RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SECOND SEMESTER EXAMINATION, AUGUST 2021

FIRST YEAR [BATCH 2020-23]

Date : 10/08/2021

CHEMISTRY (HONOURS)

Time : 11 am – 1 pm

PAPER : III [CC3]

Full Marks : 50

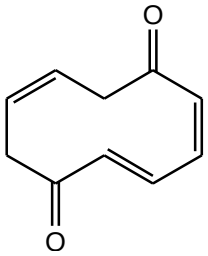
[Attempt **one** from **each unit**]

Unit : I

[1×12]

1. a) Explain the following observation [2×2]

(i) The compound below exist 100 % in Keto form.



(ii) Triphenyburithyl radical (Ph_3C) is not so stabilized as expected. [2]

b) Which species in each of the following pairs is more stable and why? [2]

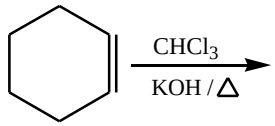
(i) Phenyl Cation and cyclohexyl cation.

(ii) Phenylanion and Cyclohexyl anion.

c) Draw the orbital picture of carbine in Sp^2- singlet, Sp^2 – triplet and sp- triplet states. [2]

d) What is primary kinetic isotopic effect? Explain with example. [2]

2. a) Explain the formation of the product with mechanism. [2]



b) Explain the observation with possible structure :

$(C_6H_5)_3C - OH \xrightarrow{50\ \%\ H_2SO_4}$ yellow colour solution $\int H_2O / H^+$ colourless solution. [2]

c) Discuss the outcome of the reaction of singlet and triplet methylene carbine separately mixture with cis – 2 – butane with mechanism. [3]

d) Predict the product when 1,3,5 – trihydroxy benzene reacts with excess of hydroxylamine. [2]

e) Draw a reaction co-ordinate diagram for the following reaction in which 'C' is most stable and 'B' is less stable. The transition state going from A to B is more stable than B to C.

$A \xrightarrow{K_1} B \xrightarrow{K_2} C$

(i) How many T.S. is there ? (ii) Which is the rate determing step in reaction sequence. [1+1+1]

UNIT - II

[1×13]

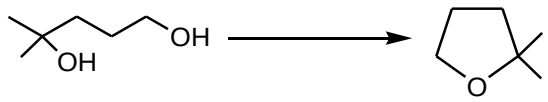
3. a) Justify the following relative rates of reaction with MeBr in EtOH. [2]

Necleophile Relative rate

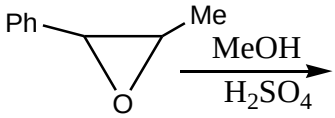
$PhS^{\ominus}$ 5.0×10^{7}

$PhO^{\ominus}$ 2.0×10^{3}

b) Convert : [3]

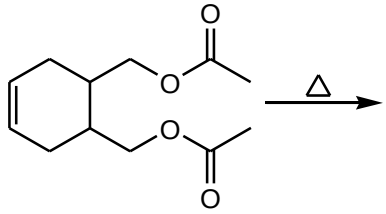


c) Indicate with plausible mechanism what will happen in the following reaction. [2]



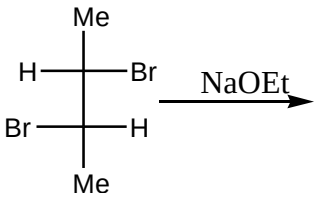
d) Predict the product of the following reactions. Give mechanism. [3×2]

(i)



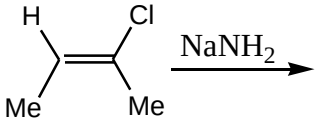
(ii)

(iii)

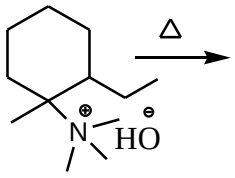


4. a) Predict the major product of the following reactions : [1+1]

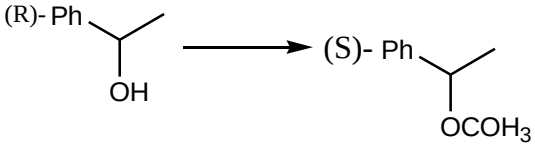
(i)



(ii)



b) Convert : [2]

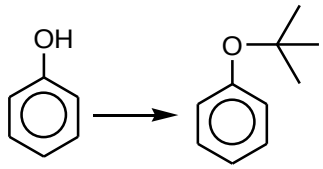


c) Predict the product of the following reaction with stereochemistry : [2]

Threo – 3 – bromo -2 – butanol $\xrightarrow{HBr}$

d) Justify : NH_2NH_2 is a better nucleophile than NH_3. [2]

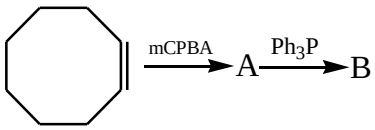
e) What happens when $F_3C - CHCl_2$ is heated with EtONa Na in ethanol? Give mechanism with evidence. [2]

f) Convert :  [2]

g) Cite an S_N^2 reaction which is attended by racemisation. [1]

UNIT - III [1×12]

5. a) Identify A and B in the following radiation sequence also give mechanism for each step. [1+3]



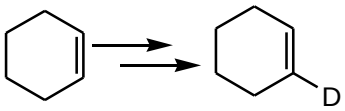
b) Carry out the following conversions and give plausible mechanisms for the reactions involved: [3×2]

(i) 2 – butane → 1 – butane

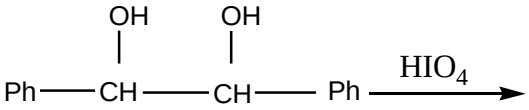
(ii) Cyclohexene → trans – cyclohexane – 1,2 – diol

