

CHEMISTRY 210 • Mole 1 Answers

Carry out the following conversions. (Note: Density is listed on the Sargent-Welch Periodic Table)

1. 8.92 moles CO₂ → molecules

$$\frac{8.92 \text{ mol CO}_2}{1} \times \frac{6.022 \times 10^{23} \text{ molecules CO}_2}{1 \text{ mol}} = 5.37 \times 10^{24} \text{ molecules}$$

2. 58.5 g silver metal → moles

$$\frac{58.5 \text{ g Ag}}{107.87 \text{ g}} \times \frac{1 \text{ mol}}{1} = 0.542 \text{ mol Ag}$$

3. 1.45 x 10²⁵ atoms Al → kg Al

$$\frac{1.45 \times 10^{25} \text{ atoms Al}}{6.022 \times 10^{23} \text{ atoms}} \times \frac{1 \text{ mol}}{1 \text{ mol}} \times \frac{26.98 \text{ g Al}}{1 \text{ mol}} \times \frac{1 \text{ kg}}{1000 \text{ g}} = \boxed{0.650 \text{ kg}}$$

4. 100.0 cm³ Fe → mol Fe

$$\frac{100.0 \text{ cm}^3}{1 \text{ cm}^3} \times \frac{7.874 \text{ g}}{1 \text{ cm}^3} \times \frac{1 \text{ mol Fe}}{55.845 \text{ g Fe}} = 14.10 \text{ mol}$$

5. 32.7 g selenium → mol

$$\frac{32.7 \text{ g Se}}{78.96 \text{ g}} \times \frac{1 \text{ mol}}{1} = 0.414 \text{ mol}$$

6. 3.4 x 10²² Na⁺ ions → mol

$$\frac{3.4 \times 10^{22} \text{ ions}}{6.022 \times 10^{23} \text{ ions}} \times \frac{1 \text{ mol Na}^+}{1} = 0.056 \text{ mol Na}^+$$

7. 87.5 mol hydrogen gas (H₂) → g H₂

$$\frac{87.5 \text{ mol}}{1 \text{ mol H}_2} \times \frac{2.02 \text{ g H}_2}{1} = 177 \text{ g}$$

8. 25.5 mg CaCl₂ → formula units

$$\frac{25.5 \text{ mg}}{1000 \text{ mg}} \times \frac{1 \text{ g}}{1} \times \frac{1 \text{ mol}}{110.98 \text{ g}} \times \frac{6.022 \times 10^{23} \text{ fu.}}{1 \text{ mol}} = 1.38 \times 10^{20} \text{ formula units CaCl}_2$$

9. 8.91 x 10²⁴ atoms zirconium → cm³

$$\frac{8.91 \times 10^{24} \text{ atoms Zr}}{6.022 \times 10^{23} \text{ atoms}} \times \frac{1 \text{ mol}}{1 \text{ mol}} \times \frac{91.22 \text{ g}}{1 \text{ mol}} \times \frac{1 \text{ cm}^3}{6.51 \text{ g}} = 207 \text{ cm}^3$$

10. 552 pg Pt(NO₃)₂ → formula units

$$\frac{552 \text{ pg}}{1 \text{ pg}} \times \frac{1 \times 10^{-12} \text{ g}}{1} \times \frac{1 \text{ mol}}{319.11 \text{ g}} \times \frac{6.022 \times 10^{23} \text{ form units}}{1 \text{ mol}} = 1.04 \times 10^2 \text{ formula units}$$