



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF APPLIED CHEMISTRY
BACHELOR OF SCIENCE HONOURS DEGREE
SUPPLEMENTARY EXAMINATION – AUGUST 2014
CHROMATOGRAPHIC SEPARATIONS – SCH 4292
TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATES

Answer **ANY FOUR (4)** questions out of **FIVE (5)** questions provided.
Each question carries 25 marks.

1. (a) Define the following terms as used in Chromatography.
- | | |
|------------------------|-----------|
| (i) elution | [2 marks] |
| (ii) mobile phase | [2 marks] |
| (iii) stationary phase | [2 marks] |
| (iv) retention time | [2 marks] |
| (v) column resolution | [2 marks] |
- (b) Compound A migrates 7.6 cm from its point of application on a thin-layer chromatographic plate, whereas in the same time the solvent front migrates 16.2 cm beyond the point of sample application.
- | | |
|---|--|
| (i) Calculate R_f for compound A. | |
| (ii) On an identical plate, the solvent front has moved 14.3 cm beyond the point of sample application; where should compound A be located on this plate? | |
- [10 marks]
- (c) If you want to produce maximum activity on an Al_2O_3 adsorbent, how do you treat it?
- [5 marks]
2. (a) Define the following terms:
- | | |
|-----------------------------|-----------|
| (i) sparging | [2 marks] |
| (ii) reversed-phase packing | [2 marks] |
| (iii) normal-phase packing | [2 marks] |
| (iv) gel-filtration | [2 marks] |

- (b) List the differences in properties and roles of the mobile phase in gas and liquid chromatography. How do these differences influence the characteristics of the two methods? [17 marks]
3. (a) With the aid of a diagram, describe the following columns which are used in Gas Chromatography? Also indicate the conditions under which each is used.
- (i) Capillary column [10 marks]
 - (ii) Packed column [10 marks]
- (b) What is resolution as used in separation chromatography? [5 marks]
4. (a) How can the use of temperature programming improve resolution in Gas Chromatography? [12 marks]
- (b) In HPLC how is gradient elution used to identify optimal conditions for separation of several compounds? [13 marks]
5. (a) How do instruments for supercritical fluid chromatography differ from those for:
- (i) HPLC [10 marks]
 - (ii) GC [10 marks]
- (b) Describe the effect of pressure on super critical fluid chromatograms. [5 marks]

END OF QUESTION PAPER!!!