Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Science	Course:	Chemistry	Unit 3 Title:	Bonding & Nomenclature	Grade Level(s):	10th
Assessed Trimester:	Trimester A	Pacing:	10-15 Days	Date Created:	6/7/2012	Last Revision Date:	6/25/2014

Course Understandings: *Students will understand that:*

- Problems can be solved and knowledge gained in a systematic way: solutions to one problem can create new questions and problems.
- Chemistry is recognized as significant in its application to other disciplines and the world.
- Ideas are expressed symbolically, numerically, and graphically.
- Behavior and properties of materials are organized, classified, and predicted utilizing periodic trends.
- Mathematical relationships are interpreted and manipulated to model the real world.
- The basic building blocks combine and recombine in a variety of ways to make all matter from the simple to the complex.
- The laws of chemistry predict outcomes that impact and apply to daily life.

DESIRED RESULTS (Stage 1) - WHAT WE WANT STUDENT TO KNOW AND BE ABLE TO DO?

Established Goals

- **Standard:** Matter
  Chemical and physical properties of matter result from the ability of atoms to form bonds.
  9C.2.1.2.1: Explain how elements combine to form compounds through ionic and covalent bonding.
  9.2.1.2.1: Describe the role of valence electrons in the formation of chemical bonds.
  9C.2.1.2.3: Use IUPAC (International Union of Pure and Applied Chemistry) nomenclature to write chemical formulas and name molecular and ionic compounds, including those that contain polyatomic ions.

- **Literacy Standards:**
  9.13.8.8: Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

Transfer

Students will be able to independently use their learning to: (product, high order reasoning)

- Identify chemicals in nature and common household products and understand their reactivities.
- Learn how to use a systematic method.

Meaning

Unit Understanding(s):	Essential Question(s):
Students will understand that: • A bond is a force that holds groups of two or more atoms together and makes them act as a unit. The force is between valence electrons which can be transferred or shared. How the electrons are arranged in the atom and then in the compound determine the characteristics and chemical behavior of the compound. • Be able to name ionic compounds, including those with polyatomic ions, and molecular compounds according to the IUPAC system.	**Students will keep considering:** • What is a chemical bond? • How are chemical compounds named? • How are chemical formulas written?

Acquisition

Knowledge - Students will:

- Know that ionic bonds involve the transfer of electrons between metals and nonmetals. (H) 9C.2.1.2.1
- Know that covalent bonds involve the sharing of electrons among two or more nonmetals. (H) 9C.2.1.2.1
- Recognize a polyatomic ion (M) 9C.2.1.2.3
- Identify polar and non-polar covalent bonds. (L) 9C.2.1.2.1

Reasoning - Students will:

- Explain why the stability of an atom increases when it transfers electrons or shares electrons with another atom in order to complete the valence energy level. (M) 9C.2.1.2.1
- Differentiate between ionic and molecular (covalent) compounds. (H) 9C.2.1.2.1
- Relate the physical and chemical properties of water to its chemical composition and structure. 9C.2.1.2.7 (L)

Skills - Students will:

- Predict the chemical formula and name simple (binary) ionic compounds. (H) 9C.2.1.2.3
- Predict the chemical formula and name ionic compounds containing polyatomic ions. (M) 9C.2.1.2.3
- Recognize the formulas for common acids such as hydrochloric acid, sulfuric acid, nitric acid, phosphoric acid, and acetic acid. (L) 9C.2.1.2.3
- Predict the chemical formula and name binary molecular compounds using prefixes. (H) 9C.2.1.2.3
- Use Lewis structures to draw molecular structures. (M)

Common Misunderstandings

- Compounds and molecules are the same thing.
- Atoms and molecules are the same.
- Use of subscripts in polyatomic ions and compounds
- Diatomic elements are always paired up in compounds as well as when they are by themselves ($H_2 + O_2 \rightarrow H_2O_2$)
- Ions in an ionic compound remain together when dissolved in water
- Many students think solvents must be liquids.
- Students believe there is something between atoms of compounds rather than a force of attraction
- Bonding must be either 100% ionic or covalent
- Covalent bonds must be weak since covalent molecules have relatively low melting points

Essential new vocabulary

- Chemical bond
- Ionic bond
- Covalent bond
- Ion
- Molecular compound
- Ionic compound
- Lewis structure/electron dot diagram
- Molecule
- Formula unit
- Cation
- Anion
- Subscript
- Single bond
- Double bond
- Triple bond
- Polar
- Non-Polar