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End Semester Examination of Semester–I, 2015
Subject : CHEMISTRY (PG)
Paper : CEM–104 (Theory)
Full Marks : 40
Time : 2 Hrs

The figures in the margin indicate the marks corresponding to the question

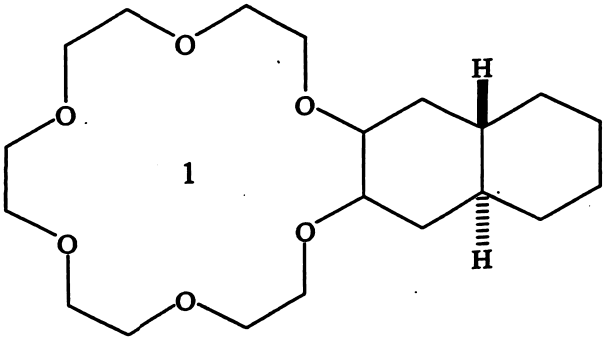
Candidates are requested to give their answers in their own word as far as practicable.

Illustrate the answers wherever necessary.

Answer **four questions** taking **one** from each group : 10x4=40

Group A

1. a) Name the compound 1 and propose a synthetic route. 1+2



b) Write the applications of crown ethers. 2

c) What are cryptands? How can Cryptates be used in light conversion and energy transfer device? 2+3

2. a) What are the forces involved in molecular recognition process? Design, synthesize and illustrate the mode of complexation of a receptor for adipic acid. 2+1+2+1

b) What are rotaxanes? Write the applications of rotaxanes. 2+2

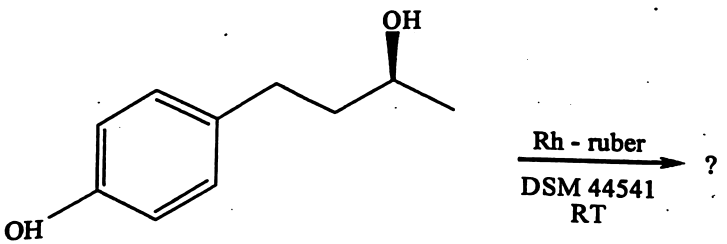
Group B

3. a) What are sustainable development? 1

b) Hoechest route is a green route for the preparation of an analgesic ibuprofen—Explain. 2

c) Predict the product(s) of the following reaction: 1X3

i)



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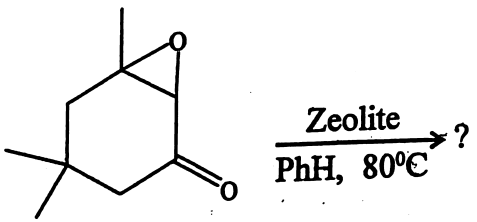

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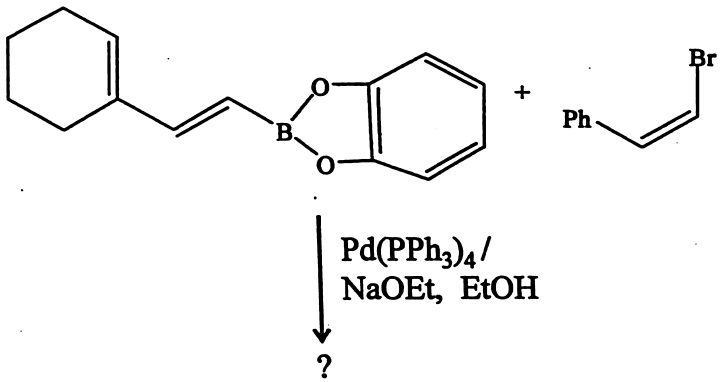


d) Why ionic liquid is used as green solvent? 2

e) Using biocatalyst prepare aspartame. (an artificial sweetener) 2

4. a) Renewable sources are related to sustainability — Explain. 1

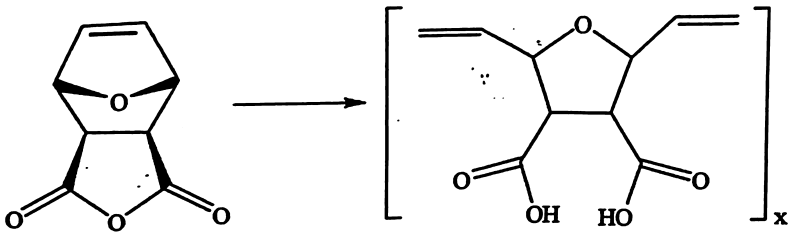
b) How do you synthesize the following compounds. 2X2=4

i) Caprolactam from Cyclohexanone. (By Sumitomo process)

