

Kenai Peninsula Borough School District
Science; Chemistry
Unit 6: The Mole

Pacing:

NGSS Standards:

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

ELA/LITERACY:

RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. (HS-PS1-1)

MATHEMATICS STANDARDS:

MP.2 Reason abstractly and quantitatively. (HS-PS1-7)

- a. decontextualize to abstract a given situation and represent it symbolically and manipulate the representing symbols.
- b. reflect during the manipulation process in order to probe into the meanings for the symbols involved
- c. create a coherent representation of the problem
- d. make sense of quantities and their relationships in problem situations
- e. attend to the meanings of quantities
- f. use flexibility with different properties of operations and objects
- g. translate an algebraic problem to a real world context
- h. explain the relationship between the symbolic abstraction and the context of the problem
- i. compute using different properties
- j. consider the quantitative values, including units, for the numbers in a problem

HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-7)

HSN-Q.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-7)

HSN-Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-7)

Essential Questions:

1. How is mole similar to a dozen?
2. What is the relationship between a mole and Avogadro's number?
3. Explain how you convert for the number of representative particles to the moles of a substance.
4. Explain what is meant by molar mass.
5. What conversion factor should be used to convert from mass to moles? Moles to mass?
6. Explain the steps needed to convert the mass of an element to the number of atoms of the element.

7. Describe how to determine the molar mass of a compound.
8. What three conversion factors are often used in mole conversions?
9. Explain how percent composition data for a compound are related to the mass of the element in the compound.
10. What is the difference between an empirical formula and a molecular formula?
11. What is a hydrate? What does its name indicate about its composition?
12. Describe the experimental procedure for determining the formula for a hydrate. Explain the reason for each step.

Big Ideas:

1. The mole as a unit for measuring the amount of a substance.
2. The molar mass of an element is the numerical equivalent of the atomic mass (amu) in grams.
3. The molar mass and its relationship to Avogadro's number.
4. Subscripts in a chemical formula indicate how many moles of each element are in one mole of the compound.
5. Empirical and molecular formulas and how to determine them.
6. The formula of a hydrate and how to determine it.

Vocabulary: Avogadro's number, Empirical formula, Hydrate, Molar mass, Mole, Molecular formula, Percent composition