Unit 2 Practice MC

1. A 0.10 mol sample of $Na_2CO_3(s)$ and a 0.30 mol sample of NaCl(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

$0.2\ mol\ Na^+ + 0.3\ mol\ Na^+ = 0.5\ mol\ Na^+$

$[Na^+] = \frac{0.5\ mol\ Na^+}{.25\ L} = \frac{\frac{1}{2}}{\frac{1}{4}} = \frac{1}{2} \times \frac{4}{1} = 2\ M$

2. What is the molarity of $K^+(aq)$ 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

$\frac{26\ g\ K_3N}{} \left| \frac{1\ mol\ K_3N}{131\ g} \right. = \frac{26}{130} = \frac{\cancel{13}^{1} \times 2}{\cancel{130}_{10}} = \frac{2}{10}\ mol\ K_3N$

$\frac{25}{125} = \frac{1}{5} \approx 0.2$

$\frac{\cancel{10}^{1}}{\cancel{100}_{10}}$

$= 0.2\ mol\ K_3N \times 3 = 0.6\ mol\ K^+$

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

Questions 3-5 refer to the following equation.

$$3\ \overset{0}{Cu}(s) + 2\ \overset{+5\ -2}{NO_3^-}(aq) + 8\ \overset{+1}{H^+}(aq) \rightarrow 3\ \overset{+2}{Cu^{2+}}(aq) + 2\ \overset{+2\ -2}{NO}(g) + 4\ \overset{+1\ -2}{H_2O}(l)$$

3. How many moles of $NO_3^-(aq)$ 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

$\frac{\cancel{6.355\ g\ Cu}^{1}}{} \left| \frac{1\ mol\ Cu}{\cancel{63.55\ g}_{10}} \right| \frac{2\ mol\ NO_3^-}{3\ mol\ Cu}$

$\frac{2}{3} = .6666/10 = .0666$

4. How many moles of NO(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

$\frac{\cancel{63.55\ g\ Cu}}{} \left| \frac{1\ mol\ Cu}{\cancel{63.55\ g}} \right| \frac{2\ mol\ NO}{3\ mol\ Cu} = .666\ mol\ NO$

$(2\ M)(.05) = .10\ mol\ NO_3^- \left| \frac{\cancel{2}\ mol\ NO}{\cancel{2}\ mol\ NO} \right. = .10\ mol\ NO$

5. Which species is being reduced?

   (A) Cu(s)
   (B) $NO_3^-(aq)$
   (C) $Cu^{2+}(aq)$
   (D) NO(g)

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

$\frac{.1\ mol\ NO_3^-}{2} = .05$