

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.

- Which of the following is a weak electrolyte?
  - NaOH
  - Ca(OH)<sub>2</sub>
  - NaCl
  - Fe(OH)<sub>3</sub>
- How many moles of K<sup>+</sup> are there in 10.0L of 0.680 M K<sub>2</sub>SO<sub>4</sub>?
  - 6.80 mol K<sup>+</sup>
  - 13.6 mol K<sup>+</sup>
  - 0.0680 mol K<sup>+</sup>
  - 14.7 mol K<sup>+</sup>
- What stoichiometric coefficients correctly balance the following equation?  
$$\underline{\hspace{1cm}} \text{BaCl}_2 + \underline{\hspace{1cm}} \text{Li}_3\text{PO}_4 \rightarrow \underline{\hspace{1cm}} \text{Ba}_3(\text{PO}_4)_2 + \underline{\hspace{1cm}} \text{LiCl}$$
  - 1, 1, 1, 1
  - 3, 1, 1, 3
  - 3, 2, 1, 6
  - None of the above
- Many reactions do not proceed to completion. Which of the follow is NOT a reason for this?
  - Competing reactions consume starting materials.
  - Some of the product is lost during purification.
  - Reactions can only occur for a set period of time.
  - None of the above
- What (if any) precipitate is formed by the reaction of sodium chloride with cobalt(II) nitrate?
  - CoCl<sub>2</sub>
  - NaNO<sub>3</sub>
  - Co(NO<sub>3</sub>)<sub>2</sub>
  - No precipitate is formed in the reaction.

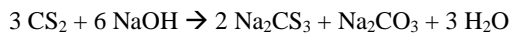
**II. Reactions, Precipitates and Calculations:** Show all work on the Test Answer Sheet. Partial credit will be given for correct work. If I cannot read the work, it will not be graded.

- (18 pts) Indicate whether or not the following compounds are soluble (SOL) or insoluble (IS).

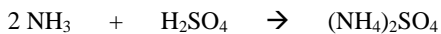
a. Ca(OH) <sub>2</sub>	d. Mn(NO <sub>3</sub> ) <sub>2</sub>	g. Cr <sub>2</sub> O <sub>3</sub>
b. Zn(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub>	e. (NH <sub>4</sub> ) <sub>2</sub> CO <sub>3</sub>	h. AgCl
c. BaSO <sub>4</sub>	f. CdCr <sub>2</sub> O <sub>7</sub>	i. Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>
- (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
- (5 pts) Write the balanced equation for the reaction of ammonia with nitric acid.
- (10 pts) Calculate the molar mass of copper(II) chloride tetrahydrate. (**Show all work**)
- How many atoms of oxygen are in 25.0 g of glucose, C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>? (MM of C<sub>6</sub>H<sub>12</sub>O<sub>6</sub> = 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  $\text{Na}_2\text{CS}_3$  are produced in the reaction of 117 g  $\text{CS}_2$  and 15.0L of 6.00 M  $\text{NaOH}$ ? (MM of  $\text{CS}_2 = 76.13 \text{ g/mol}$ , MM of  $\text{Na}_2\text{CS}_3 = 154.17 \text{ g/mol}$ )



13. (15 pts) What volume (in L) of 0.509M  $\text{H}_2\text{SO}_4$  is needed to neutralize 2.50 L of 1.25 M  $\text{NH}_3$ ?



