Unit 4 (Ch 8-9) Student Led Lessons Project

Test/Project; Lab Grade; Quiz Grade

To Turn in as a Group: Formal Lesson Plan Document (see attachment)
Lesson Notes Presentation Document (will be POSTED)
Assignment Documents (inclass/HW) *Must have HW.
10 AP-style test questions submitted to me.

Turn in Individually: Group Evaluation Form

* You have complete control over all aspects of your lesson.

* Be creative, professional, and serious... Have Fun!
  ↳ Be prepared to answer student questions (learn the material)

Wed, 12/9 - Make Outline of topics, Discuss topics w/ group, Locate resources
Learn about topic & discuss as a group
Work on Note Presentation; Put together Activities & HW

Thur 12/10 - • I will provide AP Learning objectives for each topic to allow you to check whether you have included what is needed.

Fri 12/11 - Approval/Questions on topic/plan/Questions

Schedule of Lessons →

Lesson Schedule

Mon 12/14 - Overview of Bonds: Coulomb's Law, Electronegativity, Polarity

Tues 12/15 - Ionic Bonding

Wed 12/16 - Covalent Bonding

Thur 12/17 - Lewis Dot: Octet Rule

Mon 1/4 - Resonance: Formal Charge

Tues 1/5 - VSEPR

Wed 1/6 - Hybridization of Orbitals

Fri 1/8 - Unit 4b Test (Questions from You) (Not Test Grade)

FORMAL LESSON PLAN ASSIGNMENT

I. **Identify this document** with your full name, date of lesson,

II. **Activity Title**: indicate the topic to be taught

IV. **Learner Objectives or Learning Targets**: Explain what the students should know and be able to do upon completion of the lesson. Clearly identify the knowledge and skills that they will acquire.

V. **Resources**: Research sources that extend your depth of understanding of the topic to be taught, enhance your lesson and extend the information in the teacher's manual. This may include teacher resources like; on line teacher websites and instructional materials like Pinterest, the publisher's website for the text, other teacher manuals, you tube videos, videos, journal articles; and school personnel. List all resources used to create your lesson.

VI. **Materials needed for this lesson:** Using the chart format shown below, list materials needed for students and teacher. Be sure they are readily available for the lesson. *if you need copies made, let me know,

Materials Needed by the Teacher	Materials Needed by the students
SmartBoard	Text book called…..
timer	Colored pencils

VII. **Teaching the Lesson/Instructional Methods:** List activities you will use to deliver instruction. . You should create **windows of time** for each component. Example:

a. **Engagement /Anticipatory Set/Motivation**: How will you will "hook" or motivate the class? What will you use to capture students' attention and access their prior knowledge? State the objective either here or in the next section. Tell students how this lesson will help them either in their lives or in other curriculum. What will be said to introduce the activity?

b. **Explanation / Content Introduction**: How will you introduce and teach the concept, process, or skill to fulfill the Objective(s)/Learning Target(s)?

c. **Elaboration / Guided Practice**: Students need to practice what they have learned under the direct supervision of the teacher. What activities or discussions will be used to enable students to apply, extend or elaborate upon targeted objectives within new situations?

d. **Exploration / Activity**: Identify activities you will use to foster students' exploration, create concrete experiences, and engage students in hands-on learning. If there is a project, worksheet, group work, etc. to do, show or model for them what you expect.

College Board Learning Objectives

LEARNING TARGET	*I can....*

- Draw the electron–dot representation of valence electrons (Lewis structure) for any atom.
- Explain and apply the octet rule.
- Predict the chemical formula for any pair of elements that form an ionic compound.
- Define the term *lattice energy*.
- State the classifications of elements that typically form ionic bonds and determine whether or not ionic bonds are present in a particular compound of known elemental composition.
- Define the term *covalent bond*.
- Define the term *electronegativity* and explain electronegativity differences among elements within periods and groups in the periodic table.
- Identify polar bonds in covalent molecules and describe how electronegativity differences between bound atoms influence bond polarity.
- Draw the Lewis structures for a covalent molecule, given linkages of constituent atoms.
- Identify covalent compounds that do not conform to the octet rule.
- Draw resonance structures for covalent molecules that cannot be represented by a single Lewis structure.
- Define the term *bond dissociation energy* and explain its relationship to the strength of a chemical bond.
- Calculate the ΔH° for a reaction, given all requisite bond energies.
- Distinguish between bonding pairs and nonbonding pairs of electrons in the molecules of covalent compound.
- Differentiate between the electron–pair geometry and the molecular geometry for any simple covalent molecule.
- Apply the molecular geometry using valence–shell electron pair repulsion (VSEPR) model to predict molecular geometry.
- Describe molecular geometries that result from bond angles in a given covalent molecule.
- Describe the effect of nonbonding electrons on bond angle in a given series of covalent molecules.
- Identify the molecular geometry about any non-terminal atom in any molecule lacking a single central atom.
- Define the term *polar* and *nonpolar* as it is used in covalent molecules.
- Define the term *dipole moment* and predict its presence or absence in a covalent molecule.
- Define the term *overlap* and diagram the orbital overlap of two *s* orbitals, of an *s* and a *p* orbital, and of two *p* orbitals.
- Distinguish between sigma and a pi chemical bonds.
- Describe how a set of hybrid orbitals differ from a collection of atomic orbitals.
- Show how the geometry of a covalent molecule to a particular set of hybrid orbitals on a central atom.
- Identify the atomic orbitals used to bind atoms in covalent molecules containing multiple bonds.
- Calculate formal charges on atoms in a given compound
- Use the argument of formal charges to determine the most stable Lewis structure

