

Time: 90'

Chemistry 205
Final Exam

June 4, 1997
H. Deeb

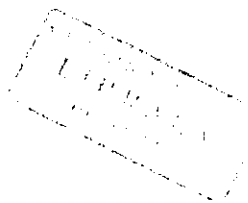
Family Name: _____

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 HNO₃
- c- Concentrated NH₄OH
- 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 K₂C₂O₄ and KCl solids, using a simple visual test, by:**

- a- Dissolving in H₂O, only KCl will dissolve.
- b- Addition of Ca⁺⁺ ions in aqueous solution .
- c- Dissolving in dilute H₂SO₄.
- d- Addition of NH₄⁺ 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 Molar 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:



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. K_{sp} 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.

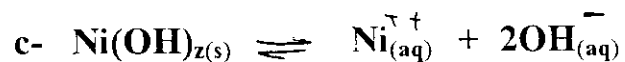
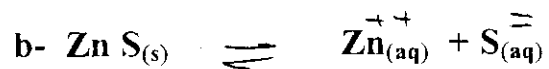
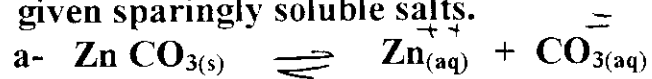
* 25.0 ml of 0.0010 M AgNO_3 are mixed with 75.0 ml of 0.0010 M Na_2CO_3 - K_{sp} of $\text{Ag}_2\text{CO}_3 = 6.2 \times 10^{-12}$ at 25°C

- 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.



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 $\text{Fe}_2(\text{SO}_4)_3$ 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
Beaker 1: AgNO_3
Beaker 2: $\text{pb}(\text{NO}_3)_2$
Beaker 3: $(\text{NH}_4)_2 \text{CrO}_4$
Beaker 4: $\text{Cu}(\text{NO}_3)_2$

II
Beaker 5: $\text{pb}(\text{ClO}_4)_2$
Beaker 6: $\text{K}_4\text{Fe}(\text{CN})_6$
Beaker 7: KI
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 $\text{Ba}(\text{OH})_2$ 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.