	IA																		VIIIA																												
1	1 <b>H</b> 1.008																			2 <b>He</b> 4.00																											
2	3 <b>Li</b> 6.94	4 <b>Be</b> 9.01																																													
3	11 <b>Na</b> 22.99	12 <b>Mg</b> 24.31																																													
			IIIB	IVB	VB	VIB	VIIIB	VIII B			IB	IIB	5 <b>B</b> 10.81	6 <b>C</b> 12.01	7 <b>N</b> 14.01	8 <b>O</b> 16.00	9 <b>F</b> 19.00	10 <b>Ne</b> 20.18																													
4	19 <b>K</b> 39.10	20 <b>Ca</b> 40.08	21 <b>Sc</b> 44.96	22 <b>Ti</b> 47.90	23 <b>V</b> 50.94	24 <b>Cr</b> 52.00	25 <b>Mn</b> 54.94	26 <b>Fe</b> 55.85	27 <b>Co</b> 58.93	28 <b>Ni</b> 58.71	29 <b>Cu</b> 63.55	30 <b>Zn</b> 65.37	31 <b>Ga</b> 69.72	32 <b>Ge</b> 72.59	33 <b>As</b> 74.92	34 <b>Se</b> 78.96	35 <b>Br</b> 79.90	36 <b>Kr</b> 83.80																													
5	37 <b>Rb</b> 85.47	38 <b>Sr</b> 87.62	39 <b>Y</b> 88.91	40 <b>Zr</b> 91.22	41 <b>Nb</b> 92.91	42 <b>Mo</b> 95.94	43 <b>Tc</b> [98]	44 <b>Ru</b> 101.1	45 <b>Rh</b> 102.9	46 <b>Pd</b> 106.4	47 <b>Ag</b> 107.9	48 <b>Cd</b> 112.40	49 <b>In</b> 114.8	50 <b>Sn</b> 118.7	51 <b>Sb</b> 121.8	52 <b>Te</b> 127.60	53 <b>I</b> 126.90	54 <b>Xe</b> 131.30																													
6	55 <b>Cs</b> 132.9	56 <b>Ba</b> 137.3	71 <b>Lu</b> 175	72 <b>Hf</b> 178.5	73 <b>Ta</b> 181	74 <b>W</b> 183.9	75 <b>Re</b> 186.2	76 <b>Os</b> 190.2	77 <b>Ir</b> 192.2	78 <b>Pt</b> 195.1	79 <b>Au</b> 197	80 <b>Hg</b> 200.59	81 <b>Tl</b> 204.4	82 <b>Pb</b> 207.2	83 <b>Bi</b> 209	84 <b>Po</b> [209]	85 <b>At</b> [210]	86 <b>Rn</b> [222]																													
7	87 <b>Fr</b> [223]	88 <b>Ra</b> [226]	103 <b>Lr</b> [262]	104 [261]	105 [262]	106 [263]																																									
	<table border="1"> <tr> <td>57 <b>La</b> 138.9</td> <td>58 <b>Ce</b> 140.1</td> <td>59 <b>Pr</b> 140.9</td> <td>60 <b>Nd</b> 144.2</td> <td>61 <b>Pm</b> [145]</td> <td>62 <b>Sm</b> 150.4</td> <td>63 <b>Eu</b> 152</td> <td>64 <b>Gd</b> 157.3</td> <td>65 <b>Tb</b> 158.9</td> <td>66 <b>Dy</b> 162.5</td> <td>67 <b>Ho</b> 164.93</td> <td>68 <b>Er</b> 167.3</td> <td>69 <b>Tm</b> 168.9</td> <td>70 <b>Yb</b> 173</td> </tr> <tr> <td>89 <b>Ac</b> [227]</td> <td>90 <b>Th</b> 232</td> <td>91 <b>Pa</b> [231]</td> <td>92 <b>U</b> 238</td> <td>93 <b>Np</b> [237]</td> <td>94 <b>Pu</b> [244]</td> <td>95 <b>Am</b> [243]</td> <td>96 <b>Cm</b> [247]</td> <td>97 <b>Bk</b> [247]</td> <td>98 <b>Cf</b> [251]</td> <td>99 <b>Es</b> [252]</td> <td>100 <b>Fm</b> [257]</td> <td>101 <b>Md</b> [258]</td> <td>102 <b>No</b> [259]</td> </tr> </table>																			57 <b>La</b> 138.9	58 <b>Ce</b> 140.1	59 <b>Pr</b> 140.9	60 <b>Nd</b> 144.2	61 <b>Pm</b> [145]	62 <b>Sm</b> 150.4	63 <b>Eu</b> 152	64 <b>Gd</b> 157.3	65 <b>Tb</b> 158.9	66 <b>Dy</b> 162.5	67 <b>Ho</b> 164.93	68 <b>Er</b> 167.3	69 <b>Tm</b> 168.9	70 <b>Yb</b> 173	89 <b>Ac</b> [227]	90 <b>Th</b> 232	91 <b>Pa</b> [231]	92 <b>U</b> 238	93 <b>Np</b> [237]	94 <b>Pu</b> [244]	95 <b>Am</b> [243]	96 <b>Cm</b> [247]	97 <b>Bk</b> [247]	98 <b>Cf</b> [251]	99 <b>Es</b> [252]	100 <b>Fm</b> [257]	101 <b>Md</b> [258]	102 <b>No</b> [259]
57 <b>La</b> 138.9	58 <b>Ce</b> 140.1	59 <b>Pr</b> 140.9	60 <b>Nd</b> 144.2	61 <b>Pm</b> [145]	62 <b>Sm</b> 150.4	63 <b>Eu</b> 152	64 <b>Gd</b> 157.3	65 <b>Tb</b> 158.9	66 <b>Dy</b> 162.5	67 <b>Ho</b> 164.93	68 <b>Er</b> 167.3	69 <b>Tm</b> 168.9	70 <b>Yb</b> 173																																		
89 <b>Ac</b> [227]	90 <b>Th</b> 232	91 <b>Pa</b> [231]	92 <b>U</b> 238	93 <b>Np</b> [237]	94 <b>Pu</b> [244]	95 <b>Am</b> [243]	96 <b>Cm</b> [247]	97 <b>Bk</b> [247]	98 <b>Cf</b> [251]	99 <b>Es</b> [252]	100 <b>Fm</b> [257]	101 <b>Md</b> [258]	102 <b>No</b> [259]																																		