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(104) SARDAR PATEL UNIVERSITY

M.Sc. Semester-III: Analytical Chemistry Examination (CBCS)
October-2018,
Tuesday, Date: 30.10.2018
Time: 2.00 p.m. to 5.00 p.m., Paper: PS03EANC21
Subject: Separation Methods

Total Marks: 70

N.B.: i) The numbers of the marks carried by each question is indicated at the end of the question
ii) Assume suitable data if considered necessary and indicate the same clearly.

Q.1   Highlight the correct option   [08]
i) HEPT express by_____.
   a) L x n   b) L/n
   c) H/n   d) A+ B/H
ii) Give the name of detector suitable for preparative chromatography.
   a) FID   b) ECD
   c) FPD   d) TCD
iii) Which of the following is used as a detector in SFC over HPLC?
   a) FID   b) TCD
   c) ECD   d) None
iv) Give the expected retention volume for a solute which has distribution co-efficient 0.68 on a column contains 58 mL. of stationary phase and 6.3 mL. mobile phase.
   a) 45.75 mL.   b) 4.57 mL.
   c) 4.57 Lit.   d) None
v) Which of the chromatography techniques does not have mobile and stationery phase?
   a) TLC   b) HPLC
   c) Gel-electrophoresis   d) GC
vi) Capacity of resin depends on _____.
   a) porosity   b) rigidity
   c) nature functional group   d) number of functional groups
vii) Which of the following preferred as absorbent to separate alkaloid?
   a) Cellulose   b) Alumina
   c) Polyamides   d) Silica gel
viii) Which of the following type of gel is filled in GPC column?
   a) Porous   b) Spherical
   c) Hard   d) All of above

Q.2   a) Attempt any **SEVEN**   [14]
i) Explain the theoretical equation of 'resolution' in chromatography and its utility.
ii) Discus the *Kovats* retention index and its applications.
iii) Explain briefly the SFE.
iv) Why post trailing of peak is observed in GSC? How to avoided it?
v) Why HPLC is superior over GC?

vi) Give the advantages of TLC over PC.

vii) Discuss the Rf and Rx Values?

viii) Write a note on "Chromatotron".

ix) Write the principle of size exclusion chromatography.

Q.3 a) Answer the following [06]

i Give the general method for separation of amino acids using PC.

ii Explain superiority of TLC over other chromatographic technique.

b) Describe methods employed for detection of spots in PC and discuss the choice of filter paper in this technique. [06]

OR

b) Give an account on applications of solvent extraction and Discuss the characteristics of solvent for extraction.

Q.4 a) What type of information retrieves from 'rate theory' and 'plate theory'? Discuss Van- Deemter constant, equations and its usefulness to find $H_{min.}$ and $u_{opt.}$ [06]

b) Answer the following [06]

i) Discuss ECD and its working principle.

ii) A 4.20 meter column has a height equivalent to a theoretical plate 0.70 mm. If the flow rate is 32.5 mL/min. calculate the base width in second of a peak for a solute having retention time.

   a) 39 Sec.   b) 1 min. and 14 Sec. and c) 3 min. and 48 Sec.

OR

b) Explain working principle of TCD. Discuss the comparison between TCD and FID.

Q.5 a) Explain the "gradient elution" in HPLC technique and discuss a detector suitable for it. [06]

b) Discuss the resolution in Chromatography. Two solutes with distribution ratio 1.47 and 1.86 are to separate on a column whose volume ratio of stationary phase to mobile phase is 13.6, (a) How many theoretical plates are needed to ensure a resolution of 1.35. (b) What length of column is required for part (a), if H is 0.250 cm. [06]

OR

b) Discuss the advantage of SFC over other chromatography. Explain the instrumentation and operating variables of SFC. [06]

Q.6 a) Answer the following [06]

i Explain the separation mechanism used in GPC.

ii Discuss the principle and types of ion-exchangers in detail.

b) Write a note on endosmosis and discuss on correction of endosmosis. [06]

OR

b) Discuss various methods used for calibration of gel permeation chromatography. [06]

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