DD-127

December-2018

M.Sc., Sem.-I

404 : Chemistry
(Analytical Chemistry)

Time : 2:30 Hours]   [Max. Marks : 70

1. (A) Explain in detail confidence limit, confidence intervals and test of significance. An enzymatic method for determining alcohol in wine is evaluated by comparison with a gas-chromatographic (GC) method. The same sample is analyzed several times by both methods with the following results (% ethanol). Enzymatic method: 13.1, 12.7, 12.6, 13.3, 13.3. GC method: 13.5, 13.3, 13.0, 12.9. Comment on the significance of the enzymatic method compared to the GC method at the 95 % confidence level. (F value at 95 % confidence level is 9.12)   14

OR

(i)   Discuss in brief qualitative and quantitative analysis in analytical science.   7

(ii) Describe the significance of quality control charts and Q-test.   7

(B) Answer the following : (any **four** out of six)   4

(i)   What is relative standard deviation ?

(ii) Explain method robustness.

(iii) Name any two publishers in analytical science.

(iv) How can determinate errors be overcome ?

(v)   What do you understand by sample matrix ?

(vi) Define: Limit of detection.

2. (A) Explain the fundamentals of sampling and sample preparation. Discuss general steps involved in chemical analysis.   14

OR

(i)   Give an account of least square regression for finding best straight line.   7

(ii) Describe in brief standard addition technique and importance of internal standards.   7

(B) Answer the following : (any **four** out of six)   4

(i)   Significance of correlation co-efficient.

(ii) What are residues in a calibration curve ?

(iii) If the mole fraction of KBr in its aqueous solution is 0.24, what will be the mole fraction of water ? (Molecular mass of KBr is 119.0 g/mol and that of water is 18.0 g/mol)

(iv) Molarity is independent of temperature. – True or false.

(v) 50 mL of an iron(II) sulphate solution reacts completely with 60.0 ml of 0.150 N potassium permanganate. Calculate the normality of iron (II) sulphate solution.

(vi) Why it is recommended to prepare solutions in normality for titrations ?

3. (A) Derive Lambert-Beer's Law in chemical analysis. Describe in detail the instrumental components of UV-Visible spectrophotometer.   14

OR

(i) Explain the concept of circular dichroism and optical rotary dispersion.   7

(ii) Give a detailed account of Ringbom plot.   7

(B) Answer the following : (any **three** out of **five**)   3

(i) Define : Transmittance.

(ii) Why monochromator is placed after the light source in a spectrophotometer ?

(iii) State the equation which represents relation between frequency and wavelength for electromagnetic waves.

(iv) What is derivative spectrophotometry ?

(v) Find the absorbance of a 0.0024 M solution of a substance with a molar absorptivity of 313 L M^{-1} cm^{-1} in a cell with a path length of 2.00 cm.

4. (A) Discuss the analysis of a mixture of analytes when the spectra are resolved and unresolved.   14

OR

(i) Explain the theory for measurement of equilibrium constant by Scatchard Plot.   7

(ii) Describe the role of Job's method of continuous variation in finding stoichiometry of a complex.   7

(B) Answer the following : (any **three** out of **five**)   3

(i) Absorbance is dimensionless. – True or false.

(ii) What do you understand by stoichiometry ?

(iii) Give any one example of photometric titration.

(iv) Define equilibrium constant.

(v) Give any two applications of spectrophotometry.

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