Chemistry 121A Hanson **EXAM 1** **Fall 2014**

Name_____

CALCULATORS ARE EXPLICITLY NOT ALLOWED ON THIS EXAM

NOTE: To receive credit, show your work.
If you feel strapped for time, try to at least *start* each problem before going on to the next.

PLEASE DO NOT OPEN THE EXAM UNTIL INSTRUCTED TO DO SO

1 1A																	18 8A
1 **H** 1.008	2 2A											13 3A	14 4A	15 5A	16 6A	17 7A	**2** **He** 4.003
3 **Li** 6.941	**4** **Be** 9.012											**5** **B** 10.81	**6** **C** 12.01	**7** **N** 14.01	**8** **O** 16.00	**9** **F** 19.00	**10** **Ne** 20.18
11 **Na** 22.99	**12** **Mg** 24.31	3 3B	4 4B	5 5B	6 6B	7 7B	8	9 8B	10	11 1B	12 2B	**13** **Al** 26.98	**14** **Si** 28.09	**15** **P** 30.97	**16** **S** 32.07	**17** **Cl** 35.45	**18** **Ar** 39.95
19 **K** 39.10	**20** **Ca** 40.08	**21** **Sc** 44.96	**22** **Ti** 47.88	**23** **V** 50.94	**24** **Cr** 52.00	**25** **Mn** 54.94	**26** **Fe** 55.85	**27** **Co** 58.93	**28** **Ni** 58.69	**29** **Cu** 63.55	**30** **Zn** 65.39	**31** **Ga** 69.72	**32** **Ge** 72.61	**33** **As** 74.92	**34** **Se** 78.96	**35** **Br** 79.90	**36** **Kr** 83.80
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** 101.07	**45** **Rh** 102.91	**46** **Pd** 106.42	**47** **Ag** 107.87	**48** **Cd** 112.41	**49** **In** 114.82	**50** **Sn** 118.71	**51** **Sb** 121.76	**52** **Te** 127.60	**53** **I** 126.90	**54** **Xe** 131.29
55 **Cs** 132.91	**56** **Ba** 137.33	**71** ***Lu** 174.97	**72** **Hf** 178.49	**73** **Ta** 180.95	**74** **W** 183.85	**75** **Re** 186.21	**76** **Os** 190.2	**77** **Ir** 192.22	**78** **Pt** 195.08	**79** **Au** 196.97	**80** **Hg** 200.59	**81** **Tl** 204.38	**82** **Pb** 207.2	**83** **Bi** 208.98	**84** **Po** (209)	**85** **At** (210)	**86** **Rn** (222)
87 **Fr** (223)	**88** **Ra** 226.03	**103** **†Lr** (260)	**104** **Rf** (261)	**105** **Db** (260)	**106** **Sg** (263)	**107** **Bh** (262)	**108** **Hs** (265)	**109** **Mt** (266)	**110** ?	**111** ?	**112** ?		**114** ?		**116** ?		**118** ?

*Lanthanide Series	**57** **La** 138.91	**58** **Ce** 140.12	**59** **Pr** 140.91	**60** **Nd** 144.24	**61** **Pm** (145)	**62** **Sm** 150.36	**63** **Eu** 151.96	**64** **Gd** 157.25	**65** **Tb** 158.93	**66** **Dy** 162.50	**67** **Ho** 164.93	**68** **Er** 167.26	**69** **Tm** 168.93	**70** **Yb** 173.04
†Actinide Series	**89** **Ac** 227.03	**90** **Th** 232.04	**91** **Pa** 231.04	**92** **U** 238.03	**93** **Np** 237.05	**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)

(16) 1. Define **and give one example** of each:

a. *element*

b. *compound*

c. *allotrope*

d. *solution*

(16) 2. Fill in the blank with the best word or number you can think of.

In this world, just about everything we see is a (a)_____ because it contains more than one chemical substance. Even the purest diamond contains more than one (b)_____ of carbon -- for example, carbon-(c)_____ and carbon-(d)_____, which differ only in their number of (e)_____. And a pure substance such as water can be present as more than one (f)_____, in which case we say that we have a (g)_____ (h; same as a)_____.

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(30) 3. Lay out the calculation in each case using a sequence of conversion factors, and indicate how many significant figures should be used to express the answer. Do not attempt to solve it by hand.

a. How many mg of a aspirin are in a 35.0 kg of aspirin?

b. How many grams of AuCl are required to make 25 mL of a solution that is 10 mg/L using a volumetric flask?

c. The size of a standard gold bar is 7.00 inches by 3.625 inches by 1.75 inches. If the density of gold is 19.31 g/cm^3, and gold sells for $1,216.60 a troy ounce, how much is a standard gold bar worth? (1 troy ounce is 31.1034768 grams; 1 inch is 2.54 cm.

