diane Paskowski**

***Molecular Geometry***

**Massachusetts Science Curriculum Frameworks**

4.1 Explain how atoms combine to form compounds through both ionic and covalent bonding. Predict chemical formulas based on the number of valence electrons.

4.2 Draw Lewis dot structures for simple molecules and ionic compounds.

4.3 Use electronegativity to explain the difference between polar and nonpolar covalent bonds.

4.4 Use valence-shell electron-pair repulsion theory (VSEPR) to predict the molecular geometry (linear, trigonal planar, and tetrahedral) of simple molecules.

**College Board AP Chemistry Curriculum Standards**

Big Idea 1: The chemical elements are fundamental building materials of matter, and all matter can be understood in terms of arrangements of atoms. These atoms retain their identity in chemical reactions.

* **Enduring understanding 1.A:** All matter is made of atoms. There are a limited number of types of atoms; these are the elements.
  + **Essential knowledge 1.A.1:** Molecules are composed of specific combinations of atoms; different molecules are composed of combinations of different elements and of combinations of the same elements in differing amounts and proportions.

Big Idea 2: Chemical and physical properties of materials can be explained by the structure and the arrangement of atoms, ions, or molecules and the forces between them.

* **Enduring understanding 2.C:** The strong electrostatic forces of attraction holding atoms together in a unit are called chemical bonds.
  + **Essential knowledge 2.C.1:** In covalent bonding, electrons are shared between the nuclei of two atoms to form a molecule or polyatomic ion. Electronegativity differences between the two atoms account for the distribution of the shared electrons and the polarity of the bond.
  + **Essential knowledge 2.C.2:** Ionic bonding results from the net attraction between oppositely charged ions, closely packed together in a crystal lattice.
  + **Essential knowledge 2.C.3:** Metallic bonding describes an array of positively charged metal cores surrounded by a sea of mobile valence electrons.
  + **Essential knowledge 2.C.4:** The localized electron bonding model describes and predicts molecular geometry using Lewis diagrams and the VSEPR model.
* **Enduring understanding 2.D:** The type of bonding in the solid state can be deduced from the properties of the solid state.
  + **Essential knowledge 2.D.1:** Ionic solids have high melting points, are brittle, and conduct electricity only when molten or in solution.
  + **Essential knowledge 2.D.2:** Metallic solids are good conductors of heat and electricity, have a wide range of melting points, and are shiny, malleable, ductile, and readily alloyed.
  + **Essential knowledge 2.D.3:** Covalent network solids generally have extremely high melting points, are hard, and are thermal insulators. Some conduct electricity.
  + **Essential knowledge 2.D.4:** Molecular solids with low molecular weight usually have low melting points and are not expected to conduct electricity as solids, in solution, or when molten.

**Lesson Plans**

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**Friday, October 4th**

**G day**

Period 2

Lecture/discussion/modeling: Create a table relating number of electron pairs on the central atom of the molecule to the shape of the molecule. How to determine polarity of the molecule using electronegativity differences between atoms in the bonds and the shape of the molecule. VSEPR – Valence Shell Electron Pair Repulsion model of shape. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Monday, October 7th**

**H day**

Period 3

Lecture/discussion/modeling: Drawing diagrams and determining the shape and polarity using VSEPR

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**Tuesday, October 8th**

**A day**

Periods 2 and 3

Lecture/discussion/practice: Using hybridization of atomic orbitals to explain shape of the molecules – sigma and pi bonds. Labeling molecular diagrams. Models of hybrid orbitals. Online simulations.

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**Wednesday, October 9th**

**B day**

Periods 2 and 3

Lecture/Discussion/activity: Building and labeling models. Bond energies and bond lengths.

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**Thursday, October 10th**

**C day**

Period 2

Lecture/Discussion: Complete activity from Wednesday if necessary. Do practice problems. Determining the energy of formation from bond energies.

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**Friday, October 11th**

**D Day**

Period 3

Assessment: Quiz on covalent molecules: Lewis structures, polarity, hybrization, and shape. Labeling sigma and pi bonds, contrasting Interpreting 2D diagrams.

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**Tuesday, October 14th**

**E Day**

Period 2 and 3

Assessment: Interpreting 3D models. Multiple questions for each model covering all the information.

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