Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Science	Course:	Chemistry I (H)	Unit 5 Title:	Stoichiometry	Grade Level(s):	10th
Assessed Trimester:	Trimester B	Pacing:	1 Trimester (Tri B)	Date Created:		Last Revision Date:	6/17/2013

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.2.1.3.4: Balance chemical equations by applying the laws of conservation of mass and constant composition.
  9.2.1.2.2: Explain how the rearrangement of atoms in a chemical reaction illustrates the Law of Conservation of Mass.
  9C.2.1.3.5: Use the law of conservation of mass to describe and calculate relationships in a chemical reaction, including molarity, mole/mass relationships, mass/volume relations, limiting reactants and percent yield.

- **ACT Standards:**
  ACT-S-11: Select a simple hypothesis, prediction, or conclusion that is supported by two or more data presentations or models.

Transfer

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

- Generate the percent yield of a product produced from a chemical reaction in a lab setting. [9C.2.1.3.5]

Meaning

Unit Understanding(s):	Essential Question(s):
Students will understand that: • The law of conservation of matter allows chemists to predict the masses of products based on the mole ratios in a chemical equation. [9C.2.1.3.4 & 9.2.1.2.2]	**Students will keep considering:** • How does the law of conservation of mass enable calculations of amounts of products and reactants in a chemical change? [9C.2.1.3.4 & 9.2.1.2.2] • How do you balance chemical reactions? [9C.2.1.3.4 & 9.2.1.2.2] • Describe a thorough understanding of molar mass and mole relationships to solve stoichiometric problems including limiting reactants and determining percent yields. [9C.2.1.3.5]

Acquisition

Knowledge - Students will:	Skills - Students will:
• Subscripts are molar quantities of elements within a formula. [9C.2.1.3.4 & 9.2.1.2.2]	• Balance a chemical equation. [9C.2.1.3.4 & 9.2.1.2.2]

● In a chemical reaction, reactants are written before the reaction arrow and products are written after the reaction arrow. [9C.2.1.3.4 & 9.2.1.2.2] ● The limiting reactant dictates the quantity of product formed in a chemical reaction. [9C.2.1.3.5] **Reasoning - Students will:** ● Distinguish between a balanced and unbalanced equation. [9C.2.1.3.4 & 9.2.1.2.2] ● Interpret a balanced chemical equation to form a mole ratio. [9C.2.1.3.4 & 9.2.1.2.2]	● Calculate the theoretical yield from a balanced chemical equation using dimensional analysis. [9C.2.1.3.5] ● Determine the limiting reactant from stoichiometric calculations. [9C.2.1.3.5]

Common Misunderstandings	**Essential new vocabulary**
● Lack of understanding that atoms are rearranged during a chemical change, and not destroyed or created. ● Lack of understanding of the relationship between a chemical formula and a molar quantity. ● Use of mole ratios, subscripts and coefficients in stoichiometric calculations. ● Many students do not view chemical changes as interactions. They do not understand that substances can be formed by the recombination of atoms in the original substances.	● Percent composition ● Empirical formulas Molecular formulas ● Law of conservation of mass/matter/charge ● Law of constant composition ● Stoichiometry ● Theoretical yield ● Limiting reactant. ● Experimental/Actual Yield ● Percent Yield ● Mole Ratio ● Balanced Chemical Equation