MANIPAL
ACADEMY of HIGHER EDUCATION
(Deemed to be University under Section 3 of the UGC Act, 1956)

DEPARTMENT OF SCIENCES, IV SEMESTER M.Sc (CHEMISTRY)
END SEMESTER EXAMINATIONS, APRIL 2019

SUBJECT - PRINCIPLES AND PRACTICE OF ANALYTICAL CHEMISTRY [CHM - 5008]

(REVISED CREDIT SYSTEM-2017)

Time: 3 Hours Date: 30-04-2019 MAX. MARKS: 50

Note: (i) Answer **ALL** questions

(ii) Draw diagrams, and write equations wherever necessary

1A. Define the following with appropriate examples
a) spread or range b) significant figures c) Coefficient of variation

1B. Two different analytical methods were used to determine residual chlorine in sewage effluents. Both the methods were used on the same samples, but each sample came from various locations, with differing amounts of contact time with the effluent. The concentration of chlorine in mg/L was determined by the two methods, and the following results were obtained:

Sample	Method A	Method B
1	0.39	0.36
2	0.84	1.35
3	1.76	2.56
4	3.35	3.92
5	4.69	5.35
6	7.70	8.33

a) What type of t test should be used to compare the two methods? Explain with reason.
b) Do the two methods give different results? (Tabulated t value for sample 6 at 95% confidence level is 2.3).

1C. Explain how electrolytic precipitation is different from normal precipitation technique. Discuss the various factors affecting precipitation of solute from a solution. **[3+3+4]**

2A. Differentiate between the following;
i) Wet ashing and dry ashing
ii) Electroosmosis and electrophoresis

2B. i) Describe the purification of aniline by employing steam distillation technique.
ii) Discuss in brief the factors affecting electrolytic precipitation.

2C. Explain the following with appropriate examples
i) Operational and personal errors
ii) Additive and proportionate errors [3+3+4]

3A. i) Explain the use of nitric acid and perchloric acid as the reagent for decomposition and dissolution of the sample
ii) Write any two advantages and limitations each of microwave decomposition method.

3B. A certain extraction system has a distribution ratio of 100. If 300 mg of solute is present in 100 mL of aqueous solution (solvent A), find the amount of solute extracted by one extraction with 100 mL of solvent B and by two extractions with 50 mL of solvent B which is immiscible with solvent A. Comment on the efficiency of extraction in these two cases. Also calculate the percentage of extraction of solute by solvent B.

3C. i) Why is a high supporting electrolyte concentration used in polarography? Why is it necessary to buffer solutions in organic polarography?
ii) Write the comparison between chronoamperometry and chronopotentiometry. [3+3+4]

4A. Can the components of a completely miscible mixture showing a maximum in the vapour pressure - composition curve be separated completely by distillation? Explain your reasoning with a graphical representation by taking an example.

4B. Discuss the applications of cyclic voltammetry in various fields.

4C. Explain the reason for the observed variation in conductivity in the following cases with the help of graph,
i) titration of hydrochloric acid with ammonium hydroxide
ii) titration of KCl with $AgNO_3$ [3+3+4]

5A. How do you determine the concentration of an analyte solution in complexometric titration using potentiometry? Explain the reason for the variation of E.M.F. as a function of volume of titrant added.

5B. Illustrate with appropriate examples, the applications of reverse osmosis and ultracentrifugation methods.

5C. Discuss briefly how the coulometric and amperometric analysis were performed? [3+3+4]

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