Time: 60 minutes

Chemistry 102
Lab. Final

Jan. 24, 00
R. Jaber

Family Name : _____

First Name : _____

ID Number : _____

Score:

I.	/22
II.	/24
III.	/30
IV.	/24
Grade	/100

☺ *Good Luck*

I-(22 %) Complete the following sentences.

1- A compound that exhibits both acidic and basic properties is called _____.

2- The separation of the components in a mixture based on their distribution or partition between 2 immiscible phases is called _____.

3- In the electrolysis of an aqueous solution of potassium iodide the appearance of a dark blue color at the anode indicates the formation of _____ according to the following half reaction _____.

4- Among aqueous solutions of the following compounds of equal concentration: $Na_2Cr_2O_7$, CH_3COOH , $Ba(OH)_2$, $FeCl_3$. The strongest electrolyte is _____ and the weakest electrolyte is _____.

5- An example of a compound that can act as both an oxidizing and a reducing agent is _____.

6- In the equilibrium reaction between $Fe^{3+}_{(aq)}$ & $SCN^-_{(aq)}$ ions, the product is _____ and the color of the solution depends on _____ and _____ . The law that relates quantitatively the extent of absorption to the concentration of the absorbing species is called_____.

7- The addition of hydrazinium sulfate to a diamine silver complex results in formation of _____.

II a-(24 %) Complete the following table of comparison between Galvanic and electrolytic cells.

	Galvanic	Electrolytic
1. Type of redox rxn.		
2. Energy		
3. Site of oxidation		
4. Site of reduction		
5. Anode polarity		
6. Cathode polarity		

b- Given the following standard electric potentials.

$Al^{3+} + 3e^- \longrightarrow Al_{(s)}$ $E^0 = -1.66$

$Mg^{2+} + 2e^- \longrightarrow Mg_{(s)}$ $E^0 = -2.37$

$Zn^{2+} + 2e^- \longrightarrow Zn_{(s)}$ $E^0 = -0.76$

$Cu^{2+} + 2e^- \longrightarrow Cu_{(s)}$ $E^0 = +0.34$

$Ag^+ + 1e^- \longrightarrow Ag_{(s)}$ $E^0 = +0.80$

1- Arrange the above species in an increasing order of ease of oxidation (ie. Least easily oxidized to most easily oxidized).

2- Given the net ionic equation $Zn_{(s)} + Cu^{2+}_{(aq)} \longrightarrow Cu_{(s)} + Zn^{2+}_{(aq)}$

i- Write the anode & the cathode half reactions.

ii- Find the cell voltage ΔE^0 and predict whether the above reaction is spontaneous or not.

III-(30%)1- Write the complete balanced equation for the laboratory preparation of each of the following gases.

a) Preparation of oxygen gas.

b) Preparation of Carbon dioxide gas.

c) Preparation of Carbon monoxide gas.

2-a) **Samples of sulfur and calcium are heated separately in a deflagrating spoon and each is introduced into a bottle containing oxygen gas.**

- Write your observations.
- Write the chemical equations.
- Comment on the nature of the product in each case. (Acidic or Basic).

b) Carbon dioxide is bubbled through a solution of lime water.

- Write your observation.
- Write the chemical equations.
- Give the name of the final product.

c) A stream of carbon monoxide is directed onto a spot of aqueous potassium permanganate solution on a piece of filter paper.

- Write your observation.
- Write a complete balanced equation of the reaction.

d) 1ml of concentrated nitric acid is added to 2 pieces of copper metal in a test tube.

- Write your observation.
- Write a complete balanced equation for the reaction.
- Identify the oxidizing and reducing agents.

IV-(24%)

a) Give the name of a reagent that will distinguish between the following pairs of ions in solution.
Include the chemical reactions involved and the color of precipitates.

a) Hg_2^{2+} and Hg^{2+}

b) Mg^{2+} and Zn^{2+}

c) Fe^{3+} and Bi^{3+}

d) NH_4^+ and K^+

b) Draw a flow chart for the separation and identification of the following ions when present in a mixture.
Include reagents, color of precipitates, complexes etc...

Ag^{+}, Pb^{2+}, Al^{3+}, Ca^{2+} and Na^{+}