ESSENTIAL KNOWLEDGE

- Electronegativity values for the representative elements increase going from left to right across a period and decrease going down a group. These trends can be understood qualitatively through the electronic structure of the atoms, the shell model, and Coulomb's law.

- Valence electrons shared between atoms of similar electronegativity constitute a nonpolar covalent bond. For example, bonds between carbon and hydrogen are effectively nonpolar even though carbon is slightly more electronegative than hydrogen.

- Valence electrons shared between atoms of unequal electronegativity constitute a polar covalent bond.

a.the atom with a higher electronegativity will develop a partial negative charge relative to the other atom in the bond.
b. In single bonds, greater differences in electronegativity lead to greater bond dipoles.
c. All polar bonds have some ionic character, and the difference between ionic and covalent bonding is not distinct but rather a continuum.

- The difference in electronegativity is not the only factor determining if a bond should be designated as ionic or covalent. Generally, bonds between a metal and a nonmetal are ionic, and bonds between two nonmetals are covalent. Examination of the properties of a compound is the best way to characterize the type of bonding.

- In a metallic solid, the valence electrons from the metal atoms are considered to be delocalized and not associated with any individual atom.

- A graph of potential energy versus the distance between atoms is a useful representation for describing the interactions between atoms. Such graphs illustrate both the equilibrium bond length(the separation between atoms at which the potential energy is lowest) and the bond energy (the energy required to separate the atoms).

- In a covalent bond, the bond length is influenced by both size of the atom's core and the bond order (single, double, triple). Bonds with a higher order are shorter and have larger bond energies.

- Coulomb's law can be used to understand the strength of interactions between cations and anions.

a. Because the interaction strength is proportional to the charge on each ion, larger charges lead to stronger interactions.
b. Because the interaction strength increases as the distance between the centers of the ions (nuclei) decreases, smaller ions lead to stronger interactions.

- The cations and anions in an ionic crystal are arrangedin a systematic, periodic 3-D array that maximizes the attractive forcesamong cations and anions while minimizing repulsive forces.

- Metallic bonding can be represented as an array of positive metal ions surrounded by delocalized valence electrons (sea of electrons).

- Interstitial alloys form between atoms of different radii, where the smaller atoms fill the interstitial spaces between the larger atoms(steel with carbon in the spaces)

- Substitutional alloys form between atoms of comparable radius, where one atom substitutes for the other in the lattice. (brass where zinc substitutes for copper)

- Lewis diagrams can be constructed according to an established set of principles.

- In cases where more than one equivalent Lewis structure can be constructed, resonance must be included as a refinement to the Lewis structure. In many such cases, this refinement is needed to provide qualitatively accurate predictions of molecular structure and properties.

- The octet rule and formal charge can be used as criteria for determining which of several Lewis diagrams provides the best model for predicting molecular structure and properties.

- As with any model, there are limitations to the use of the Lewis structure model, particularly in cases with an odd number of valence electrons.

- VSEPR theory uses the Coulombic repulsion between electrons as a basis for predicting the arrangement of electron pairs around a central atom.

- Both Lewis diagrams and VSEPR theory must be used for predicting electronic and structural properties of many covalently bonded molecules and polyatomic ions, including the following:molecular geometry, bond angles, relative bond energies based on bond order, relative bond lengths (multiple bonds effects atomic radius), presence of a dipole moment, and hybridization of valence orbitals of the molecule.

- The terms "hybridization" and "hybrid atomic orbital" are used to describe the arrangement of electrons around a central atom. When the central atom is sp hybridized, its ideal bond angle is 180°; for sp2 hybridized atoms the bond angles are 120°; and for sp3 hybridized atoms the bond angles are 109.5°.

- Bond formation is associated with overlap between atomic orbitals. In multiple bonds, such overlap leads to the formation of both sigma and pi bonds. The overlap is stronger in sigma than pi bonds, which is reflected in sigma bonds having greater bond energy than pi bonds. The presence of a pi bond also prevents the rotation of the bond and leads to structural isomers.