Palestine Technical University- Kadoorie

Course's Name: General Chemistry lab (2)

Course's Number: 10550106

Exam's Period: 60 min (11:00 – 12:00)

Questions' Number: 8

Total Mark: : 40

Pages' Number: 4

Instructor's Name: ....

Student's Name:.........................

Student's Number:.......................

Section's Number:.......................

Exam's Date: 08/12/2016

First Semester 2016/2017

(Molar masses: Cl_2 = 70.90 g/mol, $CaCO_3$ = 100.1 g/mol)

(Q1)   Bleach Analysis   5 Points

A 10.0-mL volume of Ultra Bleach is diluted to 100 mL in a volumetric ask. A 25.0-mL sample of this solution is analyzed according to the procedure in the bleach analysis experiment. Given that 30.75 mL of 0.135 M $Na_2S_2O_3$ are needed to reach the stoichiometric point, answer the following questions.

   a- How many grams of available Cl_2 are in the titrated sample?

   b- How many grams of Ultra Bleach are analyzed? Assume that the density
      of bleach is 1.084 g/mL.

   c- Calculate the percent available chlorine in the Ultra Bleach.

(Q2)   Molar mass of a solid   4 Points

A 0.194-g sample of a nonvolatile solid solute dissolves in 9.82 g of cyclohexane (k_f=20.0 C^o. kg/ mol). If the change in the freezing point of the solution is 2.94 C^o, Calculate the molar mass of the solute?

1

(Q3)   Potentiometric Analysis   4 Points

Data in the following table were obtained for the titration of a 0.312-g sample of a solid, monoprotic weak acid with a 0.15 M KOH solution..

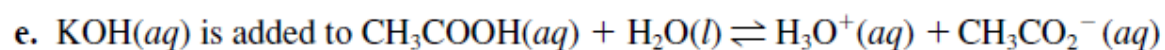| V_{KOH} added (mL)	pH
0.00	1.96
2.00	2.22
4.00	2.46
7.00	2.77
10.00	3.06
12.00	3.29
14.00	3.60
16.00	4.26
17.00	11.08
18.00	11.67
20.00	12.05
25.00	12.40
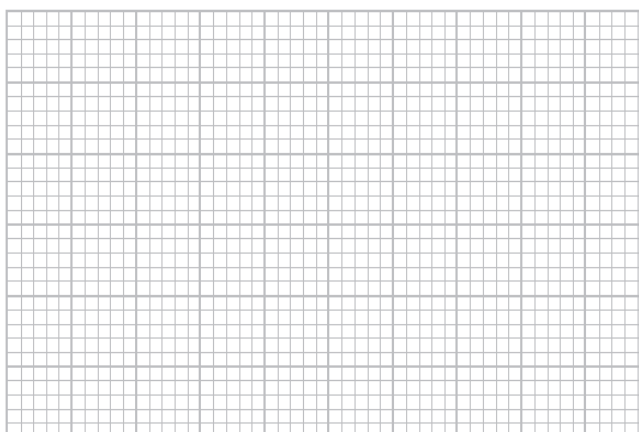
a- Plot The titration curve?

b- What is the molar mass of the solid weak acid?

(Q4)   LeChatelier's   principle   6 Points

1- Give an example of a buffer system and explain how it works?

2-The following chemical equilibria are studied in this experiment, indicate the direction, left or right, of the equilibrium shift when the accompanying stress is applied to the system.

a. $NH_3(aq)$ is added to $Ag^+(aq) + Cl^-(aq) \rightleftharpoons AgCl(s)$

b. $HNO_3(aq)$ is added to $Ag_2CO_3(s) \rightleftharpoons Ag^+(aq) + CO_3^{2-}(aq)$

e. $KOH(aq)$ is added to $CH_3COOH(aq) + H_2O(l) \rightleftharpoons H_3O^+(aq) + CH_3CO_2^-(aq)$
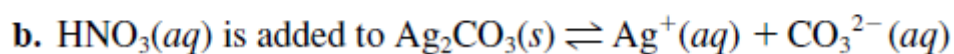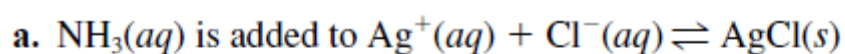
(Q5) Factors affecting reaction rate   8 Points

a- List the factors affecting reaction rates that we studied in experiment 23?

b- Consider the following acids HCl, H_3PO_4, CH_3COOH, and H_2SO_4,
List the above acids in order of decreasing reaction rate with magnesium

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(Q6)   Alkalinity of Water Source   5 Points

A- Define the alkalinity of water?

B- A chemist titrates a 50.0-mL water sample to the methyl orange endpoint with 24 mL of a 0.0120 M HCl standard solution, What is the "T" alkalinity of the solution expressed in ppm $CaCO_3$? (Assume density =1.00 g/mL)

Q7) Molar Solubility   4 Points

A saturated solution of magnesium hydroxide $Mg(OH)_2$ is prepared and the excess solid magnesium hydroxide is allowed to settle. A 25.0-mL aliquot of the saturated solution is withdrawn and transferred to an Erlenmeyer ask, and two drops of methyl orange indicator are added. A 0.00053 M HCl solution (titrant) is dispensed from a buret into the solution (analyte). The solution turns from yellow to a very faint red-orange after the addition of 13.2 mL.

   a. What is the molar solubility of magnesium hydroxide?

   b. What is the solubility product, Ksp, for magnesium hydroxide?

(Q8) Galvanic Cell   4 Points

1-Draw an example galvanic cell (show all parts) make sure to properly label the reactions at the cathode and anode, the flow of the electrons and ions?

2-Explain how is electrical neutrality maintained in each half-cell?