: 90 min. | Chemistry 205 Final Exam | Jan. 26 , 1998 H. Deeb

Family name: _____

First name: _____

Student no: _____

Major: _____

Section: _____

Grading :

I	/50
II	/20
III	/30
IV	/25
V	/14
VI	/12
VII	/12
VIII	/12

Total : _____ / 175

I) Circle the letter that precedes the correct answer in each of the following . (there is only one correct answer) .

* **During titration , the student was obliged to fill a buret twice to transfer 74.96 mls . If the absolute uncertainly of the buret is 0.02 ml ; then the relative uncertainty of the above transferred volume is :**

a- 0.08
b- 0.04
c- 0.001
d- 0.0005

* **A proper indicator foran acid - base titration is :**

a- Phenolpthalein , since it shows a recognizable change in color.
b- An indicator that changes color at pH = 7 .
c- A weak acidic indicator .
d- An indicator that changes color around the pH which corresponds to the end point .

* **A good experimental data , when plotted vs, number of measurement should follow a normal distribution :**

a- Because of systematic error .
b- Because of random error that can not be eliminated .
c- The wider this normal curve the more accurate the data .
d- The narrower the curve the more accurate the data .

* **Mercurous chloride is soluble in :**

a- H_2O
b- Conc. HCl solution .
c- Dilute HCl solution .
d- Dilute NaCl solution .

* **HgS and AgCl slightly soluble salts :**

a- are soluble in conc. HNO_3 .
b- are insoluble in conc. HNO_3 .
c- are white salts .
d- both have cotions that belong to group II ions .

* **Fe^{+3} ions can be separated from Al^{+3} ions :**

a- by addition of conc. base .
b- by addition of dilute base .
c- by addition of KSCN .
d- by addition of Aluminum dye .

* **Among the following , the only compound that can not react with NH_3 is :**

a- AgCl
b- Hg_2Cl_2
c- $pbCl_2$
d- Bi $(OH)_3$

* **To increase the solubility of AgCl in a saturated aqueous solution :**

a- Conc. NH_3 may be added .
b- Dilute HCl may be added .
c- Dilute HNO_3 may be added .
d- Any base may be added .

* **Ksp of pbI_2 at 25 °C is 1.4×10^{-8} . The maximum mass of pbI_2 that can dissolve in 1.0 L of water at 25 °C is :**

a- 1.5×10^{-3} g
b- 3.0×10^{-3} g
c- 0.31 g
d- 0.69 g

* **If 25.0 mls of 0.0010 M $AgNO_3$ are mixed with 75.0 mls of 0.0010 M Na_2CO_3 at 25 °C , (Ksp of Ag_2CO_3 = 6.2×10^{-12} at 25 °C) :**

a- Ag_2CO_3 precipitate will form .
b- Ag_2CO_3 precipitate will not form .
c- $AgCO_3$ precipitate will form if the concentration of $AgNO_3$ solution is decreased .
d- None of the above .

II) Explain the effect of adding dilute HCl solution on the solubility of each of the following in a saturated aqueous solution . Use chemical equations if applicable , to clarify your answer .

a- AgCl

b- Phthalic acid

c- ZnS

d- $ZnCO_3$

III) Write complete balanced equation(s) that represent(s) each of the following :

a- Reaction Al^{+3} when heated with thioacetamide

b- Confirmatory test for Cu^{+2}

c- Reactions that show the amphoteric properties of $pb(OH)_2$

d- Confirmatory test of Mg^{+2}

e- Reaction of any of Group II sulfides with HNO_3 .

f- Addition of hot concentrated HCl to AgCl .

IV) How can you distinguish among each of the following compounds by <u>unusual chemical means</u> .Write the chemical equation(s) involved and indicate observation :

a- $pbNO_3$ and $NaNO_3$

b- $Hg_2(NO_3)_2$ and $Hg(NO_3)_2$

c- $(NH_4)_2C_2O_4$ and $(NH_4)_2SO_4$

d- $Al(OH)_3$ and $Mg(OH)_2$

e- KCl and KNO_3

V) **In general unknown analysis , the first step done was addition of Group I reagent .**

a- Can instead thioacetamide be added as the first step before addition of HCl . Explain .

b- " Selective precipitation" was applied in general unknown analysis , at which stage this was done ? Explain .

VII) A 0,300 g sample containing phosphoric acid and inert material was diluted with water and titrated with 0.0500 M NaOH according to the following reaction :

$$H_3PO_4 + 2NaOH \rightarrow Na_2HPO4 + 2H_2O$$

The end point was reached after 29.00 ml titrant was added . Calculate the % of H_3PO_4 in the sample .

VII) Calculate the volume of 1.00 M HCL that must be added to 100.0 ml of 0.100 M NaOH to reach a pH of 11.0 .

VIII) **If a 0.0100 M solution absorbs 55% at some wave length . What will be the % transmittance for a 0.0200 M solution of the same substance .**