Ppt/Molarity, Stoichiometry and Dilution Ch 4 Sec 1-8 wksht

1. Which of the following solutions contains the largest number of moles of chloride ions:

a. 100.0 mL of 0.30M $AlCl_3$ — $100.0mL \times \frac{1L}{1000mL} \times \frac{.30mol}{1L} \times \frac{3 ions Cl^-}{1mol} = .090 mol Cl^-$

b. 50.0 mL of 0.60M $MgCl_2$ — $50.0mL \times \frac{1L}{1000mL} \times \frac{.60mol}{1L} \times \frac{2 ion Cl^-}{1mol} = .060 mol Cl^-$

c. 200.0 mL of 0.40M NaCl — $200.0mL \times \frac{1L}{1000mL} \times \frac{.40mol}{1L} \times \frac{1 ion Cl^-}{1mol} = .080 mol Cl$

2. A 100.0 mL portion of 0.200M potassium hydroxide is mixed with 100.0 mL of 0.200M magnesium nitrate.

a. Write a balanced equation for any reaction that occurs.

$2KOH_{(aq)} + Mg(NO_3)_{2(aq)} \rightarrow Mg(OH)_{2(s)} + 2KNO_{3(aq)}$

HAVE .02mol .02mol

b. What precipitates forms?

NEED .04 .01 .01mol XS $Mg(OH)_2$

c. What mass of ppt is produced?

$100.0mL \times \frac{1L}{1000mL} \times \frac{.200mol KOH}{1L} \times \frac{1 mol Mg(OH)_2}{2mol KOH} \times \frac{58.33 g}{1 mol} = .583g$

d. Calculate the concentration of each ion remaining in solution after precipitation is complete.

	$2K^+$	$2OH^-$	Mg^{2+}	$2NO_3^-$	$\rightarrow Mg(OH)_2$	$+ 2K^+$	$+ NO_3^-$
have	.020	.020	.020	.040			
need	.040	.040	.010	.020			
used	0	.020	.010	0 mol			
left	.020mol / .200L	0mol	.010mol / .200L	.040 mol / .200L			

$[K^+] = .10M$ $[Mg^{2+}] = .050M$

$[OH^-] = 0$ $[NO_3^-] = 2.0M$

3. A 230. mL sample of a 0.275 M $CaCl_2$ solution is left on a hotplate overnight; the following morning the solution is 1.10 M. What volume of water evaporated from the 0.275 M $CaCl_2$ solution?

$.230L \times 0.275M = 1.10M \times V_2$

$V = .0575L = 57.5mL$

230. mL − 57.5 mL

17.3 mL evaporated.

4. Rust stains can be removed by washing the surface witha dilute solution of oxalci acid, ($H_2C_2O_2$). The reaction is:

$$Fe_2O_{3(s)} + 6H_2C_2O_{4(aq)} \rightarrow 2Fe(C_2O_4)_3^{3-}{}_{(aq)} + 3H_2O_{(l)} + 6H^+{}_{(aq)}$$

?g 1.0L of 0.14M

a. Is this an oxidation-reduction reaction?

b. What mass of rust can be removed by 1.0L of a 0.14M solution of oxalic acid?

$1.0L \times \frac{0.14mol H_2C_2O_4}{L} \times \frac{1 mol Fe_2O_3}{6 mol H_2C_2O_4} \times \frac{159.7 g Fe_2O_3}{1 mol Fe_2O_3} = 3.7263$

3.7 g Fe_2O_3