

**Unit 5 - Calculations with Chemical Formulas and Equations**

**Next Generation Science Standards:**

**HS-PS1-1. Use the periodic table as a model to predict the relative properties of elements.**

**HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.**

*Lincoln High School Core Values:*

- Resiliency and perseverance in the face of obstacles are keys to student success
- Students will be thoughtful communicators who read, write, listen and speak effectively in preparation for careers and/or post-secondary education
- Students will be creative and practical problem solvers

**Objectives:**

Upon completion of this unit the student will be able to:

1. Write the definition of a mole and explain its importance.
2. Explain the meaning of Avogadro's number.
3. Define molar mass and explain how it relates the mass of a substance to the number of particles in that substance.
4. Distinguish between molar mass and formula mass.
5. Convert among the number of particles, moles and mass of a substance.
6. Define the molar volume of a gas.
7. Explain how to determine the number of particles in a given volume of gas at STP.
8. Calculate the mass percentage composition from a given chemical formula.
9. Calculate the empirical formula of a compound, having been given or by calculating appropriate analytical data such as elemental percentages.
10. Recognize and explain the differences between molecular and empirical formulas.

11. Calculate the molecular formula, having been given the empirical formula and molecular weight.
  12. Define stoichiometry and explain its significance.
  13. Explain the relationship between stoichiometry and balanced chemical equations.
  14. Calculate the mass of a particular substance produced or used in a chemical reaction (mass-mass problem.)
  15. Calculate the volume of a gas produced or used in a chemical reaction. (Mass-volume, volume-mass, or volume-volume problems.)
  16. Interconvert and calculate the number of moles, mass in grams and number of atoms, ions or molecules in conjunction with the stoichiometry of a chemical reaction.
  17. Determine the limiting reagent in a reaction.
  18. Determine the excess reagent in a reaction.
  19. Calculate the amount of product formed in a chemical reaction when reactants and products are present in nonstoichiometric proportions.
  20. Define and utilize the key terms for the chapter found on page 88.
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