

**P.G. DIPLOMA IN ANALYTICAL CHEMISTRY  
(PGDAC)**

**Term-End Examination**

**December, 2016**

00225

**MCH-002 : SEPARATION METHODS**

*Time : 3 hours*

*Maximum Marks : 75*

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*Note : Attempt any five questions. Marks are indicated against each question.*

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1. (a) The distribution ratio of solute A in water-organic phase is 10. Calculate the percentage of A extracted from 50 ml of water by 100 ml of organic phase. 5
  
- (b) Give a brief account of the separation methods based on molecular geometry. Support your answer citing an example in each case. 5
  
- (c) Explain what happens when extraction is carried out using an extractant whose density and interfacial tension is quite close to the aqueous phase. 5

2. (a) Explain the terms retention time and retention factor. In what range should retention factors lie for ideal separations ? 5
- (b) Write van Deemter equation and explain all the terms briefly. 5
- (c) What are the various stationary phases used in solid-liquid column chromatography ? 5
3. (a) Explain the basic principle of HPLC. How is HPLC useful in speciation studies ? Illustrate your answer with a suitable example. 7
- (b) Why are alkyl phosphorus acids preferred over a carboxylic acid for the extraction of a metal ion ? Explain with the help of an example. 5
- (c) Write a brief note on autoradiography. 3
4. (a) Discuss the importance of loading buffer in DNA gel electrophoresis. Of the linear and supercoiled DNA, which one moves faster when subjected to agarose slab electrophoresis ? Give reason. 5+5
- (b) Draw a labelled graph depicting the relationship between number of plates and separation factor. 5

5. Write short notes on the following : 3×5=15
- (a) R<sub>f</sub> value
  - (b) Plate concept applied to TLC
  - (c) Thermal conductivity detector
6. (a) Explain the principle of Ion-Exchange chromatography. Illustrate the use of this technique in separating a mixture of amino acids. 10
- (b) List the methods for development of a chromatographic column in case of liquid-liquid chromatography. 5
7. (a) Explain gas chromatography and HPLC methods. Compare the two methods and describe the advantages of HPLC. 10
- (b) Draw the structure of silica gel depicting various types of hydroxyl groups. Explain their role in the separation processes. 5
8. (a) Briefly describe a typical gel structure. What is a macro-micro reticular gel ? Mention its special advantages for chromatographic work. 7
- (b) What are the different forms of electrophoresis ? Explain each of these with suitable illustrations. 8
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