বিদ্যাসাগর বিশ্ববিদ্যালয়
VIDYASAGAR UNIVERSITY

Question Paper

B.Sc. Honours Examinations 2022
(Under CBCS Pattern)
Semester - II
Subject: CHEMISTRY
Paper: C 4 - T
Organic Chemistry - II

Full Marks : 40
Time : 2 Hours

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Group - A

Answer any ***four*** questions. 5×4=20

1. (a) What do you mean by "buttressing effect"? 2

   (b) Why is the enol content of a cyclic–1, 2–diketone more compared to an acyclic 1, 2–diketone? 2

   (c) What is valence tautomerism? Give example. 1

2. (a) Compare the acidities of *p*-chlorophenol and *p*-flurophenol. 2

   (b) What is primary kinetic isotope effect? Give an example. 2

   (c) Triphenylamine is not at all basic in nature. Explain. 1

3. (a) Which one is a better nucleophile? ^{-}OH or ^{-}OOH? Explain. 2

   (b) Vinyl halides are very unreactive towards nucleophiles. Explain. 2

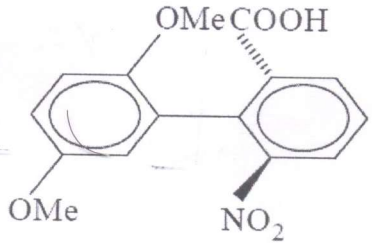
   (c) Which of the following reactions is / are stereospecific?

   S_N1, S_N2, E^1, E^2 1

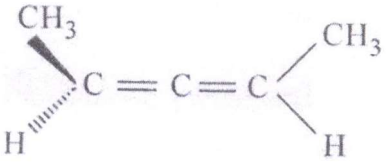
4. (a) Write the most stable conformation of (i) 1, 2-difluro ethane (ii) 1, 2-ethanediol. 2

   (b) Define Atropisomerism with suitable example. 2

   (c) Designate R/S in the following compound showing the priority of ligands. 1



5. (a) Indicate the elements of symmetry and point group in the given compound. 2

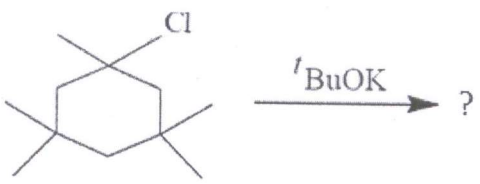


   (b) Write down the products obtained in the following reaction : 2

$$Me_2CH - \underset{\displaystyle \overset{|}{\overset{\oplus}{N}Me_3}}{CH} - Me \xrightarrow[\Delta]{\overset{\ominus}{O}H} ?$$

   (c) Represent 2-butenoic acid in $Re - Re$ face. 1

6. (a) Write down the major product of the following reaction : 2



(b) What is α-elimination? Give example. 2

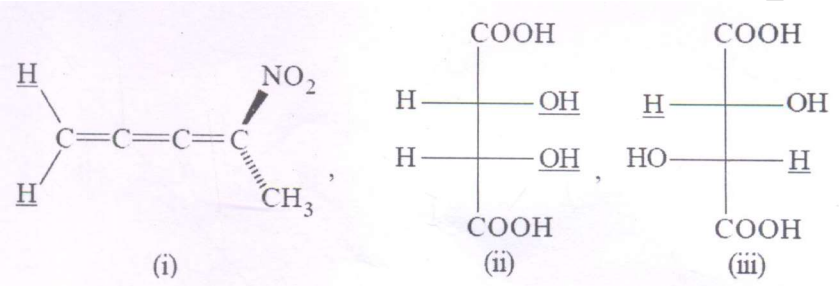
(c) Give an example of ring-chain tautomerism. 1

Group - B

Answer any ***two*** questions. 10×2=20

7. (a) Draw the staggered conformation of 1-chlorobutane for rotation about C-1/C-2 bond and also about C-2/C-3 bond. Comment on the relative stabilities of the conformers. 3

(b) Identify the underlined atoms and groups as homotopic, enantiotopic or diastereotopic with explanation. 3



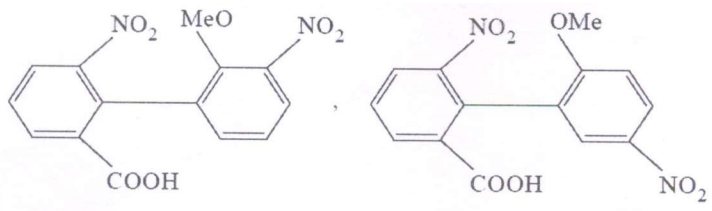
(c) Consider the following reaction sequence :

$$\mathbf{A} \underset{K_{-1}}{\overset{K_1}{\rightleftharpoons}} \mathbf{B} \xrightarrow{K_2} \mathbf{C}$$

"C" has lower free energy than "A" and $K_2 >> K_{-1} >> K_1$.

