Chem 2 Lab - FS/99
Final Exam - Monday Section

Name_____ Section: A1 / A2 / B1 / B2

Stdnt. No. _____ TA: TBone / Mathur / Emily / Dong

Read the following before beginning.

Use extra paper, or the back of the page, if necessary. All work must be neatly displayed, with units, to receive partial credit. Unreadable or missing work will not be considered for partial credit. Circle final answers, with the correct number of significant figures. Ask about any problems that may be unclear to you. A periodic table is provided on the last page.

Using standard nuclear notation for atomic number and mass number, complete the following.

1. The alpha decay of Curium, Cm-238 isotope (4 pt)

2. Given the following decay data, calculate k, t1/2 and the initial counts, No , at time = 0.
(9 pt)

time(min)	counts, (N)	ln(N)
2.00	17497	
5.00	9659	
10.00	3588	

3.An antacid containing 0.500 g of Mg(OH)2 was dispersed in water and 25.00 ml of 0.853 M HCl was added. The solution was then titrated with 1.623 M NaOH to a pink endpoint using phenolphthalein indicator. Calculate the number of ml of NaOH required for this titration assuming 100% efficiency. MWt. of Mg(OH)2 = 58.32 gram / mole. (12 pt)
Neutralization reaction: Mg(OH)2 + 2HCl ---> MgCl2 + 2H2O

4. Calculate the change in freezing point for a solution of 10.00 g of NaCl
(a strong electrolyte) dissolved in 100.00 g of water. KF for water = 1.86 K kg mole-1
MWt of NaCl = 58.443 gram/mole (6 pt)

5. Glycerine, an organic nonelectrolyte, is used in automobile radiators. A 50.00 weight percent solution of glycerine in water raises the boiling point of the solution by 8.25 oC. Calculate the molecular weight of glycerine given this information. Kb for H2O = 0.512 K kg mole-1 (6 pt)

6. Calculates the percent transmittance of a solution with an absorbance of 0.222. (5 pt)

7. A blue dye standard solution containing 10.50 ppm of dye gave a reading of 35.0%T in a spectrophotometer. An unknown containing the same dye gave a reading of 70.0%T at the same wavelength. Calculate the concentration of the blue dye in the unknown. (6 pt)

8. What is the name of the detection reaction used in our GC in which halogenated compounds produce a green coloration to a flame in the presence of copper metal? (3 pt)

9. If a compound takes 100. seconds to elute on a home made GC with 256 plates, what is the baseline width of the peak on this system? (5 pt)

10. In our GC, we injected 0.20 ml of CH2Cl2 vapor at 22 oC and 1.00 atm. What mass of CH2Cl2 was injected, assuming this is an ideal gas, PV=nRT. R= 0.082 L atm/mole K MWt=84.93 (5 pt)

In the titration of iodate ion in the Ksp experiment, the following exothermic equilibrium reaction is involved:
$IO_3^-(aq) + 5I^-(aq) + 6H^+(aq) \Longleftrightarrow 3I_2(s) + 9H_2O(l)$

What would be the effect of the following changes on the above equilibrium:

11. A decrease in temperature: (3 pt)

a) shift right b) shift left c) no change d) not enough info

12. Addition of more iodine, $I_2(s)$: (3 pt)

a) shift right b) shift left c) no change d) not enough info

13. Addition of some NaOH to raise pH: (3 pt)

a) shift right b) shift left c) no change d) not enough info

14. Write the equilibrium constant expression, Keq, for the following equilibrium reaction:
$H_2(g) + 1/2O_2(g) \Longleftrightarrow H_2O(l)$ (3 pt)

15. How many degrees of freedom are present in a set of 4 data points? (3 pt)

(a) 1 (b) 2 (c) 3 (d) 4 (e) 5 (f) depends on the data

16. The term describing the agreement of a set of experimental data points with an external, 'correct' values is called the _____ of the data. (3 pt)

17. Errors in data in which the measured values fluctuate both higher and lower than the true value are called _____ errors. (3 pt)

18. A titration experiment in which the wrong concentration of titrant was used for all of the titrations would be an example of what type of experimental error? (3 pt)

19. The solubility of strontium iodate increases as the temperature is raised. Is this reaction endo or exothermic? Write out the equilibrium involved including heat. (3 pt)

20. The solubility of strontium iodate, $Sr(IO_3)_2(s)$, is listed in the CRC as 0.30 gram / L at 15 oC.
MWt of $Sr(IO_3)_2$ = 437.43 gram / mole.
Calculate the Ksp of strontium iodate from this information. (12 pt)

Periodic Table Here