

Chemistry 121
Test 2
Spring 2007

You have 75 minutes to complete this 100 point test. Please mark each answer clearly and show all work. You may use a simple scientific calculator. NO GAPHING CALCULATORS.

I. (10 pts) Multiple Choice: Circle the best answer

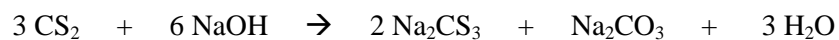
- How many moles of aluminum atoms are there in 1.0 mol of aluminum oxide?
 - 1.0 mol Al
 - 2.0 mol Al
 - 3.0 mol Al
 - 4.0 mol Al
- What is the empirical formula of ethylene glycol, HOCH₂CH₂OH?
 - CHO
 - C₂H₆O₂
 - CH₃O
 - None of the above
- What precipitate will be formed by the reaction of barium nitrate with sodium sulfate?
 - Na₂SO₄
 - NaNO₃
 - Ba(NO₃)₂
 - BaSO₄
- Which one of the following is the correct dissociation equation for ammonium carbonate in water?
 - $(\text{NH}_4)_2\text{CO}_3 \rightarrow 6 \text{ N} + 8 \text{ H} + \text{ C} + 3 \text{ O}$
 - $(\text{NH}_4)_2\text{CO}_3 \rightarrow \text{NH}_4^+ + 2 \text{ CO}_3^{2-}$
 - $(\text{NH}_4)_2\text{CO}_3 \rightarrow 2 \text{ NH}_4^+ + \text{CO}_3^{2-}$
 - $(\text{NH}_4)_2\text{CO}_3 \rightarrow (\text{NH}_4^+)_2 + \text{CO}_3^{2-}$
- Which of the following statements is correct?
 - In a balanced equation, molecules are balanced.
 - In a supersaturated solution, the solute is dissolved at high temperature and then cooled.
 - Weak acids are strong electrolytes.
 - None of the above

II. Short Answer and Balanced Equations: Clearly show all work for full credit.

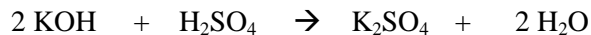
- (10 pts) Balance the following equations
 - $\text{___ Ag}_2\text{SO}_4 + \text{___ ZnCl}_2 \rightarrow \text{___ ZnSO}_4 + \text{___ AgCl}$
 - $\text{___ KI} + \text{___ Pb(NO}_3)_2 \rightarrow \text{___ KNO}_3 + \text{___ PbI}_2$
 - $\text{___ TiCl}_4 + \text{___ Na}_3\text{PO}_4 \rightarrow \text{___ Ti}_3(\text{PO}_4)_4 + \text{___ NaCl}$
 - $\text{___ Cu} + \text{___ HCl} \rightarrow \text{___ CuCl}_2 + \text{___ H}_2$
 - $\text{___ Cr(NO}_3)_6 + \text{___ K}_2\text{CO}_3 \rightarrow \text{___ Cr(CO}_3)_3 + \text{___ KNO}_3$

4. (15 pts) Indigo, the dye for blue jeans is composed of carbon, hydrogen, nitrogen and oxygen. It has percent composition by mass of 73.27% C, 3.84% H, 10.68% N and the remainder is oxygen. The molar mass of indigo is 262.3 g/mol. What are the empirical formula and the molecular formula of indigo?

5. (15 pts) Below is a side reaction in the manufacture of rayon. How many grams of Na_2CS_3 are produced in the reaction of 121 g of CS_2 and 1.50 L of 1.85 M NaOH ? (MM of $\text{CS}_2 = 76.13$ g/mol, MM of $\text{Na}_2\text{CS}_3 = 154.17$ g/mol)



6. (10 pts) How many milliliters of 2.155 M KOH are required to titrate 25.00 mL of 0.3057 M H₂SO₄?



	IA																VIIIA	
1	1 H 1.008																	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										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]				