



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF APPLIED CHEMISTRY
BACHELOR OF SCIENCE HONOURS DEGREE
END OF SECOND SEMESTER EXAMINATIONS – JUNE 2010
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. Compound A migrates 7.6cm from its point of application on a thin-layer chromatographic plate, whereas in the same time the solvent front migrates 16.2cm beyond the point of sample application.
 - (i) Calculate R_f for compound A. [8 marks]
 - (ii) On an identical plate, the solvent front has moved 14.3cm beyond the point of sample application; where should compound A be located on this plate? [7 marks]
- b) Explain how chromatographic zones are detected in HPLC. [10 marks]

2. Define the following terms:
 - (a) sparging [5 marks]
 - (b) isocratic elution [5 marks]
 - (c) gradient elution [5 marks]
 - (d) reversed-phase packing [5 marks]
 - (e) normal-phase packing [5 marks]
 - (f) [5 marks]

3. (a) What are the differences in properties and roles of the mobile phases in gas and liquid chromatography. How do these differences influence the characteristics of the two methods? [15 marks]

- (b) For a normal-phase separation, predict the order of elution of
 - (i) *n*-hexane, *n*-hexanol, benzene [5 marks]
 - (ii) ethyl acetate, diethyl ether, nitrobutane [5 marks]

4. (a) How does a soap bubble flow meter work? [8 marks]
(b) What is temperature programming as used in gas chromatography. [7 marks]
(c) Explain how temperature fluctuations affect the retention times. [10 marks]
5. What is the difference between normal phase chromatography and reversed phase chromatography? Which of these techniques has a potential to be used in the future. Give your reasons for your choice. [25 marks]

END OF QUESTION PAPER!!!