

Grade 10 Unit 1 Quiz: Quantitative Stoichiometry Mastery

Mole maps, composition evidence, combustion, and yield

Name: _____

Date: _____

Time: 30 minutes. **Tools:** calculator permitted. Show units and coefficient ratios. Every data card is fictional; do not infer a real product, safety, or performance claim from it.

1. Which factor correctly changes 0.250 mol CO₂ to grams? $M_{\text{CO}_2} = 44.01 \text{ g/mol}$. [1 pts]

- A. $\frac{1 \text{ mol}}{44.01 \text{ g}}$
B. $\frac{44.01 \text{ g}}{1 \text{ mol}}$
C. $\frac{0.250 \text{ mol}}{44.01 \text{ g}}$
D. $\frac{44.01 \text{ mol}}{1 \text{ g}}$

2. Calculate the mass of 0.250 mol CO₂. [2 pts]

3. A 25.00 g hydrate loses 9.00 g on complete heating. Calculate percent water by mass. [2 pts]

4. A compound contains 40.0% C, 6.7% H, and 53.3% O. Use a 100 g basis to determine its empirical formula. [3 pts]

5. A 0.500 g hydrocarbon produces 1.57 g CO₂ and 0.643 g H₂O in a complete-combustion paper model. What does this evidence show about atoms in the original sample, and what does it not establish about structure? [2 pts]

6. Use $2\text{Al} + 3\text{Cl}_2 \rightarrow 2\text{AlCl}_3$. If 4.00 mol Al reacts with 5.00 mol Cl_2 , identify the limiting reactant and calculate moles of AlCl_3 predicted. [3 pts]

7. The reaction in item 6 has theoretical yield 20.0 g AlCl_3 ; collection is 16.5 g. Calculate percent yield. [2 pts]

8. A student says, "At 82.5% yield, 17.5% of atoms disappeared." Identify the error and give one evidence-consistent reason yield can be below theoretical. [1 pts]
