Total No. of Printed Pages—8

6 SEM TDC CHMH (CBCS) C 14

2023

(May/June)

CHEMISTRY

(Core)

Paper : C–14

(Organic Chemistry)

Full Marks : 53

Pass Marks : 21

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Choose the correct answer from the following : 1×5=5

(a) The absence of absorption bands near 1600 cm^{-1}, 1580 cm^{-1} and 1500 cm^{-1} is a proof for the absence of

(i) carbonyl group

(ii) aromatic ring

(iii) —OH group

(iv) secondary amino group

(b) Which of the following is an auxochrome?

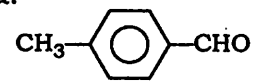
(i) —N=O

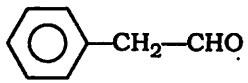
(ii) $-NO_2$

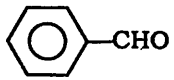
(iii) —N=N—

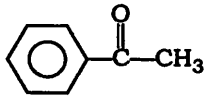
(iv) —OH

(c) The NMR spectrum of an unknown compound exhibits signals δ 7·5–8·0, (*m*, 5*H*) and 10·0 (*s*, 1*H*). Which of the following structures represents these data?

(i) 

(ii) 

(iii) 

(iv) 

(d) Invert sugar is

(i) sucrose

(ii) mannose

(iii) a mixture of glucose and fructose

(iv) None of the above

(e) Which one of the following is a natural polymer?

(i) Celluloid

(ii) Viscose rayon

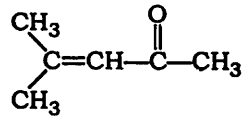
(iii) Terylene

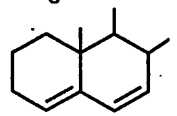
(iv) Cellulose

UNIT—I

2. Answer the following questions :

(a) Using Woodward-Fieser rule, calculate λ_{max} for the following : 1×2=2

(i) 

(ii) 

(b) Explain how *cis*-cinnamic acid and *trans*-cinnamic acid can be distinguished with the help of UV spectroscopy. 2

(c) Aniline absorbs at 280 nm, ε_{max} 8600, however in acidic solution the main absorption band is seen at 203 nm. Explain. 2

(d) Distinguish the following pair of isomers with the help of IR spectra : 2

(i) CH_3CH_2—CHO (ii) CH_3—C(=O)—CH_3

Or

(i) CH_3CH_2—OH (ii) CH_3—O—CH_3

(e) A compound with molecular formula C_8H_8O gives the following signals in NMR spectrum :

(i) Multiplet *J* 2·72 (5*H*)

(ii) Doublet *J* 7·2 (2*H*)

(iii) Triplet *J* 0·22 (1*H*)

Identify the structure of the compound. 3

Or

Predict the structure of an organic compound with molecular mass 88, whose NMR data are given below :

(i) A triplet, δ 1·2, 2*H*

(ii) A singlet, δ 1·97, 3*H*

(iii) A quartet, δ 4·06, 2*H*

(f) Define M^+ and $M^{+\bullet}$ ions. What do you mean by base peak in the mass spectrum of a compound? 1+1=2

Or

Write a short note on McLafferty rearrangement. 2

(g) An organic compound with molecular mass 72 absorbs at 274 nm, ε_{max} 17. In IR region, a strong absorption band is found at 1715 cm^{-1} and medium absorption bands are found at 2941–2857 cm^{-1}(*m*) and at 1460 cm^{-1}(*m*). The signals in the NMR spectrum are—

(i) 7·52 *J*, quartet;

(ii) 7·88 *J*, singlet;

(iii) 8·93 *J*, triplet.

Establish the structure of the compound. 4

(h) Explain shielding of acetylene protons and deshielding of ethylenic protons. 2+2=4

Or

Write in short about chemical shift. 4

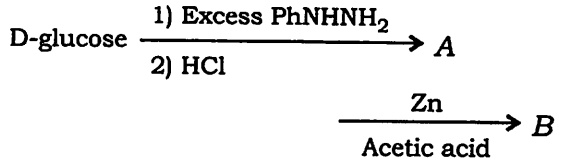
UNIT—II

3. Answer the following questions :

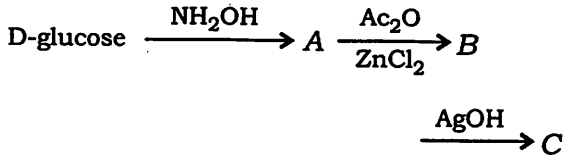
(a) Define epimerization. 1

(b) Sketch the stable conformational structure of the α-D-glucopyranose. 1

(c) Identify *A* and *B* from the following : 2



(d) Complete the following reactions and identify *A*, *B* and *C* : 2



(e) Convert D-arabinose into D-glucose with the help of Kiliani-Fischer synthesis. 2

(f) Write a short note about mutarotation. 2

Or

When D-glucose is treated with dilute aqueous alkali, a mixture of D-mannose, D-fructose and D-glucose is obtained. Explain the mechanism of the reaction. What is the name of the reaction?

UNIT—III

4. Answer the following questions :

(a) Write the structural formulas of the following dyes and mark the chromophore and auxochrome in each case : 2

(i) Congo red

(ii) Rosaniline

(b) How can alizarin be synthesized from anthracene? 2

Or

Write down the preparation of Congo red.

(c) Synthesize crystal violet from dimethyl aniline. 2

(d) How will you synthesize malachite green? 2

Or

Account the colour changes occurring when phenolphthalein is used as indicator in acid-base titration.

UNIT—IV

5. Answer the following questions :

(a) What are polyurethanes? How are they formed? 1+1=2

(b) How can phenol-formaldehyde resin be prepared? Explain. 2

(c) What is biodegradable polymer? Give one example of it. 1+1=2

(d) Explain vulcanization of natural rubber. 2

(e) How can Terylene be synthesized? 1

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