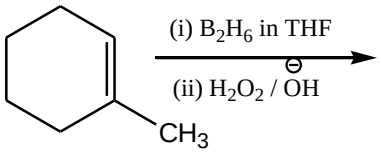
(ii) 1 – butane → 1,3 - butadiene

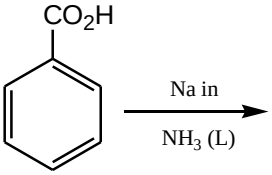
c) Write down the steps involve for the following conversions. [2]

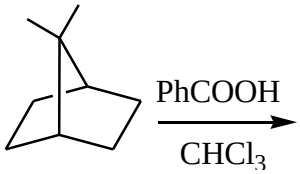


6. a) Predict the products for the following reactions and also explain with plausible mechanism. [4×2]

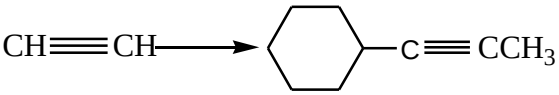
(i) 

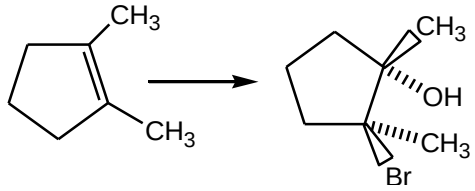
(ii) 

(iii) 

(iv) 

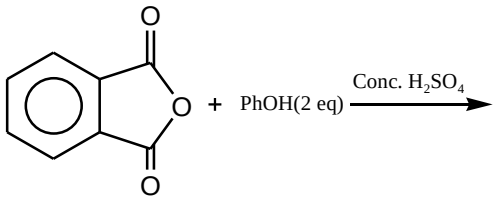
b) Complete the following conversions with suitable steps or reagents. [2×2]

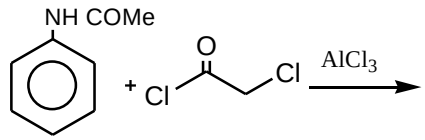
(i) 

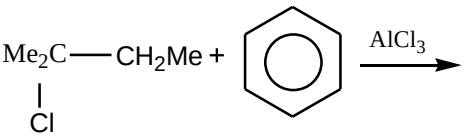
(ii) 

UNIT - IV [1×13]

7. a) Write down only the structure of the product (major) of the following reactions: [3×1]

(i) 

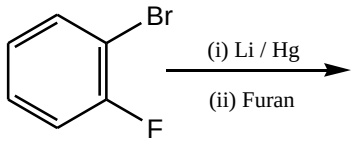
(ii) 

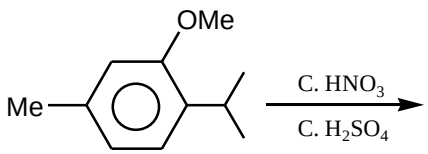
(iii) 

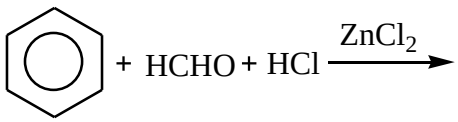
b) What happens when DNFB is treated with piperidine? Give mechanism and add a comment which distinguished it from aliphatic system. [2]

c) Distinguish π - complex and ∂ - complex. [2]

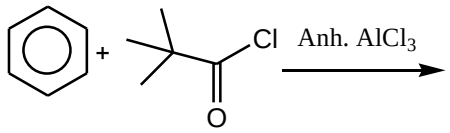
d) Predict the product of the following reactions. Give mechanism. [3×2]

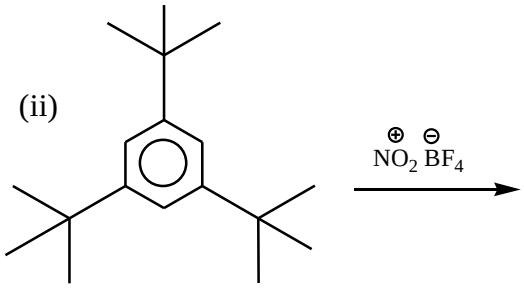
(i) 

(ii) 

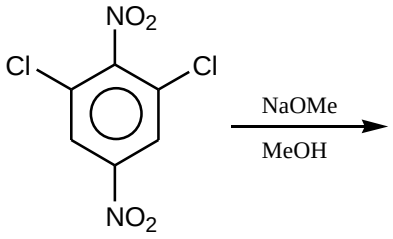
(iii) 

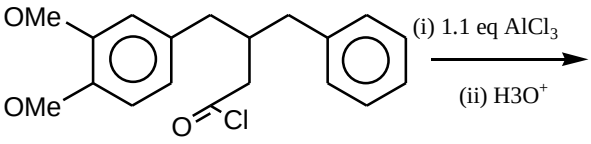
8. a) Write down the course of each of the following reactions giving appropriate mechanism. [2×2.5]

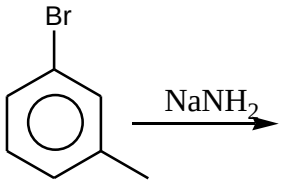
(i) 

(ii) 

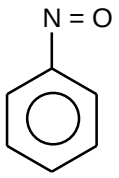
b) Predict the product with mechanism: [3×2]

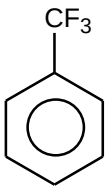
(i) 

(ii) 

(iii) 

c) Predict the favoured position of electrophilic substitution of the following and justify your answer in each case. [2]

(i) 

; (ii) 

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