Total number of printed pages–7

1 (Sem–5/FYUGP) CHE02MJ

2025

CHEMISTRY

(Major)

Paper : CHE0500204

(Organic Chemistry–II)

Full Marks : 45

Time : 2 hours

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

1. Answer the following questions as directed : 1×5=5

(a) Isopropyl bromide on Wurtz reaction gives

(i) *n*-Hexane

(ii) Propane

(iii) 2,3-Dimethylbutane

(iv) None of the above

(b) Which of the following is laevorotatory ?

(i) Glucose

(ii) Fructose

(iii) Sucrose

(iv) Cellulose

(c) Which of the following will not undergo aldol condensation reaction ?

(i) Propanal

(ii) Ethanal

(iii) Propanone

(iv) Benzaldehyde

(d) Menthol is a

(i) Monoterpene

(ii) Diterpene

(iii) Sesquiterpene

(iv) Triterpene

(e) Define 'Ketonic hydrolysis'.

2. Answer ***any five*** of the following questions : 2×5=10

(a) What is sulphur ylide ? What are the different types of sulphur ylide ?

(b) What is meant by hydroboration oxidation ? Illusstrate it with an example.

(c) How will you synthesise *n*-butanoic acid from ethyl acetoacetate ?

(d) What is Cannizzaro reaction ? Give *one* example.

(e) Give *Re* or *Si* nomenclature to two faces of accetophenone.

(f) What is Cram's rule ? Give an example.

(g) *D*-fructose is a ketohexose, yet it reduces Fehling's solution. Explain.

(h) Why do glucose and mannose form same osazones ?

(i) Give the structures of isomeric citrals.

(j) Suggest a mechanism for the acid catalysed mutarotation of *D*-(+)-glucose.

3. Answer ***any four*** from the following questions : 5×4=20

(a) What is the difference between stereoselectivity and stereospecificity in chemical reactions ? Give examples of each. 3+2=5

(b) What is the Wurtz reaction? Give an example with mechanism. What are the drawbacks of Wurtz reaction?

1+2+2=5

(c) How does the Felkin-Anh model differ from the Cram's rule? Provide an example where the two models predict different outcomes. 3+2=5

(d) How are phosphines converted to phosphonium salts and phosphorous ylides? Show *one* synthetic use of triphenylphosphine. 2+3=5

(e) What do you mean by active methylene compound? Write the reaction for preparation of ethyl acetoacetate. Provide a mechanism for the reaction.

1+1+3=5

(f) "Citral is an acyclic monoterpene." Explain this by writing the characteristics of such compounds. How many stereoisomers of citral are possible? How these stereoisomers can be distinguished? Write a synthesis of citral.

1+1+1+2=5

(g) Draw the cyclic anomeric forms of *D*-fructose. Give the mechanism for hydrolysis of glycoside under acidic condition.

1+4=5

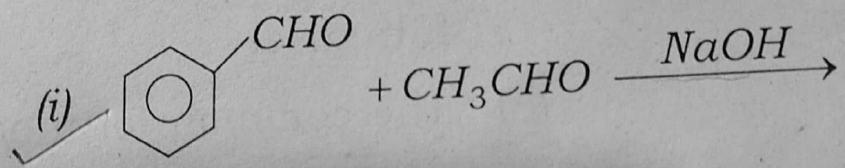
(h) Write notes on : $2\frac{1}{2}\times2=5$

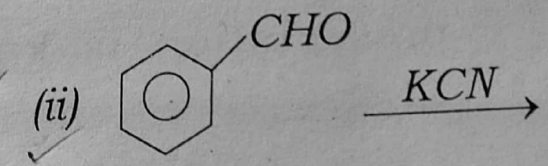
(i) Formation of stability of enamines

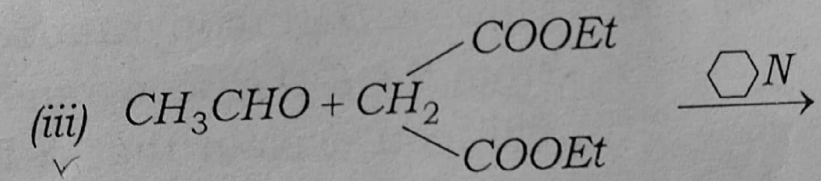
(ii) Alkylation of enolates

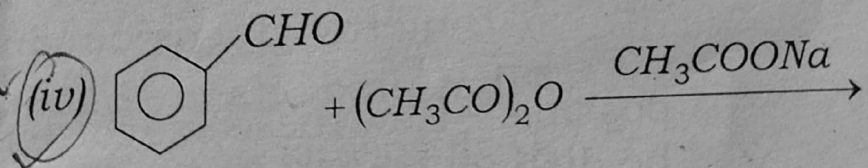
4. Answer ***any one*** of the following : $10\times1=10$

(a) Complete the following reactions and give suitable mechanisms for each of them : $2\frac{1}{2}\times4=10$

(i) 

(ii) 

(iii) 

(iv) 

(b) (i) Explain why polysaccharide do not mutarotate. 2

(ii) Give the structures of sucrose, lactose and maltose. 3

(iii) Fill in the blanks : 1×5=5

(A) *D*-glucose is an epimer of C-1 .

(B) Ketoses have less number of _____ than aldoses.

(C) Mild oxidation of glucose gives gluconic acid

(D) _____ is present mostly as furanose.

(E) The common form of glucose as represented by Haworth presentation is known as _____ .

(c) (i) How α-*D*-glucopyranose differs from the β-*D*-glucopyranose ? How will you explain that α-*D*-glucose reduces Fehling's solution but α-*D*-methylglucoside does not ? What products are obtained when *D*-glucose is—

(A) treated with excess of $PhNHNH_2$ followed by dilute hydrochloric acid;

(B) treated with periodic acid ? n-hexane

1+2+2=5

(ii) Define the following reactions and give the mechanisms : $2\frac{1}{2}\times2=5$

(A) Beckmann rearrangement

(B) Wolff rearrangement

(d) (i) How will you convert an aldopentose to an aldohexose by using Kiliani synthesis? Explain each step by using suitable chemical reactions. 5

(ii) How will you prepare the following compounds from diethylmalonate? $2\frac{1}{2}\times2=5$

(A) Succinic acid

(B) Crotonic acid