**AP Chemistry – Unit 2**
**In Class Problems**

1. List whether each of the following is a strong, weak, or nonelectrolyte. If it is strong, write the dissociation equations.
   a. $HClO_4$
   b. $C_6H_{12}$
   c. LiOH
   d. $NH_3$
   e. $CaCl_2$
   f. $HC_2H_3O_2$

2. Calculate the molarity of a solution contain 0.875 mole NaCl in 1 liter? in 500 ml; in 100 ml; in 6 liters?

3. How would you prepare 500.00 mL of a 0.0500 M solution of $Cu(NO_3)_2$?

4. Calculate the volume of 0.500 M $Cu(NO_3)_2$ needed to prepare 250 mLs of a 0.0400 M $Cu(NO_3)_2$ solution.

5. Determine the molarity of Cl- ions in a solution prepared by dissolving 9.82 g of CuCl2 in enough water to make 600. mL of solutions.

**SOLUBILITY RULES: *memorize!!!***

1. **Most alkali metal salts AND** $NH_4^+$ salts ARE ***soluble***
2. $Cl^-$, $Br^-$, $I^-$ are ***soluble***, *except for $Ag^+$, $Hg_2^{+2}$, $Pb^{+2}$
3. $F^-$ are ***soluble,*** *except for IIA metals
4. $NO_3^-$, $ClO_3^-$, $ClO_4^-$, and $CH_3COO^-$ are ***soluble***
5. $SO_4^{-2}$ are ***soluble,*** *except for $Ca^{2+}$, $Sr^{+2}$, $Ba^{+2}$, $Ag^+$, $Pb^{+2}$, $Hg_2^{2+}$
6. $CO_3^{-2}$, $PO_4^{-3}$, $C_2O_4^{-2}$, $CrO_4^{-2}$, $S^{-2}$, $OH^-$, and $O^{-2}$ are ***INSOLUBLE***

(rule 1 takes priority!)

Heavy metal BAD GUYS!

***It can be assumed that ionic cmpds. that dissolve in water are strong electrolytes and are therefore soluble.***

**6.** Determine which of the following compounds are soluble in water

a. Silver nitrate
b. Sodium chloride
c. Lead (II) bromide
d. Ammonium hydroxide
e. Barium sulfate
f. Calcium Hydroxide
g. Lithium Carbonate

**8.** Complete and balance the following reactions, determining, in each case, if a precipitate is formed. Write the molecular equation, the complete ionic equation, and the net ionic equation


a) Potassium chloride in combined with lead (II) nitrate

b) Silver nitrate and magnesium bromide are mixed

c) Potassium metal and water(Watch out here!—single replacement)

d) Sodium hydroxide is mixed with phosphoric acid

e) Zinc metal is added to a solution of copper (II) nitrate

**9.** Calculate the mass of silver sulfide produced when 18.0 g of silver nitrate is added to excess sodium sulfide.

**10.** How many mLs of 0.450 M HCl are required to completely react with 2.50 g of Zn?

$$Zn(s) + 2HCl\ (aq) \rightarrow ZnCl_2(aq) + H_2(g)$$

**11.** Calculate the molarity of sulfuric acid in a 20.00 mL sample, which is neutralized by 18.50 mLs of 0.750 M NaOH

**12.** How many grams of $Ba(OH)_2$ are contained in a 25.00 mL solution if 16.52 mL of 0.850 M HCl are required to completely neutralize the sample?

**13.** What mass of iron (III) hydroxide is produced when 35.0 ml of a 0.250 M solution of iron (III) nitrate is mixed with 55mL of a 0.180M KOH solution?

**14.** If 25.0 mL of 0.625 M HBr are mixed with 42.0 mL of 0.352 M NaOH, will the resulting solution be acidic or basic?

**15.** In the following reaction, identify the species that is reduced, oxidized, the reducing agent, and the oxidizing agent.

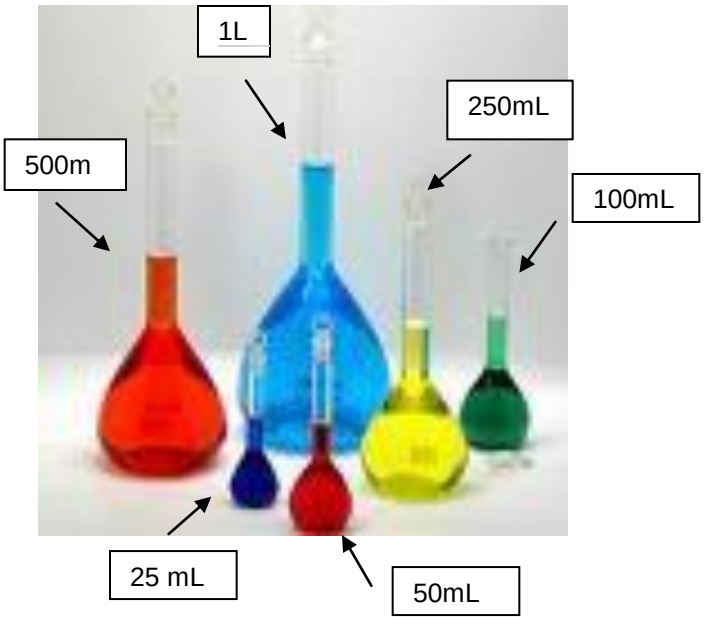
$$3Cu + 8H^{+} + 2NO_3^{-} \rightarrow 2NO + 4H_2O + 3Cu^{2+}$$

**16.** Balance the following oxidation-reduction reactions using the half-reaction method.

(a) $S^{2-}(aq) + NO_3^{-}(aq) \rightarrow S_8(s) + NO_2(g)$ acidic solution

(b) $MnO_4^{-}(aq) + I^{-}(aq) \rightarrow MnO_2(s) + IO_3^{-}(aq)$ basic solution

**Homework hint…..get rid of spectators ions before you start to balance with half reaction method.**




**17.** DeMo has a 6 M HCl stock solution. For her classes she needs 1 liters of 0.500 M. How would she make it?

**18.** DeMo has a solid silver nitrate. For her classes she needs 500mL of 0.500 M silver nitrate solution. How would she make it?

**19.** Potassium dichromate in acidic solution is frequently used to determine the concentration of Fe(II) in solution.

$$Cr_2O_7^{2-}(aq) + Fe^{2+}(aq) + H^+(aq) \rightarrow Cr^{3+}(aq) + Fe^{3+}(aq) + H_2O(l)$$

A solution of $Cr_2O_7^{2-}$ is prepared by dissolving 6.425 g of $K_2Cr_2O_7$ in 800.0 mL of water. A total of 21.35 mL of this solution is required to reach the end-point in a titration of a 250.0 mL sample containing Fe(II). Determine the concentration of Fe(II) in the solution.