Seat No. : 330.

N30-111

December-2014

M.Sc., Sem.-I

CHE-404 : Chemistry

(Analytical Chemistry)

Time : 3 Hours] [Max. Marks : 70

1. Answer the following : 14

(a) Discuss in brief ways to express accuracy and precision and explain types of errors.

OR

A soda ash sample was analyzed in a chemical laboratory by titration with standard hydrochloric acid. The analysis was performed in triplicate and the following results were obtained: 93.50%, 93.58% and 93.43% of Na_2CO_3. Within what range are you 95% confident that the true value lies ? (Student's t = 4.303).

(b) Describe qualitative and quantitative analysis in analytical science with a suitable example.

OR

Explain the role of F-test and Q-test in statistical treatment.

2. Answer the following : 14

(a) What is sampling ? Explain different sample preparation steps during chemical analysis.

OR

Calculate the molarity of each of the following solutions :

(i) 30 g of $Co(NO_3)_2 \cdot 6H_2O$ in 4.3 L of solution, molecular wt. 291.03 g/mol,

(ii) 30 mL of 0.5 M H_2SO_4 diluted to 500 mL.

(b) Write a brief note on the use of internal standards and standard addition technique with an illustration.

OR

How will you find the 'best straight line' using least square linear regression ?

3. Answer the following : 14

(a) Write a short note on Derivative Spectrophotometry.

OR

Derive Lambert-Beer's Law in chemical analysis and state its limitations.

(b) Explain in brief Circular Dichroism and Optical Rotatory Dispersion.

OR

Explain different components of a UV-Visible Spectrophotometer.

4. Answer the following : 14

(a) How will you measure an equilibrium constant using Scatchard plot ?

OR

Explain the analysis of a mixture when :

(i) the individual spectra overlap and

(ii) the individual spectra are well resolved.

(b) Illustrate various photometric titration curves and its advantages in locating the equivalence point.

OR

Discuss : The Job's method of continuous variation for determining the composition of a complex.

5. Answer in brief : (1 mark each) 14

(1) What are quality control charts ?

(2) Define limit of detection and limit of quantitation.

(3) What does the value of correlation coefficient, r = 0 suggest ?

(4) Comment on the relation between standard deviation and Gaussian curve.

(5) Define: Significant figures

(6) Define molality and normality.

(7) Define validation. Give names of two validation parameters.

(8) What is a chromophore ? Give one example.

(9) State the function of a monochromator in spectrophotometer.

(10) Write the units for 'molar absorptivity' and 'absorbance'.

(11) State the wavelength region for visible and UV radiation.

(12) Give the relation between absorbance and transmittance.

(13) Define wavenumber and wavelength.

(14) Significance of Ringbom Plot.