Worksheet #15 Dilution

1. One of the uses of methanol, CH_3OH, in diluted from is a windshield wash antifreeze. In pure form methanol has a molar concentration of 24.7 mol/L. A student prepared 8.0 L of a 10.0 mol/L aqueous methanol as windshield washer antifreeze good for -30^oC. What volume of methanol was necessary to prepare the antifreeze solution?

2. A concentrated (19.1 mol/L) sodium hydroxide solution (also known as caustic soda) when diluted has widespread use as a cleaner and disinfectant. What is the molar concentration of a bottle and jar cleaner used by a commercial firm if 10.0 L of concentrated caustic soda is diluted to 400.0 L?

3. Pure ethanol, C_2H_5OH, is 17.2 mol/L. In diluted form ethanol is present in all alcoholic beverages and in many cleaners. To what volume must 10.0 mL of pure ethanol be diluted in order to prepare 10.3 mol/L ethanol type-cleaning solution?

4. Household ammonia solution (0.70 mol/L) may be diluted to prepare a golf-cleaning solution (0.14 mol/L) or a comb and brush cleaning solution (0.021 mol/L). What volume of household ammonia is required to prepare 250 mL of a comb and brush cleaning solution?

5. If 60.0 L of a 2.50 mol/L toxic substance were poured into a pond to give a final volume of 5.00×10^3 L, what would be the final concentration?

Worksheet #16 Concentration of Ions

1. Classify each of the following substances as soluble or low solubility. Write a dissociation equation for the appropriate substances.
   a) ammonium acetate
   b) magnesium iodide
   c) barium hydroxide
   d) calcium nitrate
   e) zinc sulfide
   f) hydrochloric acid
   g) potassium permanganate
   h) aluminum sulfate

2. For each of the following write a dissociation equation and calculate the concentration of each ion.
   a) 0.0143 mol/L $NaHCO_3$ eyewash solution
   b) 0.0652 mol/L sodium phosphate tile and household cleaner
   c) 0.029 mol/L calcium hydroxide solution in a water treatment plant

3. For each of the following write a dissociation equation and calculate the concentration of each ion.
   a) A fence post preservative solution prepared by dissolving 800 g of zinc chloride in enough water to make 4.50 L of solution
   b) A solution formed by dissolving 7.50 mg of $Al_2(SO_4)_3$ in 900 mL of water processed by a water treatment plant.

4. For each of the following write a dissociation equation and calculate the concentration of the dissolved electrolyte
   a) Na_2CO_3 to give 0.500 mol/L CO_3^{2-} (aq) concentration
   b) $(NH_4)_2SO_4$ to give 1.20 mol/L NH_4^+ (aq) concentration
   c) $K_2Cr_2O_7$ to give 0.0600 mol/L K^+ (aq) concentration

5. a) What mass of calcium chloride is required to prepare 2.00 L of 0.120 mol/L Cl^- (aq) solution?
   b) What mass of potassium phosphate is required to prepare 500 mL of a 0.100 mol/L K^+(aq) solution?