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CAS 556

**IV Semester M.Sc. Examination, September/October 2022
(CBCS 2016 – 17 Syllabus)
ANALYTICAL CHEMISTRY
Separation Techniques**

Time : 3 Hours

Max. Marks : 70

Instructions : 1) Answer Part – **A** and **any four** questions from Part – **B**.
2) Figures to the **right** indicate **marks**.

PART – A

Answer **all** the following sub-questions.

(9×2=18)

1. a) What is solvent extraction ? Give any two important applications.
- b) List out factors affecting solvent extraction.
- c) Give the fundamental differences between affinity chromatography and adsorption chromatography.
- d) In a chromatographic separation of low molecular weight butyric acid elutes with retention time of 9.63 min, the column void time is 0.46 min. Calculate the retention factor for butyric acid.
- e) Give the basic principle of capillary zone and capillary gel electrophoresis.
- f) What is gel filtration chromatography ? How does it differ from gel permeation chromatography ?
- g) What is sedimentation velocity ?
- h) What is capillary isoelectric focusing ?
- i) Differentiate between liquid chromatography and gas chromatography.

P.T.O.



PART – B

Answer **any four** questions.

(13×4=52)

2. a) Discuss the basic principle, types and efficiency of solvent extraction.
b) 1 gram of benzoic acid dissolved in 100 mL of water is to be equilibrated with 100 mL of ether. The distribution coefficient, K_D is 100 and the dissociation constant, K_a is 6.5×10^{-5} . Calculate the distribution ratio, D , if the aqueous layer is at pH = 3, 5 and 7.
c) Explain the solvent extraction of a metal ion. **(5+4+4=13)**
 3. a) Explain the theory and classifications of electrophoresis.
b) Describe the factors influencing the electrophoretic phenomena.
c) Give the methodology of preparation of gel staining and destaining. **(5+4+4=13)**
 4. a) Explain the principle and instrumentation of gas chromatography.
b) What are detectors used in gas chromatography ? Briefly discuss the working principle of TCD.
c) Write a note on the theory and principle of size exclusion chromatography. **(5+5+3=13)**
 5. a) What is ultracentrifugation ? Explain the principle, methodology and applications of ultracentrifugation.
b) Briefly discuss micellar electrokinetic capillary chromatographic technique.
c) Explain the basis for electrophoretic separations. **(5+4+4=13)**
 6. a) What is synergistic extraction and salting out agent ? Explain with a suitable example.
b) Differentiate between packed and open tubular columns. Explain their applications in chromatography.
c) Discuss the capillary electrophoresis method that can be used for uncharged molecules. **(5+4+4=13)**
 7. a) Describe the working principle of packed column electro chromatography.
b) Discuss the significance of migration rate and plate height in capillary electrophoresis.
c) Explain the applications of GC/MS technique. **(4+5+4=13)**
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