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, July 2020

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

(REVISED CREDIT SYSTEM-2017)

Time: 2 Hours Date: 10/07/2020 MAX. MARKS: 25

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

(ii) Draw diagrams, and write equations wherever necessary

1A. A standard method for the determination of carbon monoxide CO level in gaseous mixtures from hundreds of measurements is known to have a standard deviation of 0.21 ppm CO. A small modification of the method yields a value of standard deviation of 0.12 ppm CO for a pooled data set with 10 degrees of freedom. Another modification of the method with has a standard deviation of 0.14 ppm CO with 10 degrees of freedom. Explain with proper reasoning the whether any of the two new methods are more precise than the standard ones. (The critical value of F at 95% confidence level for 10 degrees of freedom is 2.8)

1B. Explain the advantages of microwave digestion over other methods of decomposition and dissolution.

[2+3]

2A. Differentiate between electrodialysis and electrophoresis.

2B. What aqueous concentration of iodide should be used to remove roughly 99% of the iodine initially present in 50 mL of chloroform using 5 extractions with 50 mL volume of water? What are the limitations of distribution law?

[2+3]

3A. Explain the graph expected for the potentiometric acid-base titration when glass electrode is used as indicator electrode and S.C.E. is used as reference electrode.

3B. Discuss about the types of amperometric titrations and write their applications.

[2+3]

4A. Explain any four factors affecting the choice of an analytical method.

4B. A 5×10^{-3} M solution of $CdCl_2$ in 0.1 M KCl shows a diffusion current at -0.8 V of 50 μA. The mercury is dropping at a rate of 18 drops per minute. Ten drops are collected and found to weigh as 3.82×10^{-2} g. Calculate a) diffusion coefficient b) if the capillary is replaced by another, for which the drop time is 3 s and ten drops weigh 4.2×10^{-2} g, what will be the new value of diffusion current? Why N_2 gas is not passed through the polarographic cell during the analysis?

[2+3]

5A. Define coprecipitation and post precipitation. How can they be avoided? Explain how precipitation is different from recrystallization.

5B. Differentiate between the following;

a) Random and systematic error

b) Reproducibility and Repeatability

c) Sample and population standard deviation

[2+3]

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