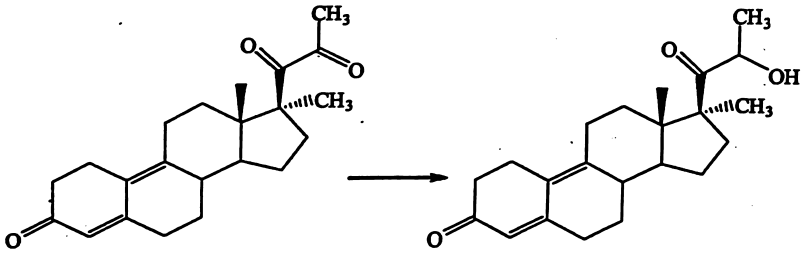
ii) Polylactic acid from Corn.

c) Give suitable reagent(s) for the following transformations: 1+1=2

i)



ii)



d) Give suitable example of the different types of reactions in aqueous solvent. 3x1=3

i) Diels-Alder reaction.

ii) Passerini reaction

iii) Knovenagel reaction

Group C

5. a) What is the information obtained from circular Dichroism of Proteins? 2

b) What type of forces are involved in the different levels of protein structures? 3

c) What do you mean by inhibition constant (Ki)? Explain with example. 3

d) List three ways in which RNA is different from DNA. 2

6. a) Write short note on Van-der-Waal forces. 4

b) What is hydrophobic effect? Illustrate hydrophobic effects on simple organic reactions in water. 2+4

Group D

7. a) What is MOF? Draw the structure of $Zn_4O(BDC)_3$ (Where BDC = 1, 4-benzene dicarboxylic acid). What are applications of MOFs? 1+2+2

b) Give an example each of cation and anion receptor. 2

c) The stability constant ($\log K_{298}$) for K^+ and As^+ with the following Crown ethers as follows : 3

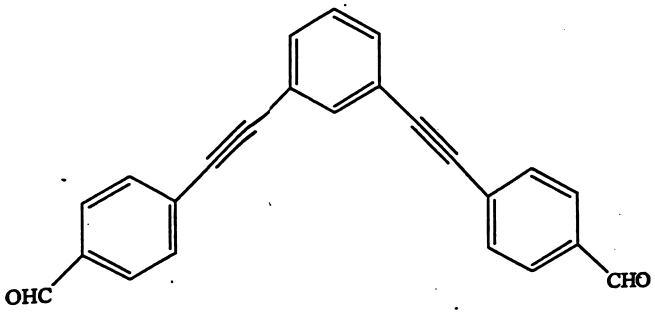
Cation	18-Crown-6 (O_6)	18-Crown-6 (O_4S_2)
K^+	6.0	1.1
As^+	1.6	4.4

How can this be explained?

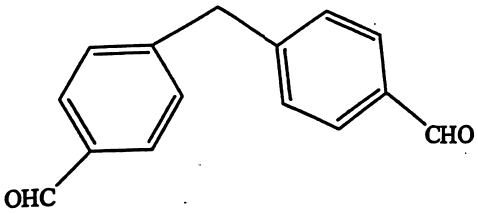
8. a) Write a short note on cation-π interaction. 4

b) A (3 equiv) + B(3 equiv) + X (2 equiv) + Y (2 equiv) in $CHCl_3$ – EtOH solution ⟶ Write the products with their structures. 3

A =



B =



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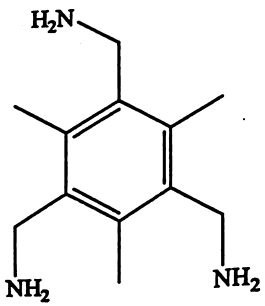
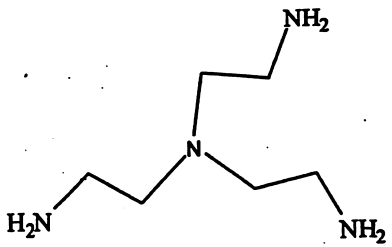


Y =



c) What do you mean by the term "Host-Guest Chemistry" and "Self assembly"? 3