IB/HL2 CHEM **Name**
CHAPTER 4 PRE-TEST **Date**

1. An unknown substance dissolves readily in water but not in benzene (a nonpolar solvent). Molecules of what type are present in the substance?
   A) neither polar nor nonpolar
   B) polar
   C) either polar or nonpolar
   D) nonpolar
   E) none of these

2. 1.00 mL of a 3.50×10^{-4} M solution of oleic acid is diluted with 9.00 mL of petroleum ether, forming solution A. 2.00 mL of solution A is diluted with 8.00 mL of petroleum ether, forming solution B. How many grams of oleic acid are 5.00 mL of solution B? (molar mass for oleic acid = 282 g/mol)
   A) 4.94×10^{-4} g
   B) 7.00×10^{-6} g
   C) 4.94×10^{-5} g
   D) 1.97×10^{-6} g
   E) 9.87×10^{-6} g

3. Which of the following is *not* a strong base?
   A) $Ca(OH)_2$ D) LiOH
   B) KOH E) $Sr(OH)_2$
   C) NH_3

4. Which of the following ions is most likely to form an insoluble sulfate?
   A) K^+ D) S^{2-}
   B) Li^+ E) Cl^-
   C) Ca^{2+}

5. When solutions of cobalt(II) chloride and carbonic acid react, which of the following terms will be present in the net ionic equation?
   A) $CoCO_3(s)$ D) $2Cl^-(aq)$
   B) $H^+(aq)$ E) two of these
   C) $2CoCO_3(s)$

6. You have 75.0 mL of a 2.50 M solution of Na_2CrO_4(aq). You also have 125 mL of a 1.99 M solution of $AgNO_3$(aq). Calculate the concentration of Ag^+ when the two solutions are added together.
   A) 0.00 M
   B) 0.622 M
   C) 1.24 M
   D) 1.88 M
   E) 0.249 M

7. Sulfamic acid, HSO_3NH_2 (molar mass = 97.1 g/mol), is a strong monoprotic acid that can be used to standardize a strong base:

$$HSO_3NH_2(aq) + KOH(aq) \rightarrow KSO_2NH_2(aq) + H_2O(l)$$

   A 0.167-g sample of HSO_3NH_2 required 19.4 mL of an aqueous solution of KOH for a complete reaction. What is the molarity of the KOH solution?
   A) 1.72e–3 M
   B) 8.87 M
   C) 0.0887 M
   D) 0.0334 M
   E) none of these

8. In the reaction $P_4(s) + 10Cl_2(g) \rightarrow 4PCl_5(s)$, the reducing agent is
   A) chlorine.
   B) PCl_5.
   C) phosphorus.
   D) Cl^-
   E) none of these

9. When the following reaction is balanced in acidic solution, what is the coefficient of I_2?

$$IO_3^- + I^- \rightarrow I_2$$

   A) 1
   B) 2
   C) 3
   D) 4
   E) none of these

10. The following equation describes the oxidation of enthanol to acetic acid by potassium permanganate:

$$3C_2H_5OH + 4KMnO_4 \rightarrow 3HC_2H_3O_2 + 4MnO_2 + 4KOH + H_2O$$

   5.00 g of ethanol and an excess of aqueous $KMnO_4$ are reacted, and 5.43 g of $HC_2H_3O_2$ result. What is the percent yield?
   A) 100. %
   B) 83.3 %
   C) 27.8 %
   D) 16.7 %
   E) 5.43 g $HC_2H_3O_2$ is impossible since it represents more than 100% yield.

Answer Key

1. B
2. E
3. C
4. C
5. A
6. A
7. C
8. C
9. C
10. B