



'समानो मन्त्रः समितिः समानी'

UNIVERSITY OF NORTH BENGAL
B.Sc. Honours 2nd Semester Examination, 2022

CC3-CHEMISTRY
ORGANIC CHEMISTRY

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
All symbols are of usual significance.*

GROUP-A

1. Answer any **five** questions from the following: 1×5 = 5
- (a) A less stable free radical does not undergo rearrangement to a more stable free radical like carbocations. — Explain.
- (b) Comment on the aromatic character of 1,3-cyclopentadiene and 1,3-cyclopentadienyl anion.
- (c) Write the structure of (Z, E)-Hepta-2,4-diene.
- (d) Draw meso-2,3-butanediol in Fischer projection formula showing plane of symmetry.
- (e) Why is the chair conformation of cyclohexane more stable than the boat conformation?
- (f) Assign R or S configuration to the following compounds:

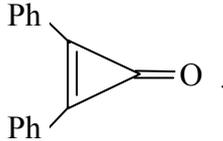
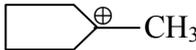
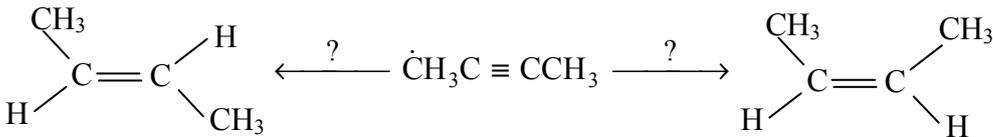


- (g) Why is the Wurtz synthesis not a good method for preparing propane?
- (h) Arrange the following carbanions according to their decreasing order of stability.



GROUP-B

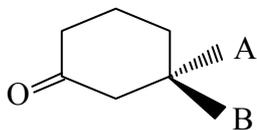
2. Answer any **three** questions from the following: 5×3 = 15
- (a) (i) Arrange the following compounds in order of their acid strengths with reasons: 3+2
- 2-hydroxy benzoic acid, 2,6-dihydroxy benzoic acid,
4-hydroxy benzoic acid and benzoic acid

- (ii) Compare C = O bond distance in $\text{Me}_2\text{C} = \text{O}$, RCOO^\ominus and .
- (b) (i) The resonance energy of naphthalene is 61 kcal mol^{-1} and for benzene it is 36 kcal mol^{-1} . Which among the two is more aromatic and why? 2+2+1
- (ii) 3,5-dimethyl-4-nitroaniline is a stronger base than the corresponding 2,6-dimethyl isomer.
- (iii) Explain why cyclohexyne does not exist.
- (c) (i) CCl_3^\ominus is more stable than CF_3^\ominus . — Explain. 2+3
- (ii) Write the canonical forms of $\text{Me}_2\text{N}-\overset{\oplus}{\text{C}}(\text{OMe})\text{CH}_3$ and indicate with reasons, which one is the most contributing.
- (d) (i) $\text{H}_3\text{C}-\text{H}$ bond energy of methane is higher ($103 \text{ kcal mol}^{-1}$) than the energy of PhCH_2-H in toluene (85 kcal mol^{-1}). Justify the statement. 3+2
- (ii) Which one is more stable of the two?
- $(\text{CH}_3)_2\overset{\oplus}{\text{C}}-\text{Ph}$ or 
- (e) (i) Carry out the following transformation: 2+3
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- (ii) How can you account for the formation of 1,4-addition product between butadiene and HBr at 40°C ?

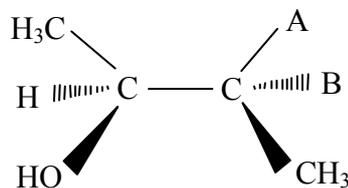
GROUP-C

3. Answer any *two* questions from the following: 10×2 = 20

- (a) (i) Identify the missing ligands (A and B) in each of the following compounds: 2+4+
(2×2=4)

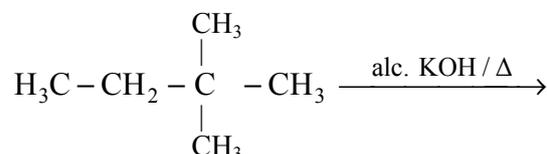


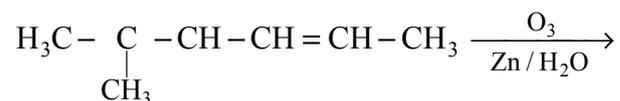
(R)-3-methylcyclohexane



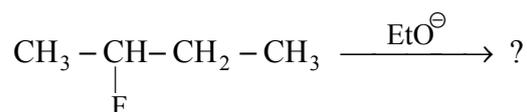
(2s, 3s)-3-bromo-2-butanol

- (ii) Draw the energy profile diagram of cyclohexane mentioning all the conformers with proper labelling.
- (iii) Predict the products:





- (b) (i) Write short notes on: (2×3=6)
- (I) Anti-Markownikoff's rule +2+2
- (II) Optical Activity
- (III) Hyperconjugation.
- (ii) How can geometric isomers be distinguished by chemical methods?
- (iii) Define racemic modification with examples.
- (c) (i) What happens when: (2×3=6)
- (I) 2-butene is treated with Lindlar's catalyst and hydrogen. +2+2
- (II) 2,3-dimethyl-2-pentene is subjected to ozonolysis.
- (III) Neo-pentyl alcohol is heated with acid.
- (ii) Nitration of benzene is much faster when carried out by heating a mixture of conc. HNO₃ and conc. H₂SO₄ than by heating with conc. HNO₃ alone. — Explain.
- (iii) Predict the major product of the given reaction. Justify the formation of the given product.



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