



বিদ্যাসাগর বিশ্ববিদ্যালয়
VIDYASAGAR UNIVERSITY

Question Paper

B.Sc. Honours Examinations 2021

(Under CBCS Pattern)

Semester - II

Subject: CHEMISTRY

Paper: C 4-T & P

Organic Chemistry - II

Full Marks : 60

Time : 3 Hours (Theory-40 + Practical-20)

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

THEORY (Marks : 40)

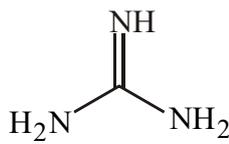
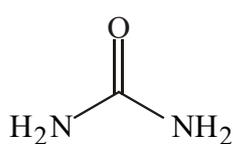
Group A

Answer any *one* question :

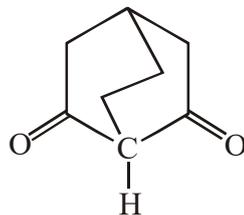
1×10=10

1. (a) Compare the basicity of the following and explain :

5×2=10



(b) The given 1,3-dicarbonyl compound exists entirely in keto form. Explain.

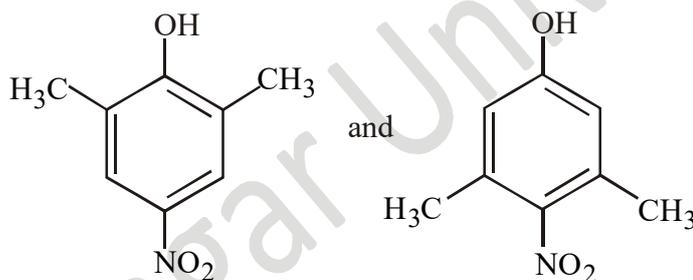


(c) Give an example of axially chiral molecule indicating the chiral axis.

(d) Allyl chloride gives a precipitate with alcoholic silver nitrate but vinyl chloride does not. Explain.

(e) What do you mean by primary and secondary kinetic isotope effect?

2. (a) Among the following compounds which one is more acidic and why? 5×2=10

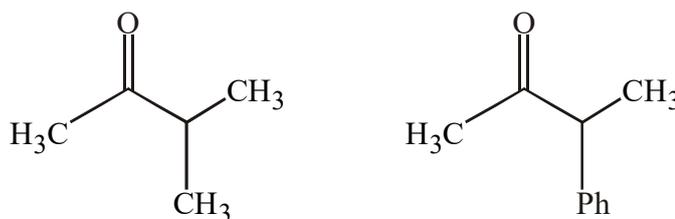


(b) Write down the most stable conformation of ethane-1,2-diol and 1,2-dichloroethane with reason.

(c) What is Buttrressing effect? Give Example.

(d) Although neopentyl bromide is a primary alkyl halide it shows lesser tendency towards S_N2 reactions. Explain.

(e) Between the two compounds which compound will have higher enol content and why?

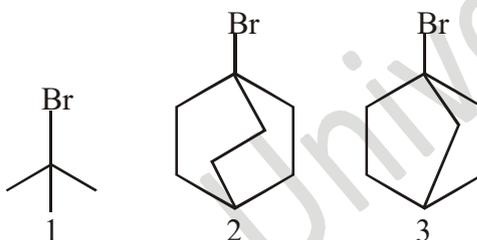


Group - B

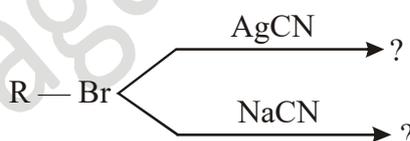
Answer any *two* questions :

2×15=30

3. (a) Draw energy profile diagram relating potential energy to dihedral angle for butane around $C_2 - C_3$ bond. Label and draw the Newman projection structure for each maximum and minimum. The equilibrium constant for anti/gauche is 1.9 at 25°C. Find out relative amount of two conformers. 4
- (b) N, N-dimethylation of aniline triples the basicity of aniline but N, N-dimethylation of 2, 6-dimethyl aniline increases its basicity by 30,000 times — explain. 3
- (c) The relative rate of solvolysis of the following bromides 1, 2 and 3 in 80% aqueous ethanol at 25°C are $1 : 10^{-6} : 10^{-14}$. Explain the relative rates with reason. 3

