



UNIVERSITY OF NORTH BENGAL

B.Sc. Honours 2nd Semester Examination, 2021

CC3-CHEMISTRY

ORGANIC CHEMISTRY

Full Marks: 40

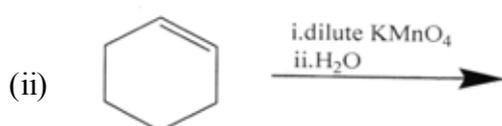
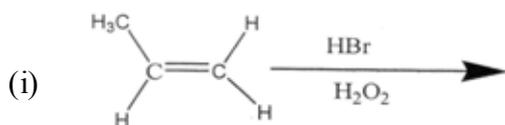
ASSIGNMENT

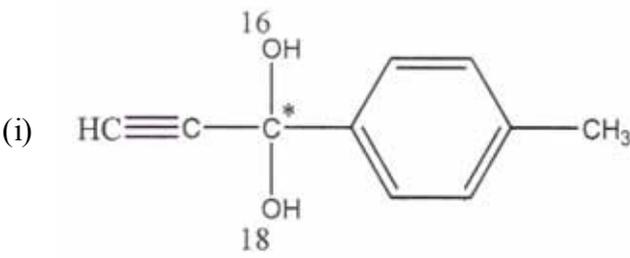
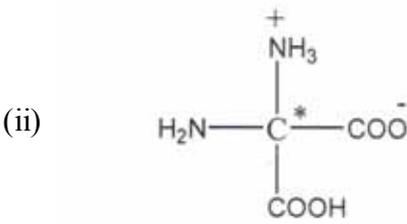
*The figures in the margin indicate full marks.
All symbols are of usual significance.*

Answer any *four* questions from the following

10×4 = 40

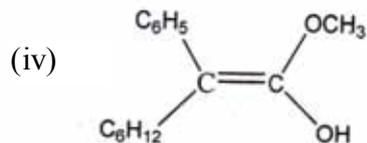
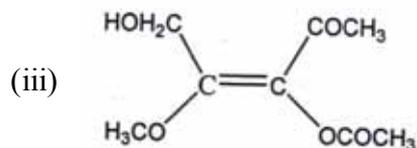
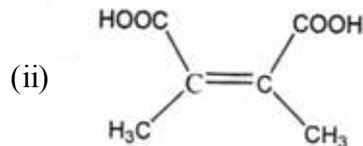
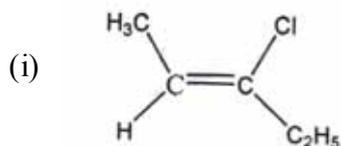
1. (a) Resonance energy of Naphthalene is 255 kJ mol^{-1} and for Benzene it is $150.5 \text{ kJ mol}^{-1}$. Between these two compounds which is more aromatic and why? $2\frac{1}{2}$
- (b) Compare the shapes of trialkyl carbocation and trialkyl carbanion. $2\frac{1}{2}$
- (c) What is "Hyperconjugation"? Why is it called as "No-Bond Resonance"? $2\frac{1}{2}$
- (d) Ethyl amine is more basic than acetamide. Explain. $2\frac{1}{2}$
2. (a) A chemical reaction is shown below: $1+1+2+2$
- $$\text{CH}_3\text{CH}_2\text{Br} + 2\text{Na} + \text{Br}-\text{CH}_2\text{CH}_3 \longrightarrow \text{A} + \text{B}$$
- (i) Write the name of this chemical reaction.
- (ii) What are the products A and B?
- (iii) Write down the plausible mechanism for this reaction.
- (iv) Are there any "limitations" of this reaction? If so, illustrate the limitations with proper explanation.
- (b) "Optical activity of a molecule is linked with the presence of asymmetric Carbon atom". Justify this statement with reference to tartaric acid. 3
- (c) K_a of an acid is 1.47×10^{-2} , find the $\text{p}K_a$ value of the acid. 1
3. (a) An aqueous solution of an optically active pure compound of concentration 100 mg in 1mL of water measured in a quartz tube of 5cm length was found to be -3° . Calculate the Specific Rotation of the compound. 2
- (b) "Picric acid is one of the most acidic phenols", Justify. 2
- (c) Complete the following reactions with plausible mechanism: 4



- (d) Most of the substitutions at an aromatic ring carbon are electrophilic and not nucleophilic, why? 2
4. (a) Discuss the mechanism of sulfonation of Benzene with concentrated sulphuric acid at 80°C. 3
- (b) Find out the absolute configuration of the chiral centre of the following molecules: 2+2
- (i) 
- (ii) 
- (c) Write down the importance of B₂H₆ in synthetic organic chemistry. 3
5. (a) Though I-I bond is very weak, but iodination of benzene does not take place readily. Explain. 3
- (b) Give evidence to show that the electrophilic aromatic substitution reactions occur not by concerted mechanism but by a stepwise mechanism of which the first step is the rate determining step. 3
- (c) The tertiary amine (CF₃)₃N has practically no basic character. Explain. 2
- (d) Why is a racemic mixture optically inactive? 2
6. (a) What are conformers? Describe the different conformations of n-butane with energy diagrams. 5
- (b) The hydrogen atoms of acetylene are more acidic than those of ethylene. Explain. 2
- (c) Define Aromaticity and state Huckel's Rule. 3
7. (a) What products would be formed when 1-butene is treated with bromine water containing a little sodium chloride? 3
- (b) Write down the Fischer projection formula of each enantiomer of 3-methylpent-1-ene and specify the chiral centre as R or S. Draw the corresponding flying wedge formula of each. 4
- (c) Formic acid is stronger than Benzoic acid. Why? 3

8. (a) Designate the following compounds as E and Z:

$1\frac{1}{2} \times 4 = 6$



(b) What is Hoffmann elimination? How does it differ from Saytzeff elimination? 3

(c) Between ortho-Nitro phenol and para-Nitro phenol which one is more acidic and why? 1

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