Palestine Technical University- Kadoorie

Course's Name: General Chemistry lab (2)   Instructor's Name: ....
Course's Number: 10550106   Student's Name:.......................
Exam's Period: 80 min (11:00 – 12:00)   Student's Number:....................
Questions' Number: 7   Section's Number:.....................
Total Mark: : 40   Exam's Date: 17/5/2016
Pages' Number: 4

Second Semester 2015/2016

(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?
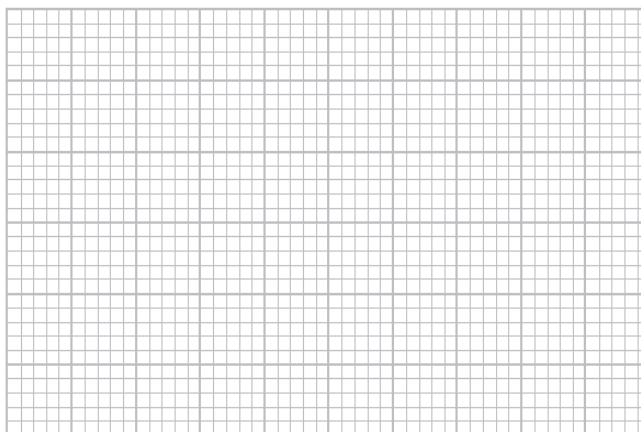
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(Q3)   Potentiometric Analysis   4 Points

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. Plot The titration curve.

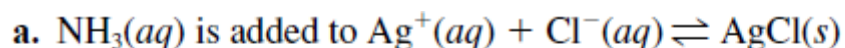| V_{KOH} added (mL)	pH
0.00	1.96
2.00	2.22
4.00	2.46
7.00	2.77
10.00	3.06
12.00	3.29
14.00	3.60
16.00	4.26
17.00	11.08
18.00	11.67
20.00	12.05
25.00	12.40

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

b- What is the pk_a of the 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 $CH_3COOH(aq) + H_2O(l) \rightleftharpoons H_3O^+(aq) + CH_3CO_2^-(aq)$

2
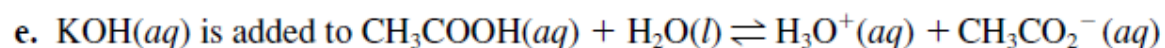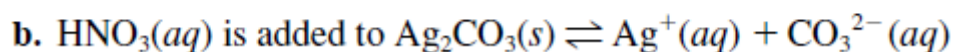
(Q5) Factors affecting reaction rate   8 Points

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)

C- If 10 ml of a 0.0120 M HCl standard solution was needed to titrate the above sample to the Phenolphthalein endpoint what type of ions contributing to alkalinity of water does the above sample have?

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?

(Q7)   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?