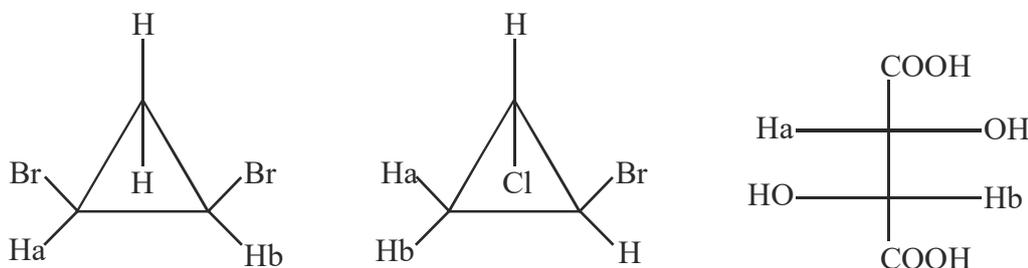


- (d) Predict the products with mechanism showing HOMO-LUMO interactions. 4

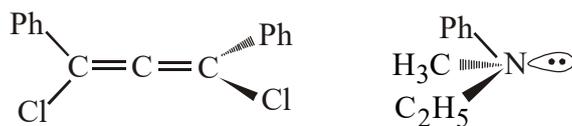


- (e) Give an example of phase transfer catalyst. 1

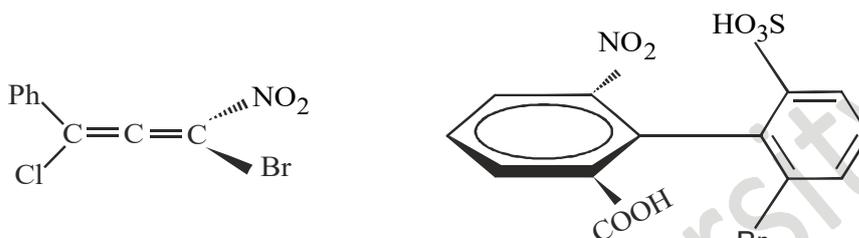
4. (a) State whether the marked atoms (a and b) are homotopic, enantiotopic or diastereotopic. 3



(b) Explain whether the following compounds are resolvable or not : 2

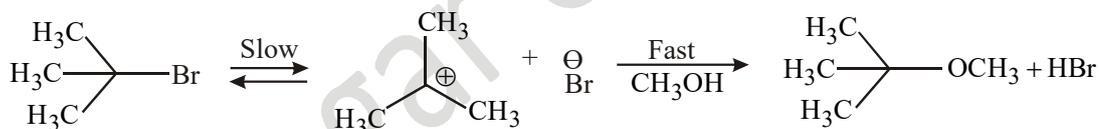


(c) Find out the absolute (R, S) configuration of the following compounds : 3



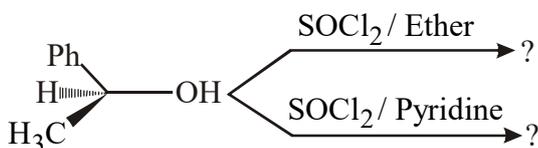
(d) 'E2 reaction of 2-bromobutane is stereoselective, but not stereospecific' — Explain. 3

(e) What would be the effect of the following changes on the rate of S_N1 reaction of t-butyl bromide with methanol.



i) The concentration of methanol is halved (ii) The concentration of t-butyl bromide is doubled (iii) The temperature of the reaction is lowered. Also construct a reaction co-ordinate diagram. 4

5. (a) Give the stereochemical products with mechanism : 4



(b) How do you convert : (R)-2 butanol \longrightarrow (S)-2-Butanol 3

(c) The rate of solvolysis of 1-bromo-1, 1-dimethyl ethane is found to be 3×10^4 times faster in 50% aqueous ethanol than in ethanol alone — Explain. 3

- (d) What is Hammond Postulate ? How does it apply to explain the regio-selectivity of HBr addition to isobutene? 3
- (e) Why is $(\text{CF}_3)\text{N}$ not basic? 2
6. (a) The observed order of basicity of amines in aqueous media is $\text{Me}_2\text{NH} > \text{MeNH}_2 > \text{Me}_3\text{N}$, whereas in gas phase the order is $\text{Me}_3\text{N} > \text{Me}_2\text{NH} > \text{MeNH}_2$. Justify. 4
- (b) Define the term "Atrop-isomerism". Draw the energy profile diagram for the rotation around the pivotal bond of biphenyl having substituents at 2, 2' and 6, 6' -positions. (1+3)
- (c) In the presence of pyridine the threo isomer of 1,2-dibromo-1, 2-diphenyl ethane undergoes dehydrobromination to give (Z)-1-bromo 1, 2-diphenylethene, whereas the erythro isomer undergoes debromination to give (E)-1, 2-diphenylethene. Account for this observation. 4
- (d) 'Inversion of configuration takes place in $\text{S}_{\text{N}}2$ reaction' explain the cause of inversion in the light of orbital theory. 3

PRACTICAL (Marks : 20)

Paper : C 4-P

Answer any *one* question :

1×20=20

- Describe the synthetic procedure, purification and chemical reactions involved in the nitration of nitrobenzene.
 - Describe the synthetic procedure, purification and chemical reactions involved in the bromination of anilide using bromate-bromide method.
 - Describe the synthetic procedure, purification and chemical reactions involved in the benzylation of aniline.
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