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(12) 4. In each case below, name the compound or give its chemical formula, as appropriate.

a. aluminum nitrate _____

b. _____ _____ $FeCO_3$

c. _____ _____ SO_3

d. mercury(I) hydroxide [CAREFUL!] _____

e. _____ _____ BeF_2

f. calcium hydrogensulfate _____

(10) 5. In each case, convert the number to standard scientific notation and indicate the number of significant figures indicated or implied by the measurement:

a. 102.0

b. 0.0040560

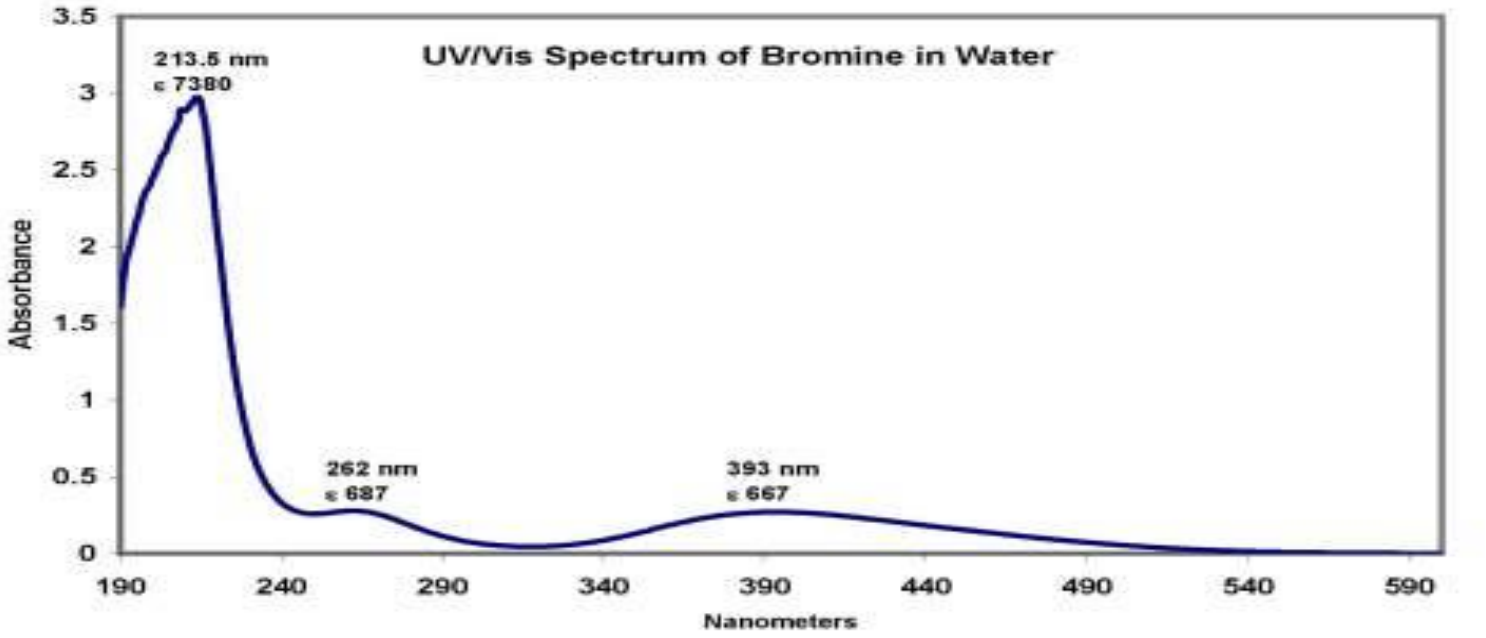
c. 70 ^{o}C (as measured on a typical thermometer)

d. 50 mL (as measured with a volumetric flask)

e. 4030.0×10^{-3}

(exam continued on the next page)

(16) 6. Consider the data below.



a. This spectrum is a "UV/Vis" spectrum, meaning it measures all the way past violet into the ultraviolet using special cuvettes made out of quartz. Below the spectrum, in the five blanks provided, indicate to the best of your ability the regions of the spectrum "yellow" "green" "blue" "violet" and "ultraviolet".

b. Within this region, what is λ_{max}? Within this region, what is A_{max}?

c. Of the two possibilities "reddish" or "bluish", which do you think is more likely for the color of this solution? Briefly explain your reasoning.

e. If this spectrum was taken in a standard cuvette like you used in lab, and the units of absorptivity are L/(g-cm), what is the concentration of bromine in this solution? [Lay out the calculation, but do not solve for the answer.]

PLEDGE: I pledge my honor that on this examination I have neither given nor received assistance not explicitly approved by the professor and that I have seen no dishonest work.

[ ] I intentionally did not sign the pledge. Signature_____