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63/1 (SEM-6) CC14/CHMHC 6146

2024

CHEMISTRY

Paper : CHMHC 6146

(Organic Chemistry-V)

Full Marks : 60

Pass Marks : 24

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Choose the correct answer (*any five*):

1×5=5

(a) What is the wavelength range of the UV-spectrum ?

(i) 100 nm to 500 nm

(ii) 200 nm to 800 nm

(iii) 300 nm to 1000 nm

(iv) 400 nm to 1600 nm

(b) The number of vibrational modes for acetaldehyde is

- (i) 23
- (ii) 24
- (iii) 15
- (iv) 9

(c) Number of NMR signal for 1-chloropropane is

- (i) 3
- (ii) 1
- (iii) 2
- (iv) 4

(d) Which class of carbohydrates cannot be hydrolysed further ?

- (i) Monosaccharides
- (ii) Polysaccharides
- (iii) Disaccharides
- (iv) Proteoglycan

(e) Which of the following is not a disaccharide ?

- (i) Maltose
- (ii) Sucrose
- (iii) Galactose
- (iv) Lactose


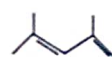
(f) Epimers glucose and mannose differ in configuration at

- (i) C-1 carbon
- (ii) C-2 carbon
- (iii) C-3 carbon
- (iv) C-4 carbon

(g) Alizarin belongs to the class of

- (i) vat dye
- (ii) mordant dye
- (iii) substantive dye
- (iv) reactive dye

- (h) In addition polymer, monomer used is
- unsaturated compounds
 - saturated compounds
 - bifunctional saturated compounds
 - trifunctional saturated compounds
- (i) Which one of the following is an addition polymer?
- Dacron
 - Teflon
 - Nylon 6, 6
 - None of the above
- (j) An IR-spectrum is found to have a medium adsorption peak near 3400cm^{-1} . This corresponds to which organic compound?
- Esters
 - Aldehydes
 - Ethers
 - Amines

2. Answer the following questions : **(any five)**
2×5=10
- Define auxochrome with examples.
 - How will you distinguish *cis*-cinnamic acid and *trans*-cinnamic acid by IR spectroscopy?
 - Define shielding and deshielding effects.
 - How will you convert D-glucose to D-arabinose?
 - Write the synthesis of malachite green dye.
 - Write the synthesis of Buna-S rubber.
 - What is polydispersity index? What is the significance of it?
3. Answer the following questions : **(any five)**
5×5=25
- Calculate the λ_{max} for the following dienes :
2½+2½=5
- (i)  (ii) 
- Write a short note on 'fingerprint region' in IR spectroscopy.

- (c) Define chemical shift. Why is TMS used as standard in chemical shift in NMR spectroscopy? 2+3=5
- (d) A compound C_8H_8O shows a doublet at $\delta = 7.86$, a multiplet at $\delta = 7.45-7.32$ and an upfield singlet at $\delta = 2.48$. Identify the compound.
- (e) What are carbohydrates and how are they classified? Give the D and L configuration of aldotriose. 1+2+2=5
- (f) Give a method to convert D(-) arabinose into D(+) glucose.
- (g) Describe the modern concept of colour and chemical constitution.
- (h) Write the differences of thermoplastic and thermosetting polymers. Define graft copolymer with examples. 3+2=5
- (i) Calculate M_n and M_w when equal number of molecules with $M_1 = 10,000$ and $M_2 = 100,000$ are mixed.

4. Answer the following questions : **(any two)**
10×2=20
- (a) (i) How will you distinguish alcohol and ketone with the help of IR-spectroscopy. 5
- (ii) Explain proton NMR spectrum of ethanol. 5
- (b) (i) What are epimers? How can you prove the epimeric relationship among D(+) glucose and D(+) mannose? 1+4=5
- (ii) Write the chemical reactions for the conversion of D-glucose to D-fructose. 5
- (c) Write the method of preparation and uses of the following dyes : $2\frac{1}{2} \times 4 = 10$
- (i) Phenolphthalein
- (ii) Alizarin
- (iii) Methyl orange
- (iv) Indigotin dye
- (d) (i) Explain the mechanism of free-radical polymerisation reaction. 5

(ii) An organic compound (A) with molecular formula, C_3H_9N shows the following peaks in the IR spectrum :

(i) 3012 cm^{-1} (m)

(ii) 3423 cm^{-1} (s)

(iii) 3236 cm^{-1} (m)

(iv) 1615 cm^{-1} (m)

When the compound A is treated with nitrous acid (HNO_2) we get a compound B which shows a strong peak at 3430 cm^{-1} . What are A and B. Explain the reactions involved. 5