2018

CHEMISTRY

CHM 102

ORGANIC CHEMISTRY-I

Full Marks : 80

Time: 3 Hours

The figures in the margin indicates full marks for the questions

1. Answer the following questions (*Any four*) **5×4=20**

(a) What do you mean by isotopic labeling? Explain its use in the study of determination of reaction mechanism. 1+4

(b) Explain the various techniques applied for detection of reactive intermediates. 5

(c) Discuss the various non-kinetic methods for determination of mechanism of a reaction. 5

(d) Derive Hammett equation. Explain the physical significance of r and s_x in the Hammett equation. 2+3

(e) Define partial rate factor. How partial rate factor is related with rate constant of benzene and substituted benzene? Explain with examples. 1+4

2. Answer the following questions (*Any three*) **5×3=15**

(a) Explain why cycloheptatrienyl cation is more stable than cycloheptatrienyl anion? Why aromatic compounds are stable? 4+1

(b) The *cis*- and *trans*- isomers of 1-bromo 4-*t*-butyl cyclohexane undergo the base catalyzed elimination reaction at different rates. Explain. 5

(c) Explain why ethyl lithium reacts with α, β-unsaturated carbonyl compound to give 1,2 addition product whereas Me_2CuLi gives 1,4-addition product. 5

(d) What do you mean by homoaromaticity? Explain aromatic, anti-aromatic and non-aromatic compounds with suitable examples. 2+3

3. Answer the following questions

(a) Allyl compounds react faster than alkyl compounds in S_N2 reaction. Explain with examples. 2

(b) What are the differences between transition state and reactive intermediate? Explain with examples. 4

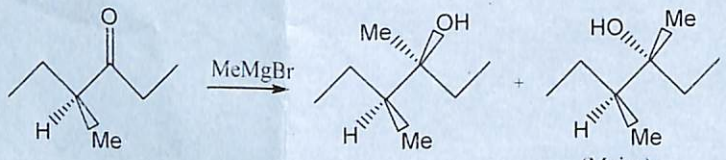
(c) Explain the factors affecting the S_N2 reactions. 4

4. Answer the following questions (*Any three*) 5×3=15

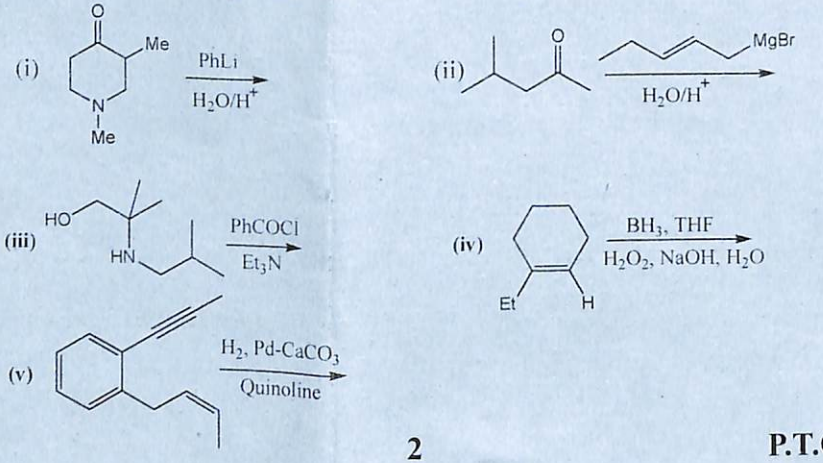
(a) What is non-classical carbocation? Explain the acetolysis of *anti*- and *syn*-7-norbornenyl tosylate on the basis of the concept of anchimeric assistance. 1+4

(b) The rate of acetolysis of *cis*- and *trans*-isomers of 2-acetoxycyclohexyl tosylates differs by a factor of about 700, the *trans*-compound being more reactive. Explain. 5

(c) How can Felkin-Anh model be used to explain the following reaction? 5

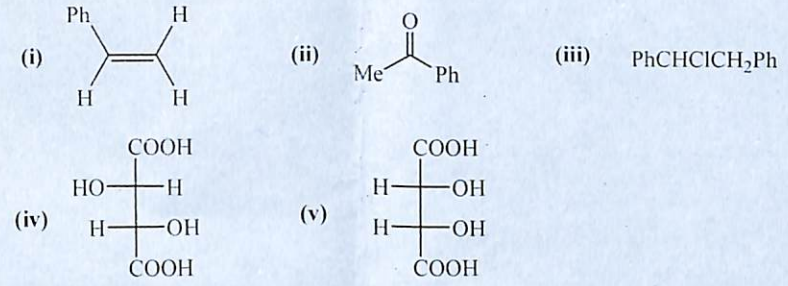


(d) What will be the products of the following reactions? 1×5

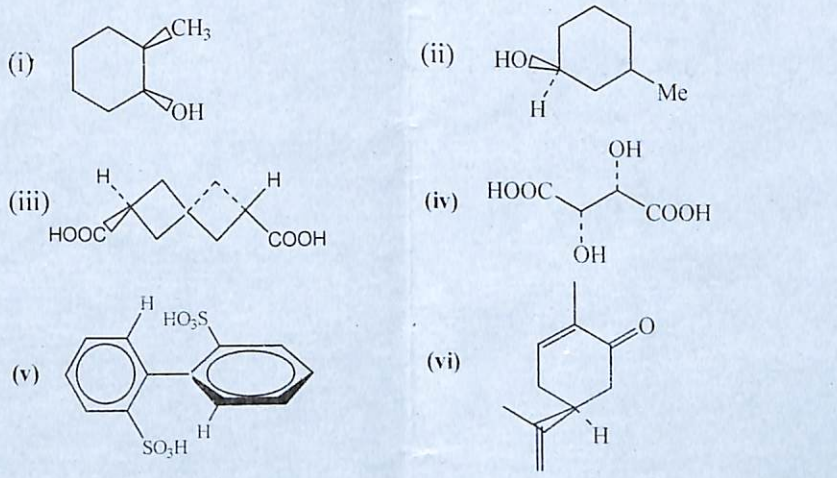


5. Answer the following questions (*Any four*) 5×4=20

(a) Identify the ligands and/or face of the following compounds? 5



(b) Designate the configurations of the followings (*Any five*) 1×5

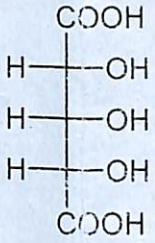


(c) Find the point group of the following molecules. 1×5

(i) *Trans*-H_2O_2 (ii) 1,4-Diiodobenzene (iii) Phenanthrene (iv) Pyridine

(v) 1,4-Dibromo-2,5-dichloro benzene

(d) Explain the stereogenicity and chirotopicity of all the three carbon atoms in the following structure. 5



(e) What do you mean by enantiomeric excess? If the enantiomeric excess is 95%, how much of each enantiomer is present? 2+3

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