Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Science	Course:	Chemistry I (H)	Unit 6 Title:	Chemical Reactions	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.2.1.2.6:** Describe the dynamic process by which solutes dissolve in solvents and calculate concentrations, including percent concentration, molarity and parts per million.
  - **9.2.1.2.3:** Describe a chemical reaction using words and symbolic equations.
  - **9.2.1.2.4:** Relate exothermic and endothermic reactions to temperature and energy changes.
  - **9C.2.1.3.1:** Classify chemical reactions as double replacement, single replacement, synthesis, decomposition or combustion.
  - **9C.2.1.3.2:** Use solubility and activity of ions to determine whether a double replacement or single replacement reaction will occur.
  - **9C.2.1.3.3:** Relate the properties of acids and bases to the ions they contain and predict the products of an acid-base reaction.
  - **9C.2.1.2.7:** Explain the role of solubility of solids, liquids and gases in natural and designed systems.

Transfer

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

- Carry out an acid-base titration to find the molarity of an unknown solution. [9C.2.1.2.6 & 9.2.1.2.3 & 9C.2.1.3.3]

Meaning

Unit Understanding(s):	Essential Question(s):
Students will understand that: ● Chemical reactions show the rearrangement of atoms forming new substances. [9.2.1.2.3] ● Strong electrolytes dissociate in solution to form cations and anions. [9C.2.1.2.6]	**Students will keep considering:** ● What happens when chemicals dissolve? [9C.2.1.2.6] ● How are new substances formed in a chemical reaction? [9.2.1.2.3] ● Distinguish between different types of chemical reactions [9C.2.1.3.1] ● How do you predict the products of a chemical reaction? [9.2.1.2.3 & 9C.2.1.3.3] ● How do you calculate the concentration of solutions? [9C.2.1.2.6]

Acquisition

Knowledge - Students will:	Reasoning - Students will:
● Explain how solutes dissolve in polar and nonpolar solvents. [9C.2.1.2.6]	● Predict the number of moles for a solution if given molarity and volume. [9C.2.1.2.6]

- Define double replacement (precipitation or acid/base), single replacement (redox), synthesis (redox), decomposition (redox), and combustion (redox). [9C.2.1.3.1]
- Understand the activity series of metals and halogens. [9C.2.1.3.2]
- Identify oxidized and reduced half reactions in a redox reaction (single replacement, synthesis, decomposition, or combustion) [9C.2.1.3.1]
- Know how to use the solubility rules. [9C.2.1.3.2]
- Identify an acid and base due to the ions that make up the compound. [9C.2.1.3.3]
- Understand acids and bases properties including pH and reactivity with metals. [9C.2.1.3.3]
- Name acids and bases. [9C.2.1.3.3]
- Understand that some chemical reactions absorb energy (endothermic) and some reactions release energy (exothermic). [9.2.1.2.4]

- Use solubility rules to predict the solubility of a substance. [9C.2.1.3.2]
- Distinguish the difference between the types of chemical reactions. [9C.2.1.3.1]
- Predict the products of a double replacement (precipitation and acid/base) and redox (single replacement, combustion, synthesis, and decomposition) reactions using solubility rules and activity of ions. [9C.2.1.3. & 9C.2.1.3.3]

Skills - Students will:

- Calculate the molarity of a solution. [9C.2.1.2.6]
- Calculate the mass percent (percent concentration) of a solution. [9C.2.1.2.6]
- Demonstrate the ability to write formulas from initial reactants and complete a balanced equation. [9.2.1.2.3]
- Calculate the molarity of a solution from the pH or pOH and vice versa. [9C.2.1.2.6 & 9C.2.1.3.3]
- Balance a redox reaction in acidic/basic solution using the half reaction method. [9C.2.1.3.1]

Common Misunderstandings

- Many students think solvents must be liquids.
- Some students will believe amount of solution is proportional to the molar concentration.
- When a colorless solute dissolves in water, it is easy for students to think that it "disappeared" without understanding the nature of dissolution.
- Students don't always realize that dissolving is a physical process and not a chemical reaction.
- Dilute and Concentrated are often confused with Weak and Strong
- Students confuse the forces within molecules (intermolecular) and forces between molecules (intramolecular)
- Lack of understanding that atoms are rearranged during a chemical change, and not destroyed or created.
- Reactants remain in original form during a chemical reaction.
- Lack of understanding that the properties of products are not related to the properties of reactants.
- Misuse of subscripts and coefficients in balancing equations
- Combustion and all other chemical processes consist of the interaction of substances such that the total mass of material after the reaction is exactly the same as before the reaction.

Essential new vocabulary

- Solution
- Solute
- Solvent
- Molarity
- Mass percent (percent concentration)
- Solubility
- Redox
- Precipitation
- Neutralization
- Activity Series
- Acid
- Base
- Oxidation
- Reduction
- Half reactions
- Oxidizing Agent
- Reducing Agent
- pH, pOH
- Solubility Rules
- Double Replacement
- Single Replacement
- Synthesis
- Decomposition
- Combustion
- Titration