Total No. of Questions : 4]

SEAT No. :

P1862

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M.Sc.-II

ANALYTICAL CHEMISTRY

CH – 390 : Electroanalytical and Current Analytical Methods in Industries

(2008 Pattern) (Semester - III)

Time : 3 Hours] *[Max. Marks : 80*

Instructions to the candidates:

1) ***All questions are compulsory and carry equal marks.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of logarithmic tables, non programmable calculator is allowed.***
4) ***Answer to the two sections should be written in seperate answer book.***

SECTION - I

Q1) Answer any four of the following. **[20]**

a) State the principle of electrogravimetric analysis. Explain the importance of hydrogen over potential in the electrogravimetry determination of metal ions.

b) What is coulometry? With example explain the technique primary coulometric titration.

c) Write a note on cathodic stripping voltametry.

d) Calculate the diffusion current of Cd^{2+} ion in solution having concentration 7.1mm, if the drop time for 10 drops was 34.7 sec. The mercury flowrate was 1.72 mg/sec.

[Give : Diffusion coefficient of $Cd^{2+} = 6.7 \times 10^{-6}$ cm^2/sec]

e) An electroactive species yielded a wave with a limiting current of 15.0μ A with rotating discelectrode rotating at rate of 10 r/s. What limiting current would be expected at a rate of 30 rotation/sec.

Q2) Attempt any four of the following. **[20]**

a) Explain the terms.

i) Half wave potential

ii) Diffusion current

b) Write a short note on cyclic voltametry.

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c) Describe the advantages of pulse polarography over classical polarographic methods.

d) State and explain the principle of amperometric titration. Explain the nature of amperogram when analyte and reagent both are electroactive.

e) Standard addition technique was used for polarographic analysis of Cd^{2+} in sample. From the data given below calculate the concentration of Cd^{2+} in a sample.

Added concentration in MM	Diffusion current in μA
0.0	3.8
1.20	5.5
2.50	7.2
4.04	9.5
6.00	12.2
7.50	14.3

SECTION - II

Q3) Answer any four of the following. **[20]**

a) Describe the various steps involved in neutron activation analysis.

b) State the principle of differential thermal analysis. Discuss its working in detail.

c) Give the applications of turbidimetry and nephelometry.

d) To determine the concentration of penicilin present in a commercial preparation an isotopically labelled reference of pencillin is used with specific activity of 75,000 Bq. $9m^{-1}$. A 10mg of labelled penicillin is added to 500mg of sample. After mixing 1.5 mg of penicillin was recovered which showed activity of 10 Bq. Calculate the concentration of penicillin in commercial preperation.

e) A TG curve was obtained for 10.05 mg of a sample containing $CuSO_4.5H_2O$. When the monohydrate formation was complete at about 200°c, the loss in mass was 1.2 mg. Find the percentage of $CuSO_4.5H_2O$ in the sample.

(Given At. Wt of Cu = 63.55, S = 32, O = 16, H = 1)

Q4) Answer any four of the following. **[20]**

a) State the principle of nephelometry. Describe the instrumental set up used for it.

b) Write a short note on direct isotope dilution analysis.

c) Explain the principle and applications of spectroelectro chemistry.

d) Explain the terms

i) Neutron flux

ii) Specific activity

iii) Radiometry

e) Calculate the percentage of $MgCo_3$ and $CaCo_3$ in 85 mg of limestone sample that exhibits thermogram showing weight of 75 mg at 500ºC and 60 mg at 900ºC.

(Give At wt. Co = 40.08 mg = 24.31 C = 12 O = 16)