What are Rf values indicates and an important variables effect on its values?

Chromatographic paper appears in several different grads, and the differences being principally in the density and thickness, illustrate how?

Classical LC suffers from a number of disadvantages.

Write the silica gel formation reaction mechanism, then demonstrate the difference form of this gel and how can be activated?

Mechanism of separation on the reversed phase column in HPLC, then explain the differences between normal and reversed bonded phase column in HPLC.

Most ion exchange experiments are performed in five main stages, discuss each of these stages and explain with suitable diagrams.

Discuss the principle of the Chromatographic plate theory and most important limitations and advantages of this theory.

Classify different chromatographic methods according to:

   a. Types of mobile phase
   b. Geometry of the System
   c. According to the mode of operation

Show with suitable diagrams and explanation mechanism of separation in each of the separation techniques:

   d. Separation in LSC (Adsorption chromatography) using Silica gel as adsorbent.
   e. Separation in reversed phase HPLC, using C18 as column packing (stationary phase).

Compare between different types of mobile phase operation system (elution, frontal and displacement) applied for column chromatography

A- A chromatographic analysis for the chlorinated pesticide Dieldrin gives a peak with a retention time of 8.68 min and a baseline width of 0.29 min. How many theoretical plates

(N) are involved in this separation? Given that the column used in this analysis is 2.0 meters long (L), what is the height of a theoretical plate (H), and the adjusted retention time of it?

Chromatography paper appears in several different grades, the differences being principally in the Density and Thickness explains how?

Define resin capacity, its values depend on what and how can be measured?

A chromatographic analysis for the organic compounds A, B and C gives the peaks with the retention times of 3.76, 4.52 and 11.3 min, respectively. While, the baseline widths are 0.29 min for A, 0.34 min for B, and 0.61 min for C, accordingly calculate:
1- How many theoretical plates (N) are involved in each separation case?
2- Given that the column used in this analysis is 2.0 meters long (L), what is the height of a theoretical plate (H).
3- The adjusted retention time (t_R') of each case, when t_m=0.2 min.
4- Resolution (R) of each two peaks (A and B), (A and C), and   (B and C).

Quaternary amine was acts as a stronger anion exchanger while primary and secondary, even tertiary amines as a weaker one.

The stationary phase layer in TLC usually contains some additive for improving their performance and convenience.

Differences between isocratic and gradient elution in HPLC.

Explain how various terms by which the solute band is broadened were explained by "van Deemeter equation" for plate height (H.E.T.P.).

Quantitative application of PC was performed by two methods explain how?

A chromatogram of a two-component mixture on a 25-cm packed LC column is shown in the following figure:
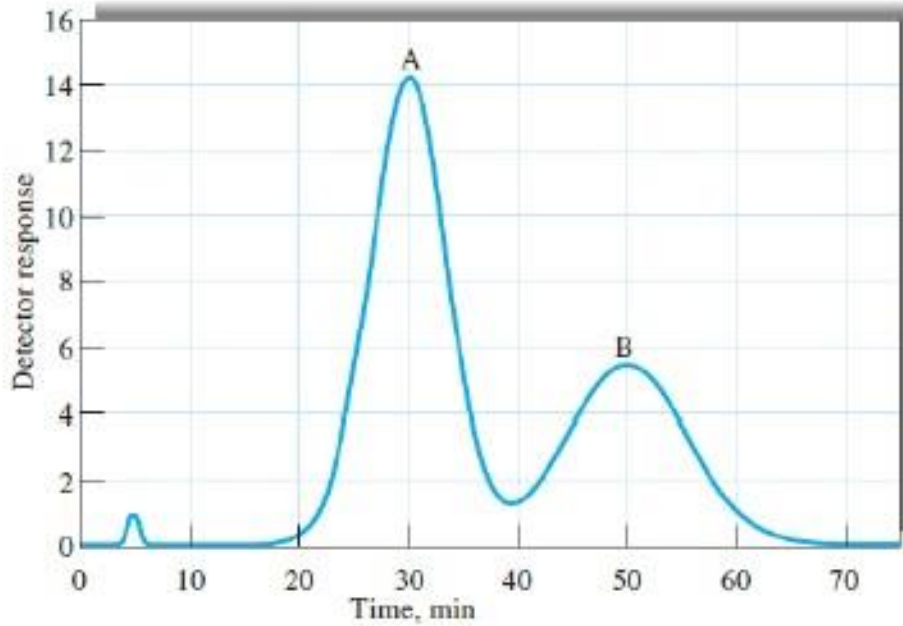
Measure each of the following:

1- Find the times that components A and B spend in the stationary phase.

2- Find the retention times for A and B.

3- Find the full widths of each peak and the full width at half-maximum values.

4- Find the resolution of the two peaks.

5- Find the average number of plates for the column.

6- Find the average plate height.

7- Find the adjusted retention time (t_R') of each species (A and B).

Q2/ Calculate the number of theoretical plates (N) for the chromatographic column used for the separation of analyte A (t_R=250sec and W=15). If the column is 120cm long (L), calculate HETP for this column?

Q3/ A chromatographic analysis for the chlorinated pesticide Dieldrin gives a peak with a retention time of 8.68 min and a baseline width of 0.29 min. How many theoretical plates (N) are involved in this separation? Given that the column used in this analysis is 2.0 meters long (L), what is the height of a theoretical plate (H), and the adjusted retention time of it?

Q4/ The following data were obtained for three compounds separated on a 20-m capillary column (L), and tm= 0.2min.

Compound	tR min	W min
A	8.04	0.15
B	8.26	0.15
C	8.43	0.16

a) Calculate the adjusted retention time for each compound.

b) Calculate the number of theoretical plates (N) for each compound and the average number of theoretical plates ($N_{average}$) for the column.

(c) Calculate the average height of a theoretical plate ($H_{average}$).

(d) Calculate chromatographic resolution (R) for each pair of peaks (A&B) and (B&C).

Q5/ Substances A and B have retention times of 16.40 and 17.63 min. respectively, on a 30.0-cm column length (L). An un-retained species passes through the column in 1.30min. The peak widths (at base) for A and B are 1.11 and 1.21 min, respectively. Calculate

(a) The column resolution (R_S)

(b) The average number of plates (N) of A and B in the column

(c) The plate height (H) in each case.