Honors Chemistry Unit 4: Chemical Reactions, Moles, and Stoichiometry
Chapter 10, 11, and 12

Graduate Learner Outcome: As a Henry County graduate, I will apply scientific and engineering practices to understand and analyze the relationships between energy, chemical bonds and chemical reactions.

Pretest Score: _____ **Post Test Score:** _____

Unit 4 Goal: Write a goal that you have for this unit.

Standards and Learning Targets:

SC3. Obtain, evaluate, and communicate information about how the Law of Conservation of Matter is used to determine chemical composition in compounds and chemical reactions.

a. Use mathematics and computational thinking to balance chemical reactions (i.e., synthesis, decomposition, single replacement, double replacement, and combustion) and construct an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
   - I can balance a chemical equation using the Law of Conservation of Matter.
   - I can classify a reaction as synthesis, decomposition, single replacement, double replacement, or combustion.
   - I can use mathematics and computational thinking to balance chemical reactions and construct an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

b. Plan and carry out an investigation to determine that a new chemical has been formed by identifying indicators of a chemical reaction (e.g., precipitate formation, gas evolution, color change, water production, and changes in energy to the system).
   - I can identify indicators of a chemical reaction in an experiment.
   - I can classify different chemical equations by type of chemical reaction.
   - I can plan and carry out an investigation to determine that a new chemical has been formed by identifying indicators of a chemical reaction.

c. Use mathematics and computational thinking to apply concepts of the mole and Avogadro's number to conceptualize and calculate percent composition, empirical/molecular formulas, mass, moles, and molecules relationships and molar volumes of gases.
   - I can determine how many molecules/formula units, how much mass, and how many moles are in a given sample of a compound, using the periodic table and the molar mass.
   - I can describe the difference between empirical formula and molecular formula and explain what each represents.
   - I can calculate the percent composition of elements in a compound.
   - I can determine the empirical formula of a compound using masses of elements in a compound or using percent composition.

d. Use mathematics and computational thinking to identify and solve different types of reaction stoichiometry problems (i.e., mass to moles, mass to mass, moles to moles, and percent yield) using significant figures.

- I can calculate the amount of product produced given the amount of reactant used in a chemical reaction (mass or moles).
- I can calculate the amount of reactant used given the amount of product produced in a chemical reaction (mass or moles).
- I can calculate the percent yield of a chemical reaction given the actual yield and the theoretical yield.
- I can calculate the theoretical yield using stoichiometry (given the amount of one reactant) and then calculate the percent yield, given the actual yield.

e. Plan and carry out an investigation to demonstrate the conceptual principle of limiting reactants.
- I can identify the limiting reactant and excess reactant and calculate the amount of remaining excess reactant after the reaction is complete.

Activities/Quizzes/Resources: (All resources can be found on my school website.)

1. Unit 4 Planning Guide
2. Unit 4 Learning Path
3. Unit 4 Pretest
2. Chapter 10 PowerPoint
3. Molar Mass Tutorial Video
4. Molar Conversions Tutorial Video
5. Percent Composition Tutorial Video
6. Empirical Formula Tutorial Video
7. Molecular Formula Tutorial Video
8. Chapter 11 PowerPoint
9. Solubility Rules
10. Activity Series
11. Word Equations Tutorial Video #1
12. Word Equations Tutorial Video #2
13. Balancing Equations Tutorial Video #1
14. Balancing Equations Tutorial Video #2
15. Types of Reactions Tutorial Video
16. Complete Ionic Equations Tutorial Video
17. Net Ionic Equations Tutorial Video
18. Predicting Precipitates Tutorial Video
19. Chapter 12 PowerPoint
20. Mole Map
21. Mole Ratio Tutorial Video
22. Stoichiometry Problems Tutorial Video
23. Limiting Reagents Tutorial Video
24. Percent Yield Tutorial Video
25. Lesson Videos
26. Unit 4 Practice Sheet
27. Review Games
28. Extra Practice Sheets
29. Unit 4 Quiz
30. Unit 4 Study Guide

Performance Task/Test:

Based on the learning targets from this unit, you will demonstrate your understanding of how the Law of Conservation of Matter is used to determine chemical composition in compounds and chemical reactions.

- Lab 9 – Chemical Reactions Lab
- Lab 10 – Percent Composition Lab
- Lab 11 – Stoichiometry S'mores Lab

Unit 4 Test (You will complete the post test at the end of this unit to show mastery.)

Unit 4 Reflection: Reflect on what you could have done better to master this unit.