

Total No. of Printed Pages—7

6 SEM TDC CHMH (CBCS) C 14

2024

(May)

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 pair of isomers which cannot be distinguished by infrared spectroscopy is

(i) *cis-* and *trans*-isomers

(ii) tautomers

(iii) enantiomers

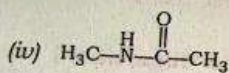
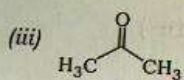
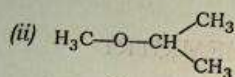
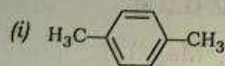
(iv) diastereoisomers

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(Turn Over)

(2)

(b) Which of the following compounds shows two PMR signals?



(c) Which of the following pairs gives the same osazone?

(i) Sucrose and fructose

(ii) Mannose and fructose

(iii) Glucose and galactose

(iv) Maltose and lactose

(d) Which of the following is not an example of thermoplastic plastic?

(i) Teflon

(ii) Dacron

(iii) Epoxy resin

(iv) Nylon

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(Continued)

(3)

(e) Azo dye is produced by the interaction of an aromatic diazonium chloride with

(i) aliphatic primary amine

(ii) nitrous acid

(iii) phenol

(iv) aromatic aldehyde

UNIT—I

2. Answer the following questions (any five) :

2×5=10

(a) Why does $nb \rightarrow \pi^*$ transition for carbonyl group shift to lower wavelength on increasing the polarity of solvent?

(b) How could you distinguish among 1°, 2° and 3° amines by infrared spectroscopy?

(c) The mass spectra of two different isomeric cycloalkanes show molecular ion peak at $m/z = 98$. One of them shows a base peak at $m/z = 69$ and the other at $m/z = 83$. Identify the cycloalkanes.

(d) What is Larmor frequency? How is it related to the external magnetic field strength?

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(4)

- (e) How can you distinguish between *cis*- and *trans*-stilbene with the help of UV-visible spectroscopy?
- (f) CH_3OH is good solvent for UV-visible spectroscopy but bad solvent for infrared spectroscopy. Explain briefly.

3. Conjugated diene has high λ_{max} than isolated diene. Explain with suitable example. 3

Or

The mass spectra of a hydrocarbon show an abundant molecular ion peak at m/e 120. UV-visible spectrum indicates aromatic character. NMR spectrum indicates signal at 1.2δ (*d*, 6*H*), 2.8δ (*m*, 1*H*) and 7.2δ (*s*, 5*H*). Determine the structure of the hydrocarbon and explain the spectral data.

4. Answer the following questions (any two) : 4×2=8

(a) The PMR signal for vinylic proton is observed at high δ -value compared to acetylenic proton. Explain.

(5)

- (b) An organic compound having molecular formula $\text{C}_4\text{H}_8\text{O}$ gives characteristic band at 275 nm ($\epsilon_{\text{max}} 17$) in its UV spectrum. In infrared spectrum, two peaks at $2940\text{--}2855\text{ cm}^{-1}$ and 1715 cm^{-1} are observed. In the mass spectrum, peak at m/e 29 and 15 is observed. PMR spectrum of the compound is as follows :

$\delta 2.5$ (*q*, 2*H*), $\delta 2.12$ (*s*, 3*H*)
and $\delta 1.07$ (*t*, 3*H*)

Identify the compound and explain the band/peak.

- (c) What is base peak? With the help of IR spectroscopy, how can you study H-bonding in *ortho*- and *para*-nitrophenol?

UNIT—II

5. Answer the following questions (any three) : 2×3=6

- (a) Glucose, mannose and fructose give same osazone. Explain.
- (b) How will you convert D-glucose to D-mannose?

(6)

(c) Draw the conformers of α -D and β -D glucose. Which conformer is more stable?

(d) Why does anomeric $-\text{OH}$ group undergo methylation with CH_3OH and HCl under reflux but others do not?

6. Explain mutarotation with probable mechanism. 3

UNIT—III

7. Answer the following questions : 2×3=6

(a) What do you mean by the terms 'chromogen', 'bathochrome', 'auxochrome' and 'hypsochrome'?

(b) β -carotene is orange red in colour. Account for the origin of its colour.

(c) Discuss briefly the quinonoid theory for colour and constitution.

8. Write one synthesis each of the following : 1½×2=3

(a) Bismark brown

(b) Malachite green

(7)

Or

Account for the colour change when phenolphthalein is used as indicator in acid-base titration. 3

UNIT—IV

9. Discuss the mechanism of free-radical addition polymerization having AIBN as free-radical generator. 3

Or

Write short notes on isotactic, syndiotactic and atactic polymers.

10. Answer the following questions : 2×3=6

(a) What is natural rubber? How does it differ from gutta-percha?

(b) Write a short note on plasticizer.

(c) Write down at least two uses of Bakelite and PVC.
