

Unit 2 Practice MC

1. A 0.10 mol sample of $\text{Na}_2\text{CO}_3(\text{s})$ and a 0.30 mol sample of $\text{NaCl}(\text{s})$ are dissolved in water and diluted to 250. mL. What is the concentration of Na^+ in the solution?

- (A) 0.50 M
- (B) 0.500 M
- (C) 2.0 M
- (D) 2.00 M

$$0.2 \text{ mol Na}^+ + 0.3 \text{ mol Na}^+ = 0.5 \text{ mol Na}^+$$

$$[\text{Na}^+] = \frac{0.5 \text{ mol Na}^+}{0.25 \text{ L}} = \frac{\frac{1}{2}}{\frac{1}{4}} = \frac{1}{2} \times \frac{4}{1} = 2 \text{ M}$$

2. What is the molarity of $\text{K}^+(\text{aq})$ in a solution that contains 26 g K_3N (molar mass 131 g) in 2.0 L of the solution?

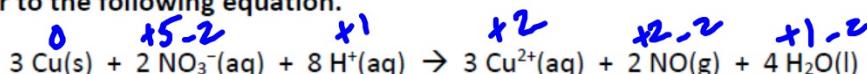
- (A) 0.10 M
- (B) 0.20 M
- (C) 0.30 M
- (D) 0.60 M

$$\frac{26 \text{ g K}_3\text{N}}{131 \text{ g}} = \frac{26}{130} = \frac{\cancel{13} \times 2}{\cancel{130} 10} = \frac{2}{10} \text{ mol K}_3\text{N}$$

$$\frac{25}{125} = \frac{1}{5} \quad \frac{1}{5} \times 0.2 = 0.2 \text{ mol K}_3\text{N}$$

$$[\text{K}^+] = \frac{0.6 \text{ mol}}{2 \text{ L}} = 0.3 \text{ M}$$

Questions 3-5 refer to the following equation.



3. How many moles of $\text{NO}_3^-(\text{aq})$ are needed to react completely with 6.355 g of Cu?

- (A) 0.03333 mol
- (B) 0.05555 mol
- (C) 0.06666 mol
- (D) 0.1000 mol

$$\frac{6.355 \text{ g Cu}}{63.55 \text{ g}} \times \frac{1 \text{ mol Cu}}{1 \text{ mol Cu}} \times \frac{2 \text{ mol NO}_3^-}{3 \text{ mol Cu}} = \frac{2}{3} \times \frac{6.355}{63.55} = .0666$$

4. How many moles of $\text{NO}(\text{g})$ will be produced when 63.55 g of Cu is mixed with 50.0 mL of acidified 2.00 M NaNO_3 solution?

- (A) 0.0100 mol
- (B) 0.0200 mol
- (C) 0.0400 mol
- (D) 0.0500 mol

$$\frac{63.55 \text{ g Cu}}{63.55 \text{ g}} \times \frac{1 \text{ mol Cu}}{1 \text{ mol Cu}} \times \frac{2 \text{ mol NO}}{3 \text{ mol Cu}} = \frac{2}{3} \times \frac{63.55}{63.55} = .666 \text{ mol NO}$$

$$(2 \text{ M})(.05) = .10 \text{ mol NO}_3^-$$

5. Which species is being reduced?

- (A) $\text{Cu}(\text{s})$
- (B) $\text{NO}_3^-(\text{aq})$
- (C) $\text{Cu}^{2+}(\text{aq})$
- (D) $\text{NO}(\text{g})$

$$\frac{1 \text{ mol Cu}}{3} = \frac{1}{3} = .333 \text{ mol Cu}$$

$$\frac{1 \text{ mol NO}_3^-}{2} = .05 \text{ mol NO}_3^-$$

$$\frac{.05 \text{ mol NO}_3^-}{.10 \text{ mol NO}_3^-} = \frac{1}{2} \text{ mol NO} = .05 \text{ mol NO}$$