

Name: _____ Date: _____

Answer Key: Feeling the Weight of Atoms? Vibrant 10th Grade Stoichiometry Quiz

Sophomores strengthen foundational chemistry recall by identifying molar masses and calculating simple particle conversions using the mole as a counting unit.

1. Which of the following is the standard numerical value for Avogadro's number, representing the count of particles in one mole?

Answer: B) 6.022×10^{23}

Avogadro's constant is defined as 6.022×10^{23} particles per mole, which provides the bridge between the microscopic world of atoms and the macroscopic world of grams.

2. True or False: The molar mass of an element is numerically equal to its atomic mass found on the Periodic Table, but expressed in grams per mole (g/mol).

Answer: A) True

Molar mass allows us to use the atomic mass value (in amu) for large-scale laboratory measurements in grams.

3. If you have a 1.0 mole sample of pure Silver (Ag), how many atoms of silver are present in that sample?

Answer: C) 6.022×10^{23} atoms

By definition, one mole of any pure substance contains Avogadro's number of units (atoms, in the case of an element).

4. Consider the reaction for making rust: $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$. According to the coefficients, what is the mole ratio of Iron (Fe) to Iron(III) oxide (Fe_2O_3)?

Answer: A) 4:2 (or 2:1)

In stoichiometry, the coefficients in front of the formulas represent the molar ratio. For Fe and Fe_2O_3 , those numbers are 4 and 2.

5. True or False: Stoichiometry is the study of the quantitative relationships between the amounts of reactants used and products formed by a chemical reaction.

Answer: A) True

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Stoichiometry involves calculating the proportions of elements or compounds involved in reactions based on the law of conservation of mass.

6. The molar mass of Sodium Hydroxide (NaOH) is approximately ___ g/mol. (Use atomic masses: Na=23, O=16, H=1).

Answer: D) 40

Adding the atomic masses together: $23 \text{ (Na)} + 16 \text{ (O)} + 1 \text{ (H)} = 40 \text{ g/mol}$.

7. If a balanced chemical equation shows a 1:2 ratio between reactant A and reactant B, how many moles of B are needed to react completely with 5 moles of A?

Answer: C) 10 moles

In a 1:2 ratio, you need twice as much of B. 5 moles of A multiplied by 2 equals 10 moles of B.

8. Which term describes the reactant that is completely consumed first in a reaction and determines the maximum amount of product that can be formed?

Answer: B) Limiting reactant

The limiting reactant (or reagent) limits the extent of the reaction and determines the theoretical yield.

9. True or False: To convert from the mass of a substance to the number of moles, you should multiply the mass by the molar mass.

Answer: B) False

To find moles from mass, you must divide the mass by the molar mass (grams / grams per mole = moles).

10. What is the molar mass of Calcium Carbonate (CaCO₃)? (Use atomic masses: Ca=40, C=12, O=16).

Answer: C) 100 g/mol

The calculation is: $40 + 12 + (3 \times 16)$. $40 + 12 + 48 = 100 \text{ g/mol}$.