

[81] Seat No : \_\_\_\_\_

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[81] SARDAR PATEL UNIVERSITY

M.Sc. Examination, Third Semester (CBCS)

Monday,

Time: 2.00 p.m. to 5.00 p.m.

Date: 25-11-2019

Subject: Separation Methods Paper: PS03EANC21

[Total Marks: 70]

N.B. (1) Figures to the right indicate full marks.

(2) Attempt all questions.

**Q. 1 Select the correct answer from each of the following: (08)**

1. The exchange capacity of cation exchanger generally \_\_\_\_\_ with increase in pH of the solution.  
(a) decrease (b) Increase (c) stable (d) random
2. Which of the following abbreviation is used for specific retention volume?  
(a)  $V_g$  (b)  $V_N$  (c)  $t_r$  (d)  $P_o$
3. Potassium is preferentially extracted by \_\_\_\_\_ with picrate as counter ion.  
(a) 15C5 (b) 12C4 (c) 18C6 (d) Cryptand 221
4. Layer of adsorbent in conventional TLC is \_\_\_\_\_ instead of layer of adsorbent in HPTLC.  
(a) slightly thinner (b) slightly thicker (c) uniformed (d) non-uniformed
5. Introduction of additional mobile phase which forces the solvent containing a part of the sample down the column is called as \_\_\_\_\_.  
(a) eluate (b) eluent (c) extract (d) elution
6. Which one the following dose not response by FID.  
(a)  $H_2S$  (b)  $CH_4$  (c)  $C_6H_6$  (d)  $C_4H_{10}$
7. As the electrophoresis proceeds, the \_\_\_\_\_ charged components migrate towards the anode.  
(a) positive (b) negative (c) none (d) all
8. The nature of silica gel is \_\_\_\_\_ and attracted of \_\_\_\_\_ compounds.  
(a) slightly acidic ..... basic (c) slightly basic ..... acidic  
(b) basic .....slightly acidic (d) neutral ..... all

**Q. 2 Answer the following: (Any Seven) (14)**

- [i] What is supercritical fluid? How it is use in separation?
- [ii] Discuss the gases used in gas chromatography as a carrier gas.
- [iii] What is distribution ratio in solvent extraction? Explain with suitable example.
- [iv] Explain the function of 'Guard column'.
- [v] Define the terms: (a) streaming potential (b) electro-osmosis
- [vi] Differentiate capillary and packed column in GC.
- [vii] Enlist the factors which are affected on  $R_f$  value in TLC.
- [viii] Explain the principle of Ion exchange chromatography.
- [ix] Briefly discuss the GC-MS.

- 3 [a] Explain the choice of paper in paper chromatography and Describe the method for separation of proteins using PC. (6)
- [b] Answer the followings: (6)
- [i] Differentiate between the conventional TLC and HPTLC.
- [ii] The distribution coefficient of  $I_2$  between  $CCl_4$  and  $H_2O$  is 85. Calculate the concentration of  $I_2$  remaining after extracting 50.0 mL of an aqueous  $1.0 \times 10^{-3}$  M solution of  $I_2$  with (a) 50.0 mL  $CCl_4$  (b) two 25 mL portion of  $CCl_4$ .
- OR**
- [b] Giving suitable example, explain various methods of contact and their efficiency of extraction. (6)
- 4 [a] Write in brief on the typical GC detectors along with its detection limit and applicable samples characteristics. Explain in detail on ECD detector. (6)
- [b] Discuss the terms 'relative retention' and 'resolution of peak'. 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. (i) 38 Sec. (ii) 1 min. and 4 Sec. and (iii) 3 min. and 28 Sec. (6)
- OR**
- [b] Define the distribution coefficient ( $K_D$ ). Discuss the "Basic chromatography equation" and its relation with  $K_D$ . (6)
- 5 [a] Discuss the term 'elution'. Explain the 'Gradient elution program'. (6)
- OR**
- [a] Discuss principle and working of UV detector use in HPLC. Give the comparative note of HPLC detectors. (6)
- [b] Discuss the important features of SFC over other separation technique. Explain SFC instrument. (6)
- 6 [a] Write in brief on following: (6)
- [i] Cation exchanger and its important applications
- [ii] Two dimensional electrophoresis.
- [b] A 3% solution of egg albumin buffer at pH of 7.2 was placed in electrophoretic cell having a diameter of 1.2 cm. A current of 20 m.amp. was used and it took 208 min. for the eggs albumin to move 5.8 cm towards the positive electrode. If the cell constant was  $18.3 \text{ cm}^{-1}$  and the resistance of the system was 7690 ohms at  $0^\circ\text{C}$ , calculate the mobility of this material. Determine the heat developed in the solution. (6)
- OR**
- [b] Explain the theory of GPC and draw schematic diagram of GPC instrumentation with proper labelling and discuss in brief about components used in it. (6)