

Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Science	Course:	Chemistry I	Unit 8 Title:	Stoichiometry	Grade Level(s):	10th
Assessed Trimester:	Trimester B	Pacing:	10 - 15 Days	Date Created:	6/7/2012	Last Revision Date:	6/26/2014

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:**
9C.2.1.3.4: Balance chemical equations by applying the laws of conservation of mass and constant composition.
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
9C.2.1.3.5: Use the law of conservation of mass to describe and calculate relationships in a chemical reaction, including molarity (low), mole/mass relationships, mass/volume relations (low), limiting reactants and percent yield.
- **Standard:** Matter
Chemical reactions describe a chemical change in which one or more reactants are transformed into one or more products.
9C.2.1.3.4: Balance chemical equations by applying the laws of conservation of mass and constant composition.
ACT-S-11: Select a simple hypothesis, prediction, or conclusion that is supported by two or more data presentations or models.
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.
- **Literacy Standards:**
9.14.2.2: Write informative/explanatory texts, as they apply to each discipline and reporting format, including the narration of historical events, of scientific procedures/ experiments, or description of technical processes.
 - a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
 - b. Develop the topic with well-chosen, relevant, credible and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic.
 - c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.
 - d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.
 - e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

Transfer	
Students will be able to independently use their learning to: (product, high order reasoning) Design and execute a procedure to produce a prescribed quantity of a chemical or other substance and determine quality of yield. (How much flower will I need to make 10 cookies instead of 12? Did it actually make 10 cookies?)	
Meaning	
Unit Understanding(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.	Essential Question(s): Students will keep considering: - How does the law of conservation of mass enable calculations of amounts of products and reactants in a chemical change? - How are chemical equations used by chemists to explain chemical reactions?
Acquisition	
Knowledge - Students will: - Know that matter is conserved in a chemical change. (H) 9C.2.1.3.4 - Know that atoms always combine in whole number ratios. (H) 9C.2.1.3.4 - Know that a limiting reactant is the reactant that will limit the amount of product produced. (M) 9C.2.1.3.5 - Know how to calculate a percent yield. (M) 9C.2.1.3.5 Reasoning - Students will: - Use the mass of products and reactants to demonstrate that mass is conserved in a chemical change. (H) 9C.2.1.3.4 - Use mole ratios to describe the relationship between coefficients and moles in a chemical reaction. (H) 9C.2.1.3.5	Skills - Students will: - Use coefficients to balance chemical equations. (H) 9C.2.1.3.4 - Use models to demonstrate the conservation of atoms in a chemical reaction. (M) 9C.2.1.3.4 - Generate experimental data to demonstrate that mass is conserved in a chemical change. (M) 9C.2.1.3.5 - Use dimensional analysis to calculate amount of reactants necessary and products produced in terms of moles, grams (M) and particles (L). 9C.2.1.3.5 - Calculate the theoretical yield of a product given mole and mass data. (M) 9C.2.1.3.5 - Calculate percent yield of product. (M) 9C.2.1.3.5 - Calculate gas stoichiometry (L). 9C.2.1.3.5
Common Misunderstandings - 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	Essential new vocabulary - Coefficient - Subscript - Product - Reactant - Stoichiometry - Mole ratio - Excess reactant - Theoretical yield - Actual yield - Limiting reactant (reagent) - Percent yield