Chemistry 121
Fall 2006
Test 2

Instructions: You have 50 minutes to complete this 100-point exam. All answers must be written on the Test Answer Sheet. You may use a simple scientific calculator. No programmable calculators allowed.

I. Multiple Choice (10 pts) Carefully and clearly circle the best answer on the Test Answer Sheet.

1. Which of the following is a weak electrolyte?
   a. NaOH
   b. $Ca(OH)_2$
   c. NaCl
   d. $Fe(OH)_3$

2. How many moles of K^+ are there in 10.0L of 0.680 M K_2SO_4?
   a. 6.80 mol K^+
   b. 13.6 mol K^+
   c. 0.0680 mol K^+
   d. 14.7 mol K^+

3. What stoichiometric coefficients correctly balance the following equation?
   ____$BaCl_2$ + ____Li_3PO_4 → ____$Ba_3(PO_4)_2$ + ____LiCl
   a. 1, 1, 1, 1
   b. 3, 1, 1, 3
   c. 3, 2, 1, 6
   d. None of the above

4. Many reactions do not proceed to completion. Which of the follow is NOT a reason for this?
   a. Competing reactions consume starting materials.
   b. Some of the product is lost during purification.
   c. Reactions can only occur for a set period of time.
   d. None of the above

5. What (if any) precipitate is formed by the reaction of sodium chloride with cobalt(II) nitrate?
   a. $CoCl_2$
   b. $NaNO_3$
   c. $Co(NO_3)_2$
   d. No precipitate is formed in the reaction.

II. Reactions, Precipitates and Calculations: Show all work on the Test Answer Sheet. Partial credit will be given for correct work. If I cannot read the work, it will not be graded.

6. (18 pts) Indicate whether or not the following compounds are soluble (SOL) or insoluble (IS).
   a. $Ca(OH)_2$
   b. $Zn(C_2H_3O_2)_2$
   c. $BaSO_4$
   d. $Mn(NO_3)_2$
   e. $(NH_4)_2CO_3$
   f. $CdCr_2O_7$
   g. Cr_2O_3
   h. AgCl
   i. $Al_2(SO_4)_3$

7. (12 pts) Write the (a) Complete, (b) Ionic and (c) Net Ionic balanced equations for the reaction of nickel(II) nitrate with rubidium carbonate. Remember to identify the precipitate

8. (5 pts) Write the balanced equation for the reaction of ammonia with nitric acid.

9. (10 pts) Calculate the molar mass of copper(II) chloride tetrahydrate. (**Show all work**)

10. How many atoms of oxygen are in 25.0 g of glucose, $C_6H_{12}O_6$? (MM of $C_6H_{12}O_6$ = 180.16 g/mol)

11. (15 pts) Mesitylene is a liquid hydrocarbon (contains hydrogen and carbon). It contains 89.94% carbon. What is the empirical formula of mesitylene?

12. (15 pts) A side reaction in the manufacture of rayon from wood pulp is seen below. How many grams of Na_2CS_3 are produced in the reaction of 117 g CS_2 and 15.0L of 6.00 M NaOH? (MM of CS_2 = 76.13 g/mol, MM of Na_2CS_3 = 154.17 g/mol)

$$3\ CS_2 + 6\ NaOH \rightarrow 2\ Na_2CS_3 + Na_2CO_3 + 3\ H_2O$$

13. (15 pts) What volume (in L) of 0.509M H_2SO_4 is needed to neutralize 2.50 L of 1.25 M NH_3?

$$2\ NH_3 \quad + \quad H_2SO_4 \quad \rightarrow \quad (NH_4)_2SO_4$$

	IA												IIIA	IVA	VA	VIA	VIIA	VIIIA
1	1 **H** 1.008	IIA																2 **He** 4.00
2	3 **Li** 6.94	4 **Be** 9.01											5 **B** 10.81	6 **C** 12.01	7 **N** 14.01	8 **O** 16.00	9 **F** 19.00	10 **Ne** 20.18
3	11 **Na** 22.99	12 **Mg** 24.31	IIIB	IVB	VB	VIB	VIIB	VIIIB			IB	IIB	13 **Al** 26.98	14 **Si** 28.09	15 **P** 30.97	16 **S** 32.06	17 **Cl** 35.45	18 **Ar** 39.95
4	19 **K** 39.10	20 **Ca** 40.08	21 **Sc** 44.96	22 **Ti** 47.90	23 **V** 50.94	24 **Cr** 52.00	25 **Mn** 54.94	26 **Fe** 55.85	27 **Co** 58.93	28 **Ni** 58.71	29 **Cu** 63.55	30 **Zn** 65.37	31 **Ga** 69.72	32 **Ge** 72.59	33 **As** 74.92	34 **Se** 78.96	35 **Br** 79.90	36 **Kr** 83.80
5	37 **Rb** 85.47	38 **Sr** 87.62	39 **Y** 88.91	40 **Zr** 91.22	41 **Nb** 92.91	42 **Mo** 95.94	43 **Tc** [98]	44 **Ru** 101.1	45 **Rh** 102.9	46 **Pd** 106.4	47 **Ag** 107.9	48 **Cd** 112.40	49 **In** 114.8	50 **Sn** 118.7	51 **Sb** 121.8	52 **Te** 127.60	53 **I** 126.90	54 **Xe** 131.30
6	55 **Cs** 132.9	56 **Ba** 137.3	71 **Lu** 175	72 **Hf** 178.5	73 **Ta** 181	74 **W** 183.9	75 **Re** 186.2	76 **Os** 190.2	77 **Ir** 192.2	78 **Pt** 195.1	79 **Au** 197	80 **Hg** 200.59	81 **Tl** 204.4	82 **Pb** 207.2	83 **Bi** 209	84 **Po** [209]	85 **At** [210]	86 **Rn** [222]
7	87 **Fr** [223]	88 **Ra** [226]	103 **Lr** [262]	104 [261]	105 [262]	106 [263]												

57 **La** 138.9	58 **Ce** 140.1	59 **Pr** 140.9	60 **Nd** 144.2	61 **Pm** [145]	62 **Sm** 150.4	63 **Eu** 152	64 **Gd** 157.3	65 **Tb** 158.9	66 **Dy** 162.5	67 **Ho** 164.93	68 **Er** 167.3	69 **Tm** 168.9	70 **Yb** 173
89 **Ac** [227]	90 **Th** 232	91 **Pa** [231]	92 **U** 238	93 **Np** [237]	94 **Pu** [244]	95 **Am** [243]	96 **Cm** [247]	97 **Bk** [247]	98 **Cf** [251]	99 **Es** [252]	100 **Fm** [257]	101 **Md** [258]	102 **No** [259]