Name: _____ **Date:** _____

Answer Key: Avogadro's Recipe: The Stoichiometry Lab Quiz for 7th Grade

How do chemists count atoms by weighing them? Practice unit conversions and mole-to-mass ratios for middle school reaction analysis.

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1. A group of scientists is synthesizing aluminum oxide (Al2O3). If the balanced equation is 4Al + 3O2 ’ 2Al2O3, what is the stoichiometric ratio of Aluminum to Oxygen gas?

Answer: A) 4:3

The coefficients in the balanced equation (4 for Al and 3 for O2) represent the molar ratio needed for the reaction to occur without leftovers.

2. The molar mass of Lithium (Li) is approximately 7 g/mol. If a battery technician has 21 grams of Lithium, they have exactly ___ moles.

Answer: C) 3 moles

Moles are calculated by dividing the given mass (21g) by the molar mass (7 g/mol). 21 / 7 = 3.

3. True or False: One mole of lead (Pb) atoms contains the same number of particles as one mole of helium (He) atoms, even though lead is much heavier.

Answer: A) True

A mole defines a specific number of particles (Avogadro's number). While their masses differ, the count of atoms in one mole remains constant across all elements.

4. In the decomposition of baking soda (2NaHCO3 ’Na2CO3 + H2O + CO2), how many moles of Carbon Dioxide are produced from 2 moles of baking soda?

Answer: B) 1 mole

The ratio of NaHCO3 to CO2 is 2:1. Therefore, 2 moles of reactant produce 1 mole of CO2 gas.

5. To find the molar mass of Calcium Chloride (CaCl2), you must add the mass of one Calcium atom to the mass of ___ Chlorine atom(s).

Answer: B) Two

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The subscript '2' in $CaCl_2$ indicates there are two chlorine atoms for every one calcium atom in the compound structure.

6. True or False: Stoichiometry allows engineers to predict exactly how much waste product will be generated in a chemical factory before the reaction starts.

Answer: A) True

Stoichiometry uses balanced equations to calculate the relationship between reactants and products, allowing for precise predictions of output and byproduct.

7. If the molar mass of Oxygen gas (O_2) is 32 g/mol, what is the mass of 0.25 moles of O_2?

Answer: C) 8 grams

Mass = Moles × Molar Mass. 0.25 moles × 32 g/mol = 8 grams.

8. If a reaction requires a 1:2 ratio of Reactant A to Reactant B, and you have 5 moles of A, you need ___ moles of B to react completely.

Answer: C) 10

Applying the 1:2 ratio, you multiply the available moles of A (5) by 2 to find the required amount of B.

9. Silver nitrate reacts with Copper to produce Silver. If the balanced equation shows 2 moles of $AgNO_3$ are needed for every 1 mole of Cu, what is this called?

Answer: B) The Mole Ratio

The mole ratio is the link between reactants and products in a balanced equation, showing the proportional relationship between substances.

10. True or False: In a balanced chemical equation, the total mass of the reactants must equal the total mass of the products.

Answer: A) True

This is the Law of Conservation of Mass, which stoichiometry relies upon to ensure that matter is neither created nor destroyed during the reaction.