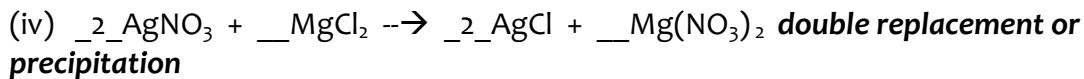
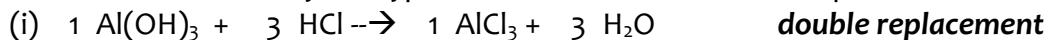


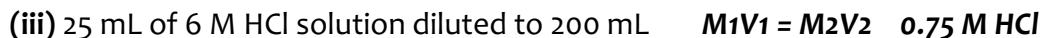
Homework Set 10 Solutions
(Distributed 11/21/16; Due on 11/30/16)

Review Chapter 6 and read Chapters 7 and 15 in Zumdahl and complete the listed questions from the text: Chapter 7: 18, 40, 53, 91, 95; Chapter 15: 22, 34, 43, 46, 62, 69; as well as the following problems:

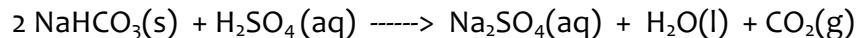
A. Balance and Identify the type of reaction for each of the equations.



B. Calculate the molarity of the following solutions:



C. If sulfuric acid is spilled in the lab, it can be neutralized by sprinkling sodium bicarbonate (NaHCO_3) on the spill. The reaction is as follows:



If 27 mL of 6.0 M H_2SO_4 was spilled, how many grams of NaHCO_3 must be added to neutralize the acid?

$0.027 \text{ L} * 6 \text{ M} = 0.162 \text{ moles H}_2\text{SO}_4; \text{ this requires } (2)(0.162 \text{ moles}) = 0.324 \text{ moles NaHCO}_3. \quad 0.324 \text{ moles} * 84 \text{ g/mole} = 27.2 \text{ grams of NaHCO}_3$

D. Titration of 12.5 mL of HCl solution requires 24.22 mL of a 0.1004 M KOH solution. What is the molarity of the HCl solution?



In titration, moles acid = moles base at the endpoint.

For KOH, $0.02422 \text{ L} * 0.1004 \text{ M} = 0.002432 \text{ moles KOH}$

If there are 0.002432 moles HCl: Molarity = $\frac{0.002432 \text{ moles}}{0.0125 \text{ L}} = 0.1945 \text{ M HCl}$

Problems from Zumdahl:

Chapter 7:

18. (a) $\text{Na}_2\text{CO}_3 + \text{CuSO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \underline{\text{CuCO}_3(s)}$
(b) $\text{HCl} + \text{AgC}_2\text{H}_3\text{O}_2 \rightarrow \underline{\text{AgCl}(s)} + \text{HC}_2\text{H}_3\text{O}_2$
(c) no precipitate expected
(d) $3(\text{NH}_4)_2\text{S} + 2\text{FeCl}_3 \rightarrow 6\text{NH}_4\text{Cl} + \underline{\text{Fe}_2\text{S}_3(s)}$
(e) $\text{H}_2\text{SO}_4 + \text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{HNO}_3 + \underline{\text{PbSO}_4(s)}$
(f) $3\text{K}_3\text{PO}_4 + 3\text{CaCl}_2 \rightarrow 6\text{KCl} + \underline{\text{Ca}_3(\text{PO}_4)_2(s)}$

40. (a) $\underline{2\text{KOH} + \text{H}_2\text{SO}_4 \rightarrow \text{K}_2\text{SO}_4 + 2\text{H}_2\text{O}}$
(b) $\underline{\text{HNO}_3 + \text{NaOH} \rightarrow \text{NaNO}_3 + \text{H}_2\text{O}}$
(c) $2\text{HCl} + \text{Ca(OH)}_2 \rightarrow \text{CaCl}_2 + 2\text{H}_2\text{O}$
(d) $2\text{HClO}_4 + \text{Ba(OH)}_2 \rightarrow \text{Ba(ClO}_4)_2 + 2\text{H}_2\text{O}$

91. (a) $2 \text{I}_4\text{O}_9 \longrightarrow 2 \text{I}_2\text{O}_6 + 2 \text{I}_2 + 3\text{O}_2$ oxidation/reduction or decomposition
(b) $\text{Mg} + 2 \text{AgNO}_3 \longrightarrow \text{Mg}(\text{NO}_3)_2 + 2 \text{Ag}$ oxidiation/reduction or single displacement
(c) $\text{SiCl}_4 + 2 \text{Mg} \longrightarrow 2 \text{MgCl}_2 + \text{Si}$ oxidation/reduction or single displacement
(d) $\text{CuCl}_2 + 2 \text{AgNO}_3 \longrightarrow 2 \text{AgCl} + \text{Cu}(\text{NO}_3)_2$ precipitation or double displacement
(e) $2 \text{Al} + 3 \text{Br}_2 \longrightarrow 2 \text{AlBr}_3$ oxidation/reduction or synthesis/combination

95; YOUR CHOICE

Chapter 15:

$$22. \frac{67.1 \text{ g}}{67.1 \text{ g} + 275 \text{ g}} \times 100\% = 19.6\%$$

34. (a) 3.35 M (b) 1.03 M (c) 0.630 M (d) 4.99 M

$$43. (a) 4.46 \times 10^{-4} \text{ mol} (b) 4.58 \times 10^{-3} \text{ mol} (c) 15.1 \text{ mol} (d) 0.0545 \text{ mol}$$

$$46. (a) 0.235 \text{ g} (b) 0.593 \text{ g} (c) 2.29 \text{ g} (d) 2.61 \text{ g}$$

$$62. M_1V_1 = M_2V_2 (1.25 \text{ M})(100 \text{ mL}) = (12.1 \text{ M})? \text{ mL} V_2 = 10.3 \text{ mL}$$

$$69. M_A V_A = M_B V_B (0.491 \text{ M})(27.2 \text{ mL}) = (0.502 \text{ M})? \text{ mL} V_B = 26.6 \text{ mL}$$