Printed Pages : 4

AS-203

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1214 Roll No.

B. Tech.

(Semester II) Even Semester Theory Examination, 2012-13

ENGINEERING CHEMISTRY

Time : 3 Hours] *[Total Marks : 80*

Note : Attempt questions from each Section as per instructions.

Section-A

Attempt *all* parts of this question. Each part carries 2 marks. 2×9=18

1. (a) What are micelles? Give two examples of micellar systems.
   (b) Explain racemic modification.
   (c) Give all the stereoisomers of 2, 3-dichloro butane. Identify the mesoform.
   (d) Two isomeric compounds A and B having the molecular formula. C_5H_8 absorb at λ_{max} 223 nm and λ_{max} 178 nm respectively. Write the structures of the two isomers.
   (e) Describe inductive and electrometric effect with suitable examples.
   (f). What is Calgon conditioning? Explain.
   (g) Define the following terms :
      (i) Water recovery
      (ii) Solute rejection
   (h) Discuss the structure of methyl free radical.
   (i) What is Langelire Index (LI)? Mention its significance.

Section-B

Attempt any *five* parts of this question. Each part carries 4 marks. 4×5=20

2. Give an account of the following:
   (a) Adsorption and Partition Chromatography
   (b) Asymmetric synthesis

P. T. O.

(c) Regioselective reaction

(d) Biomedical polymers

(e) Nanotechnology

(f) Reverse osmosis

(g) Synthetic lubricants

Section-C

Attempt any *seven* questions of this Section. Each question carries 6 marks. 6×7=42

3. (a) Write the basic principle of NMR and explain the following terms :

(i) Chemical shift

(ii) Spin-spin splitting.

(b) An organic compound C_3H_6O contains a carbonyl group C=O. How will its NMR spectrum decide whether it is an aldehyde or ketone?

(c) Discuss the significance of following in relation to IR spectroscopy :

(i) Group frequency region

(ii) Fingerprint region.

4. (a) State and explain Lambert Beer's law of photometry.

(b) Explain the following terms :

(i) λ_{max}

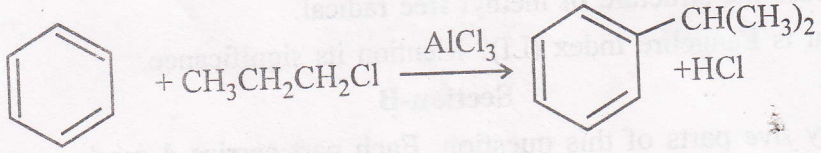
(ii) ε

(iii) Bathochromic effect

(iv) Hypsochromic effect.

(c) What percentage of light will be transmitted through two cells put together in the path of light if their individual transmissions are 60% and 30% respectively?

5. Discuss the mechanism of the following reactions:

(i) 

(ii) Cationic polymerization of propylene

(iii) Walden inversion reaction.

6. (a) Define (i) temperature coefficient and (ii) energy of activation of a chemical reaction and mention their significance.

(b) A bottle of milk stored at 30° C sours in 36 hours, stored in refrigerator at 5°C sours after one week. Assuming the rate constant to be inversely related to the souring time, estimate the activation energy of the chemical reaction involved in souring reaction. Given R= 8.314 JK^{-1} mol^{-1}.

(c) Explain with reasons Acid catalyzed hydrolysis of ethyl acetate is a first order reaction while alkaline hydrolysis is a second order reaction.

7. (a) The $t_{1/2}$ of a reaction is doubled as the initial concentration of the reactant is doubled. Calculate the order of this reaction.

(b) What is meant by number-average molar mass (M_n) and weight-average molar mass (M_w) and polydispersity index of a polymer?

(c) Equal masses of polymer molecules with molar masses 10,000 and 100,000 are mixed. Calculate Mn and M_w.

8. (a) Define corrosion. How does it differ from rusting?

(b) Discuss the electrochemical theory of corrosion. How does this theory explain the mechanism of rusting?

(c) What are corrosion inhibitors? Explain the mechanism of their action.

9. (a) What are fuel cells? Draw schematic diagram of a simple H_2–O_2 fuel cell. Write the electrode reactions and net cell reaction.

(b) Calculate the efficiency of a H_2–O_2 fuel cell if its EMF is 1.23 V and ΔH= –68.3 Kcal mol^{-1}. What will be the effect of temperature on efficiency of this cell.

(c) What are the advantages and limitations of fuel cells?

10. (a) What is shape selective catalysis? Write the reactions in which following catalysts are used :

(i) ZSM-5

(ii) $BiMoO_4$

(iii) Ziegler Natta.

(b) Write the basic principles of Valance Bond theory.

(c) Draw the Molecular Orbital diagram of HF molecule and comment on the stability and polarity of the covalent bond between H and F.