

Grade 9 Unit 8 Quiz: Reactions and Stoichiometry

Conservation, reaction models, ratios, and yield

Name: _____

Date: _____

Time: 25–30 minutes. **Tools:** calculator permitted. Show balanced equations and units. Coefficients count whole particles or moles; subscripts describe the composition of one formula unit or molecule.

1. Balance: ____Fe + ____O₂ → ____Fe₂O₃. [2 pts]

2. In 3H₂O, how many H atoms and how many O atoms are represented? Explain the different roles of the 3 and the 2. [2 pts]

3. Classify: (a) CaCO₃ → CaO + CO₂; (b) C₃H₈ + 5O₂ → 3CO₂ + 4H₂O. [2 pts]

4. A sealed reaction vessel has mass 12.50 g before a reaction and 12.49 g afterward on a balance with a stated uncertainty of ±0.02 g. What does this evidence support, and what would be an overclaim? [2 pts]

5. Use 2H₂ + O₂ → 2H₂O. If 3.00 mol H₂ reacts with excess O₂, how many moles of water can form? [2 pts]

6. Use N₂ + 3H₂ → 2NH₃. Starting with 1.50 mol N₂ and 4.00 mol H₂, identify the limiting reactant and calculate the maximum moles of NH₃. [3 pts]

7. Heating 10.0 g CaCO_3 gives $\text{CaO} + \text{CO}_2$. Assuming complete reaction, calculate the theoretical mass of CO_2 . Use $M_{\text{CaCO}_3} = 100.09 \text{ g/mol}$ and $M_{\text{CO}_2} = 44.01 \text{ g/mol}$. [3 pts]

8. If the actual mass of CO_2 collected in item 7 is 3.52 g, calculate percent yield. [2 pts]

9. A student says, “An 80% yield means 20% of the atoms disappeared.” Correct the statement using conservation and one plausible experimental or process reason for a yield below 100%. [2 pts]