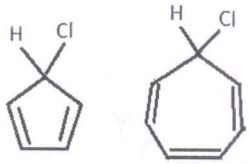
Draw an energy profile diagram indicating transition states and rate determining step. 2

(d) Compare the ease of racemisation of the following compounds with proper justification.



2

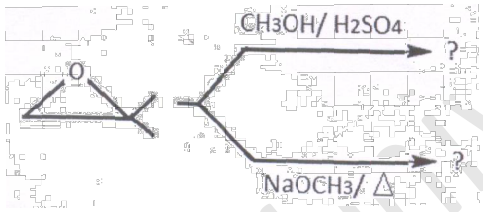
8. (a) Which of the following compounds will be more readily hydrolyzed by aqueous silver nitrate solution? Why?



3

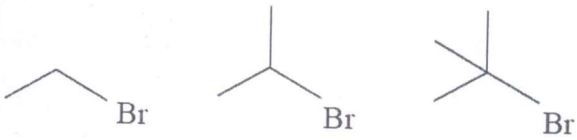
(b) What happens when (R)-2-chloro butanoic acid is treated separately with dilute *KOH* solution and concentrated *KOH* solution? 4

(c) Predict the products with mechanistic explanation :



3

9. (a) Relative rate constants for solvolysis of three bromoalkanes in 60% $EtOH - H_2O$ and in H_2O are as follows :



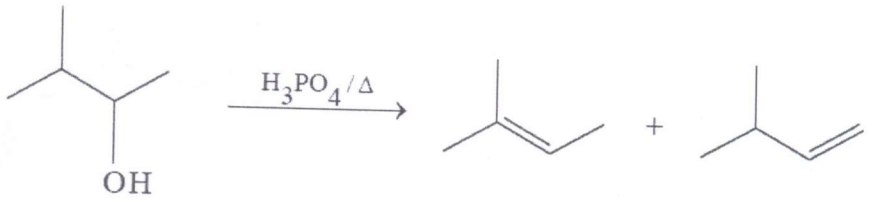
1. 60%	$EtOH–H_2O$ (55°C)	1.00	1.78	2.41×10^4
2. H_2O	(50°C)	1.00	11.60	1.2×10^6

(i) Explain why 2–bromo–2–methylpropane undergoes solvolysis more than 10^4 times faster than bromoethane and 2–bromopropane in both solvents.

(ii) Explain why the relative solvolytic reactivity of 2–bromopropane is significantly larger in H_2O than in 60% $EtOH - H_2O$ as solvent. 3+2

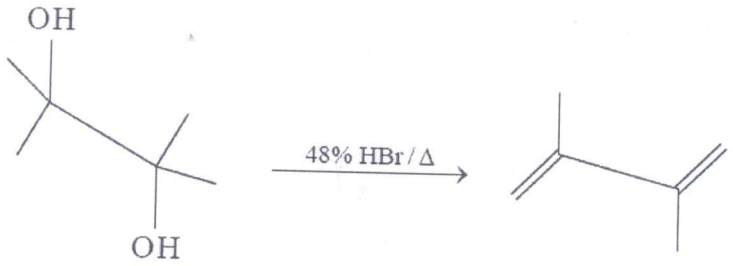
(b) Suggest mechanisms for the following elimination reactions. Why does the first reaction yield a mixture of products but the second one gives a single product?

(i)



(Yield = 64% in 4:1 ratio)

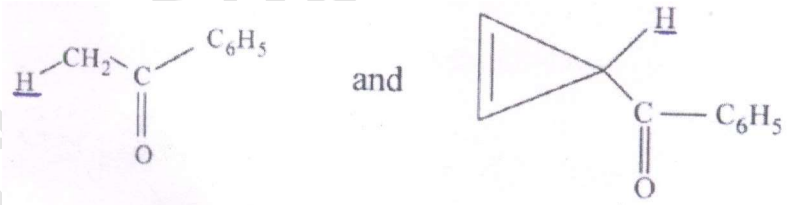
(ii)



3+2

10. (a) $CH_3CH(OH)CH_2SEt$ and $CH_3CH(SEt)CH_2OH$ gives the same product when treated with dry *HCl*. Give the structure of the product and explain its formation. 3

(b) Which one is more acidic and why? (Underlined H atom)



2

(c) Discuss the stereochemistry of dehydrobromination of meso-1, 2-dibromo-1, 2-diphenyl ethane with *NaOEt* in *EtOH*. Write down the product. 3

(d) The following reaction normally does not take place. What you should add to the reaction mixture to make it a feasible one? Explain your answer.

$$R-X \xrightarrow[CH_2Cl_2]{NaCN(\text{Aqueous})} R-CN$$

2