

Grade 9 Unit 7 Quiz: Mole and Chemical Quantities

Counting, mass, composition, and formula models

Name: _____

Date: _____

Time: 25–30 minutes. **Tools:** calculator permitted. Use $N_A = 6.02214076 \times 10^{23} \text{ mol}^{-1}$ and show units in each conversion. Classroom masses: H 1.008, C 12.011, O 15.999, Ca 40.078, Cl 35.45.

1. Define one mole and state what the Avogadro constant counts. [2 pts]

2. How many molecules are in 0.250 mol CO_2 ? Show a unit-canceling setup. [2 pts]

3. $1.204428152 \times 10^{24}$ formula units of NaCl is how many moles of NaCl? [2 pts]

4. Convert 36.030 g H_2O to moles of water. ($M_{\text{H}_2\text{O}} = 18.015 \text{ g/mol}$) [2 pts]

5. What mass of CaCl_2 is 0.2500 mol? First find or use $M_{\text{CaCl}_2} = 110.978 \text{ g/mol}$. [2 pts]

6. Calculate the percent by mass of oxygen in CO_2 . [2 pts]

7. A 100.0 g sample contains 40.00 g C, 6.71 g H, and 53.29 g O. Determine its empirical formula. Show mass $\rightarrow$ mole $\rightarrow$ simplest-ratio work. [3 pts]

8. A compound has empirical formula CH_2O and molar mass 180.156 g/mol. Determine its molecular formula. [2 pts]

9. A 25.0 g sample is stated to be pure CO_2 . Calculate the mass of carbon in it. Then name one condition that must be true for this percent-composition prediction to apply. [3 pts]
