2022

(February)

CHEMISTRY

(Honours)

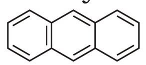
[Chem–H–502]

(Part—B : Organic Chemistry—I)

Marks : 37

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. *(a)* Explain with equations how you would synthesize anthracene () from benzene. 3

(b) What happens when -naphthol is treated with ferric chloride? Give equations. 1

(c) What are carotenoids? How are they isolated? 1+2=3

(d) What are peptides? Give one example of a dipeptide. 2

OR

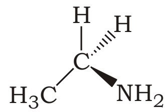
2. *(a)* How is naphthalene synthesized by Haworth's method? 2

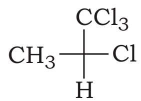
(b) What are proteins? How do they differ from peptides? 1+1=2

(c) Write a short note on tertiary structure of proteins. Name the different kinds of bonds responsible for the stability of tertiary structure of proteins. 4

(d) Why are carotenoids coloured? 1

3. *(a)* Assign *R*/*S* designation to the following compounds : 1×2=2

(i) 

(ii) 

(b) Draw perspective formulas for the two chair conformations of *cis*-1,2-dimethylcyclohexane. Which one is more stable? 2

(c) What are the various classes of dienes? Illustrate with structures. Out of these which class is more stable and why? 3

(d) Outline the formation of the polyester 'dacron'. 2

OR

4. (a) What is meant by 'relative configuration'? Illustrate with suitable example. 2

(b) Give a method of preparation of 1,3-butadiene with equations. 2

(c) Predict all the possible products of the following reaction and mention the major product : 2

$$C_6H_5CH{=}CH{-}CH{=}CH_2 \xrightarrow{Br_2 \text{ (equimolar amounts)}} ?$$

(d) What are the advantages of Ziegler-Natta polymerization over free radical polymerization? 2

(e) During free-radical polymerization, why purity of the monomers is so important? 1

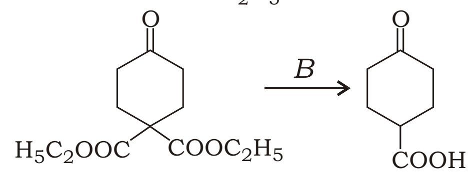
5. (a) Suggest the starting materials for the synthesis of

$$PhCOCH_2CH(Ph)CH(COOC_2H_5)_2$$

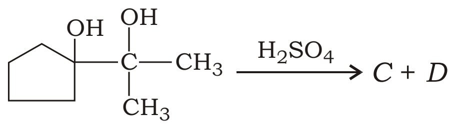
by Michael reaction. 2

(b) Complete the following equations mentioning the missing products/ reagents with proper mechanisms : 2½+(2+2)=6½

(i) $A + CH_2(COOC_2H_5)_2 \xrightarrow[C_2H_5OH]{NaOC_2H_5}$



(ii)

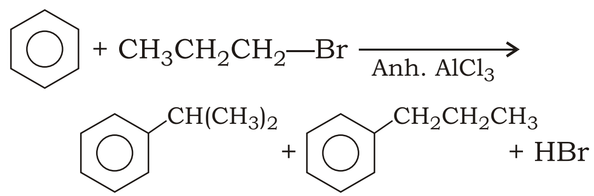


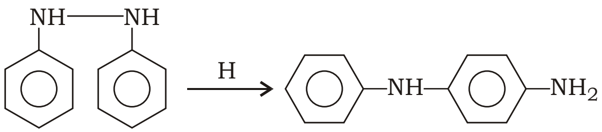
(c) Mention the migratory aptitude for the pinacol-pinacolone rearrangement. 1½

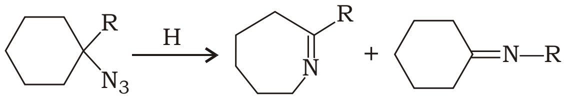
OR

6. (a) Sketch the mechanisms of the following transformations : 3+1½+3=7½

(i)



(ii) 

(iii) 

(b) The treatment of 2,2,6,6-tetramethylcyclohexanol with acid leads to the formation of an alkene after rearrangement. Assign the structure to the alkene and sketch the mechanism leading to its formation. 2½

Or

What is Knoevenagel reaction? Give an example and discuss the mechanism of this reaction. Why in Knoevenagel reaction the use of excess active methylene compound is not recommended? ½+1+1=2½

7. (a) Offer suitable explanations for the following : 1½×2=3

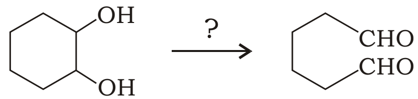
(i) The sulphonation of indole is carried out in SO_3 dissolved in pyridine instead of sulphuric acid, the normal sulphonating agent.

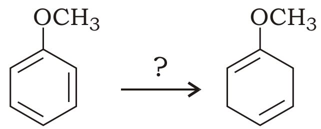
(ii) Quinoline on treatment with phenyllithium forms 2-phenylquinoline whereas isoquinoline under similar conditions gives 1-phenylisoquinoline.

(b) Distinguish between percentage yield and percent atom economy as measures of reaction efficiency. 2

(c) What type of reaction vessels are used in microwave reactions? 1

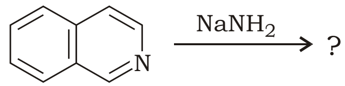
(d) Give an appropriate reagent in each of the following conversions and suggest their mechanisms : 1½×2=3

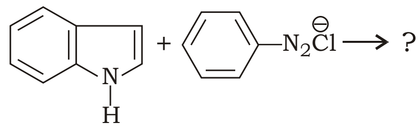
(i) 

(ii) 

OR

8. (a) Predict the products of the following reactions with mechanisms : 1½×2=3

(i) 

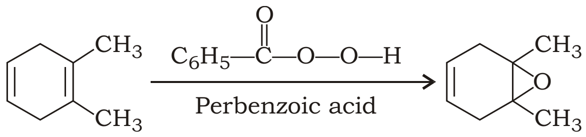
(ii) 

(b) Discuss the Hofmann elimination reaction under conventional and microwave conditions. 3

Or

Explain two principles of Green chemistry with the help of examples.

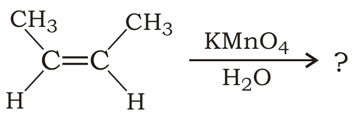
(c) Give the mechanism of the following reaction and also explain the result : 1+½=1½



(d) Suggest a step-by-step mechanism for the reduction of cyclopentyl methanol by aluminium isopropoxide. 1½

Or

Predict the product and suggest mechanism of the following reaction :



★ ★ ★