CHEMISTRY 116 - Fall 2021
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Worksheet Week 3 - Chapters 3.7 - 4.6

1. Write a balanced chemical equation for each of the following:
   a) combustion of gaseous ethane (C_2H_6)

   b) iron(III) chloride and sodium sulfide react in aqueous solution to yield aqueous sodium chloride and solid iron (III) sulfide

   c) solid potassium peroxide is added to water to form a solution of potassium hydroxide and hydrogen peroxide

   d) solid sodium oxide reacts with aqueous ammonium bromide to produce ammonia, water, and aqueous sodium bromide

   e) aqueous potassium dichromate reacts with aqueous HI to give a precipitate of CrI_3, elemental iodine, aqueous potassium iodide and some water

2. Trinitrotolune (TNT), $C_7H_5N_3O_6$, reacts violently with oxygen to produce carbon dioxide, water, and nitrogen.
   a) Write a balanced chemical equation for the explosion.

   b) How much oxygen is required to explode a ton of TNT? [0.7 ton]

   c) What is the theoretical yield of nitrogen from a ton of TNT? [0.2 ton]

3. 0.0320 g of xenon and 0.0304 g of fluorine are used to make XeF_6.
   a) Which reagent is limiting? [Xe]

   b) How many grams and how many moles of XeF_6 can be made? [0.0598 g]

   c) If the yield were 80 percent, how much XeF_6 is formed? [0.048 g]

4. What are the concentrations of Ba^{2+} and OH^- in 0.125 M $Ba(OH)_2$?

5. Write balanced **net ionic** equations for the dissolution in water of
   a) solid sodium sulfate
   b) solid potassium hydroxide
   c) solid manganese(III) dichromate
   d) ethanol, C_2H_5OH (soluble liquid nonelectrolyte)

6. How many grams of methanol (CH_3OH, $M = 32.04$) are contained in 0.100 L of 1.71 M aqueous methanol?

7. Any dilute aqueous solution has a density near 1.00 g/mL. Suppose the solution contains 1 ppm of solute; express the concentration of solute in g/L, µg/L, µg/mL, and mg/L.

8. What is the maximum volume of 0.25 M sodium hypochlorite that can be prepared by dilution of 1.00 L of 0.80 M NaOCl?

9. How many grams of 50 wt% NaOH ($M = 40.00$) should be diluted to 1.00 L to make 0.10 M NaOH?

10. A bottle of concentrated aqueous sulfuric acid, labeled 98.0 wt% H_2SO_4 has a concentration of 18.9 M.
   a) How many milliliters of reagent should be diluted to 1.000 L to give 0.100 M H_2SO_4?

   b) Calculate the density of 98.0 wt% H_2SO_4.

11. The density of 70.5 wt% aqueous perchloric acid is 1.67 g/mL.
   a) How many grams of solution are in 1.000 L?

   b) How many grams of $HClO_4$ are in 1.000 L?

   c) How many moles of $HClO_4$ are in 1.000 L?

12. Barium chloride and ammonium phosphate react to give a precipitate of barium phosphate. What volume of 0.26 M ammonium phosphate is required to react with 40 mL 0.30 M $BaCl_2$? [31 mL]