Chemistry - E Analytical Chemistry
Quality in Analytical Chemistry

QP Code : 19422

(2½ Hours) [Total Marks : 60

N. B. : (1) All questions are compulsory.
(2) Figures to the right indicate full marks.
(3) The use of a log table or a non-programmable calculator is permitted.

1. (a) Attempt any two of the following :–
(i) Define "sampling". Give the criteria for the acceptance or rejection of any sample.
(ii) Explain the terms: "quality control" and "quality assurance" with reference to chemical industry.
(iii) What is the information to be documented about the sample, while reporting the results of analysis?
(iv) State and explain the factors to be considered while selecting a method for analysis. 8

(b) What are the performance criteria for the methods used to determine the analytical sample from the complex matrix? 4

OR

(b) Describe the following parameters involved in validation of any analytical method: 4
(i) Recovery Test (ii) Blank

2. (a) Attempt any two of the following :– 8
(i) How would you distinguish between the detection limit of instrument and the detection limit of method?
(ii) Explain the Boxcar Technique used to reduce noise.
(iii) Write a note on: "significance of GMP in pharmaceutical manufacturing processes".
(iv) What is "Drug Act" and "Drug Schedule"?

(b) Three quantities are a = 29.75, b = 34.36, c = 45.42 and their respective uncertainties are 0.06, 0.08, 0.05; If the final measurement is of the type Y = a + b + c, calculate the combined uncertainty in the measurement of Y. 4

OR

(b) The following data were obtained for a voltage measurement in mV on a noisy system: 5.86, 5.53, 5.39, 5.48, 5.93, 5.61, 5.75, 5.67 Assuming that the noise is random, calculate the signal to noise ratio of the system. 4

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3. (a) Attempt any **two** of the following :– 8
   (i) Explain the principle and instrumentation of ion chromatography, with the help of suitable diagram.
   (ii) What are supercritical fluids? Discuss their properties.
   (iii) With suitable examples, explain the synthetic ion exchangers.
   (iv) Explain the terms "Ion exchange equilibria" and "Breakthrough capacity".

(b) 250 cm^3 of sodium ion solution containing 10 g / dm^3 sodium chloride is allowed to pass through a cation exchanger with 5.5 m mol/g exchange capacity dry resin. What is the minimum weight of the resin required to remove sodium ions completely from the solution? (at. wt. Na = 23, Cl = 35.5) 4

OR

(b) Explain the role of suppressor column in ion chromatography. What are the applications of ion chromatography? 4

4. (a) Attempt any **two** of the following :– 8
   (i) Discuss the technique of inverse gas chromatography.
   (ii) Differentiate between gel filtration and gel permeation.
   (iii) Compare supercritical fluid chromatography with other types of liquid chromatography.
   (iv) Explain the retention behaviour in the size exclusion chromatography.

(b) What are affinity ligands? Discuss it with suitable examples. 4

OR

(b) State the advantages and limitations of the size exclusion chromatography. 4

5. Attempt any **four** of the following :– 12
   (i) Define - (i) Random Sample (ii) Representative Sample
   (ii) What is holding time with respect to analytical sample?
   (iii) Give a brief account of environmental noise.
   (iv) What is flicker noise? How is it minimized?
   (V) Name the various supercritical fluids used in supercritical extraction. Which is the most preferred and why?
   (vi) Give applications of super critical fluid extraction with reference to environmental and pharmaceutical field.
   (vii) Describe column packing in size exclusion chromatography.
   (viii) State the characteristics for an ideal matrix with respect to affinity chromatography.

OR-Con. 975-16.