Time: 90'

Chemistry 205
Final Exam

June 4, 1997
H. Deeb

Family Name:_____

First Name:_____

Student Nb.:_____

Major:_____

Section:_____

Grading:

I _____ /96

II _____ /18

III _____ /20

IV _____ /24

V _____ /17

Total _____/175

I- Circle the letter that precedes the correct answer (there is only one correct answer)

* **Silver chloride is insoluble in:**

a- Concentrated HCl
b- Concentrated HNO_3
c- Concentrated NH_4OH
d- All aqueous acidic or basic solutions.

* **$S^{=}$ can be attained by heating thioacetamide aqueous solutions.**

a- $S^{=}$ can be used to precipitate group II and group III ions as sulfides when present as a mixture.
b- In general qualitative analysis, $S^{=}$ can be used to separate group II ions from other ions irrespective of the pH of the solution.
c- All ions that can form insoluble sulfides with $S^{=}$, react to give a black precipitate.
d- Although $S^{=}$ is group II reagent, it can precipitate group III, group II and some other ions.

* **We can distinguish between $K_2C_2O_4$ and KCl solids, using a simple visual test, by:**

a- Dissolving in H_2O, only KCl will dissolve.
b- Addition of Ca^{++} ions in aqueous solution .
c- Dissolving in dilute H_2SO_4.
d- Addition of NH_4^{+} ions in aqueous solution.

* **To transfer an aliquot of an unknown for titration, the student should use:**

a- Volumetric flask of proper volume.
b- Pipet of the appropriate volume.
c- Graduated cylinder of proper volume.
d- Erlenmeyer flask of proper volume.

* **The answer of the following operation:**

$$\frac{(2.65)^2 - 5.117}{40.933 \times (5.21 + 2.1)}$$

reported to the proper number of significant figures, using scientific notation is:

a- 6.4×10^{-3}
b- 0.0064
c- 6.37×10^{-3}
d- 0.63×10^{-2}

* **A compound of molecular weight = 280, absorbed 65.0% of the radiation at a certain wave length in a 2.00 cm cell at a concentration of 0.0150 g/l . The Molor absorptivity of this compound is:**

a- 6.06×10^{3}
b- 15.2
c- 21.7
d- 4.25×10^{3}

* **In the following unbalanced redox reaction:**

$$C + H_2SO_4 \rightarrow CO_2 + SO_2 + H_2O$$

a- The equivalent weight of the reducing agents is greater than the equivalent weight of the oxidizing agent.
b- The equivalent weight of the oxidizing agent is greater than the equivalent weight of the reducing agent.
c- In all its reactions, carbon has the same equivalent weight as in the above reaction.
d- The above reaction can not take place and can not be balanced.

* **The number of moles of NaOH that has to be added to 333 mls of water to produce a solution of pH = 12,67 is:**

a- 0.0156 moles
b- 7.12×10^{-14} moles
c- 0.0468 moles
d- none of the above

* **The solubility of Ag_2CrO_4 is 2.157×10^{-2} g/l. Ksp of Ag_2CrO_4 is:**

a- 4.014×10^{-5}
b- 4.653×10^{-4}
c- 1.099×10^{-12}
d- 4.226×10^{-9}

* **The molar solubility of lead iodide in 0.200 M sodium iodide is:**

a- 2.0×10^{-7} M
b- 1.3×10^{-3} M
c- 4.0×10^{-8} M
d- none of the above.

* **25.0 ml of 0.0010 M $AgNO_3$ are mixed with 75.0 ml of 0.0010 M Na_2CO_3 - Ksp of Ag_2CO_3 = 6.2×10^{-12} at 25°C**

a- No precipitate of Ag_2CO_3 will form after mixing.
b- Ag_2CO_3 will precipitate upon mixing.
c- More Ag^+ has to be added to form the slightly soluble salt Ag_2CO_3.
d- none of the above.

* **The molar concentration of the salt at the equivalence point of the complete titration of 0.500 N solution of H_2SO_4 with 10.0 ml of 0.25 M NaOH solution is:**

a- 0.167 M
b- 1.25×10^{-3} M
c- 0.0833 M
d- 0.0416 M

II- The following reactions represent the solubility equilibrium for the given sparingly soluble salts.

a- $ZnCO_{3(s)} \rightleftharpoons Zn^{++}_{(aq)} + CO^{=}_{3(aq)}$

b- $ZnS_{(s)} \rightleftharpoons Zn^{++}_{(aq)} + S^{=}_{(aq)}$

c- $Ni(OH)_{2(s)} \rightleftharpoons Ni^{++}_{(aq)} + 2OH^{-}_{(aq)}$

The solubility of these salts can be increased by adding a common reagent. What is this common reagent? Write chemical equations involved (if applicable) in each case to explain the function of this reagent in increasing the solubility.

III- State if a precipitate will form or not upon mixing the compounds mentioned in each case. If so, write the formula of the precipitate and its color.

a- Aqueous solution of $Fe_2 (SO_4)_3$ and sodium hydroxide.

b- Aqueous solution of calcium nitrate and potassium carbonate.

c- Aqueous solution of sodium nitrate and lead acetate.

d- Aqueous solution of mercurous nitrate and potassium chloride.

IV- When the solution in each of the beakers in column I is mixed with the proper solution in a beaker in column II, a precipitate will form. Identify this proper solution by writing the number in the blank below , and write the net-ionic equation involved in each case.

I	II
Beaker 1: $AgNO_3$	Beaker 5: $pb(ClO_4)_2$
Beaker 2: $pb(NO_3)_2$	Beaker 6: $K_4Fe(CN)_6$
Beaker 3: $(NH_4)_2\ CrO_4$	Beaker 7: KI
Beaker 4: $Cu(NO_3)_2$	Beaker 8: K_2SO_4

a- Beaker 1 + Beaker _____
Equation:

b- Beaker 2 + Beaker _____
Equation:

c- Beaker 3 + Beaker _____
Equation:

d- Beaker 4 + Beaker _____
Equation:

V- Solve the following problem, show your solution and report the answer to the proper number of significant figures.

A 1.331g sample of impure $Ba(OH)_2$ was dissolved in 250 ml of aqueous solution. A 35.0 ml portion of this solution was needed to titrate 17.6 ml of 0.0935 M HCl to the end point. What is the percent age purity of the original sample.