**University of Salahaddin - Erbil Analytical Chemistry**

**College of Agriculture Time : 3 hours
Department of Field Crops Date : / / 2018**

**First Class Model No. (2)**

**Final Examination (Autumn Season) - (2017-2018)**

**ــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــSend Back The Question Sheet Upon Completing Your Answer. You Should Draw Correct and Precise Figures**

**ـــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــ**

**Q1)** Explain with details and equations **Volhard method** according to:

**1-** Basic principles of the method.

**2-** Enumerate and explain three steps to prevent the Ag ion present in AgCl from reaction with SCN ion.

**3-** When I- is analyzed: the indicator is not added until AgI is precipitated completely.

**4-** When (Br-) & (I-) are titrated with Ag+, it is no need to filtration..

**5-** The titration must be carried out in acid solution.

**6-** **Prove**: at equilibrium; (Cl-) concentration of the solution is estimated and should be 1.6 \* 10-3 mol/l., k = [1.65 \* 10+2].

 **(30 marks)**

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**Q2-A)**Explain and Enumerate five requirements for a material to be primary standard

 **(12 marks)**

**Q2-B)** an analyst wishes to prepare a standard solution of NaCl, then (about) 3gm of NaCl are dissolved in 500 ml H2O. What is (N) NaCl ? Assuming (685.2 mg) AgNO3 requires 38.23 ml of NaCl solution? **(12 marks)**

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**Q3)** Answer the following: **(24 marks)**

1- **Prove:** 28% solution of H2SO4 contains in 1000g of H2O = 3.965 molal.

2- **Prove:** 2.8 gm of KOH are required to prepare a solution of (0.1 F , 500ml) of this compound .

3- Calculate the **p value** for each ion in a solutionthat is 2.0 \* 10-3 *M* ofNaCl and 5.4\* 10-4 *M* of HCl?

4-Give three balancedequations for KMnO4reaction in (acidic, neutral and basic solutions), also show how you will calculate the equivalent weight of this oxidizing reagent.

5- A quantity of BaCl2.2H2O is to be titrated with AgNO3. Calculate the number of meq contained in 0.367g of pure substance?

6- Compute (N) of concentrated sulfuric acid having sp. gr = 1.84, percentage ratio = 98%. Then prepare 250 ml of 0.1 N of this acid.

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**Q4)** Choose the suitable word to complete the following sentences. **(22 marks)**

**(gravimetric, Halids, Ag2O, Oxygen, scatter, K2CrO4 , acetic acid, direct, titrant, Mohr, solute**

1- Precipitation titration are important because they provide excellent methods for the determination of……………. and certain metal ions.

2- The formation of a second precipitate of distinctive color is the basis for end point detection with ……………. method.

3- Ag+ + 2 OH- $ ⇄$ 2AgOH $⇄$ ……………. + H2O

4- AgNO3 + …………... Ag2CrO4 + 2KNO3

5- …………… and carbon dioxide are also essential components of blood chemistry.

6- A solution does not allow beams of light to ……………. .

7- The particles of ……………. in a solution cannot be seen by naked eye.

8- We might refer to vinegar as 5% solution of ………………….. in H2O.

9- The end point signal tells the analyst to stop adding ……………….

10- in several instances, the ……………. titration of an analyte with reagent is not feasible.

11- The volumetric methods re equivalent in accuracy to …………… procedures.

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**Atomic weights : H = 1 , C = 12 , O = 16 , S = 32 , Na = 22.99 , Cl = 35.45 , K = 39 , Mn = 54 , Fe = 55.9 , Ag = 107.9 , N = 14, Ba=137**

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**Prof.(A.)/ Dr. Dheyaa J. Yaqoob . 31 / JAN /2018**