

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.)

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| 1. Unit 4 Planning Guide | 16. Types of Reactions Tutorial Video |
| 2. Unit 4 Learning Path | 17. Complete Ionic Equations Tutorial Video |
| 3. Unit 4 Pretest | 18. Net Ionic Equations Tutorial Video |
| 2. Chapter 10 PowerPoint | 19. Predicting Precipitates Tutorial Video |
| 3. Chapter 10 Outline | 20. Chapter 12 PowerPoint |
| 4. Molar Mass Tutorial Video | 21. Chapter 12 Outline |
| 5. Molar Conversions Tutorial Video | 22. Section 12.1 Lesson Video |
| 6. Percent Composition Tutorial Video | 23. Mole Map |
| 7. Empirical Formula Tutorial Video | 24. Mole Ratio Tutorial Video |
| 8. Molecular Formula Tutorial Video | 25. Stoichiometry Problems Tutorial Video |
| 9. Chapter 11 PowerPoint | 26. Limiting Reagents Tutorial Video |
| 10. Chapter 11 Outline | 27. Percent Yield Tutorial Video |
| 11. Solubility Rules | 28. Unit 4 Practice Sheet |
| 12. Word Equations Tutorial Video #1 | 29. Review Games |
| 13. Word Equations Tutorial Video #2 | 30. Extra Practice Sheets |
| 14. Balancing Equations Tutorial Video #1 | 31. Unit 4 Quiz |
| 15. Balancing Equations Tutorial Video #2 | 32. 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.

