

2020

CHEMISTRY

(Major)

Course : 403

(Organic Chemistry)

The figures in the margin indicate full marks for the questions

(New Course)

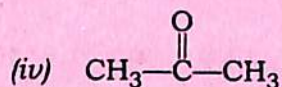
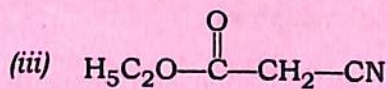
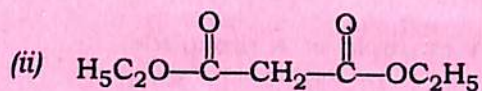
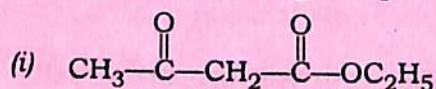
Full Marks : 48

Pass Marks : 14

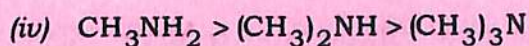
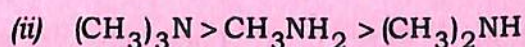
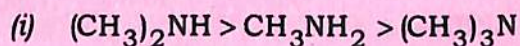
Time : 2 hours

1. Choose the correct answer from the following :

1×5=5

(a) Which of the following compounds has the lowest pK_a value?

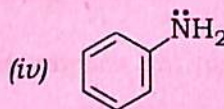
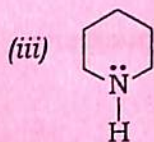
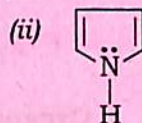
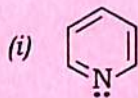
(b) The correct order of basic strength of methyl substituted amines in aqueous solution is



(c) Anthracene may be synthesized by

- (i) Haworth method
- (ii) Elbs method
- (iii) Both (i) and (ii)
- (iv) Duma's method

(d) The strongest base among the following is



(e) Quinine is obtained from the bark of which of the following trees?

- (i) Banyan
- (ii) Cinchona
- (iii) Redwood
- (iv) Eucalyptus

2. Answer any five from the following :

2×5=10

(a) Starting from ethyl acetoacetate, how will you prepare uracil?

(b) What is a polypeptide? Give an example of a dipeptide.

1+1=2

(c) Write one medicinal use of quinine and morphine.

(d) Aniline cannot be prepared by Gabriel phthalimide synthesis. Explain.

(e) Convert either naphthalene to anthracene or anthracene to alizarin.

(f) Synthesize 1-ethyl isoquinoline with the help of Bischler-Napieralski synthesis.

UNIT—I

3. (a) Sketch the keto and enol tautomeric forms of ethyl acetoacetate. Which of them is more stable and why?

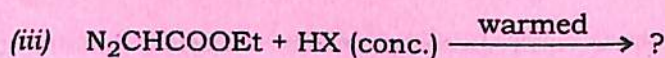
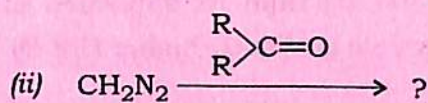
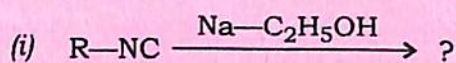
1+1=2

(b) Starting from diethyl malonate, how will you prepare active valeric acid?

2

UNIT—II

4. (a) Complete the following reactions (any three) : 1×3=3



- (b) How will you prepare diazomethane from methylamine? 2

5. Starting from benzene diazonium chloride how will you prepare nitrobenzene? 2

UNIT—III

6. Discuss the α -helical structure of protein. 2

Or

Give one example of a tripeptide showing N-terminal end and C-terminal end.

7. (a) Synthesize alanine with the help of Strecker's synthesis. 2

Or

Write a short note on electrophoresis of amino acids.

- (b) What happens when alanine reacts with ninhydrin? Give the chemical reaction. 1

UNIT—IV

8. (a) Naphthalene undergoes Friedel-Craft alkylation reaction at α -position in CS_2 medium whereas the reaction takes place at β -position in nitrobenzene medium. Justify. 2

- (b) What happens, when—

(i) a solution of anthracene is exposed to sunlight;

(ii) naphthalene is oxidized with $KMnO_4 / H^+$?

1+1=2

Or

How can phenanthrene be synthesized by Bardhan-Sengupta method? 2

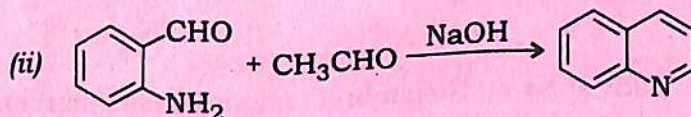
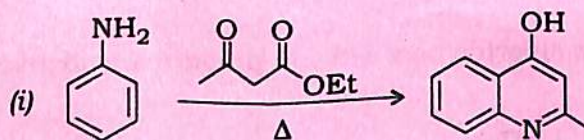
UNIT—V

9. Explain why—

(i) the dipole moment of furan is lower (0.7 D) than its saturated analog (1.7 D) whereas the dipole moment of pyrrole is slightly higher (1.8 D) than its saturated analog (1.57 D);

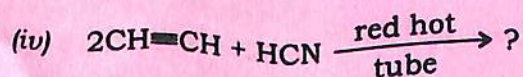
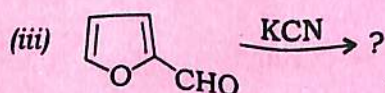
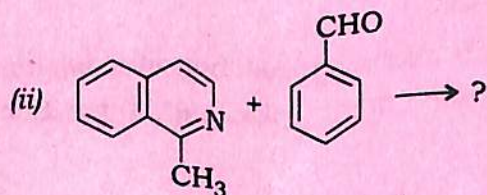
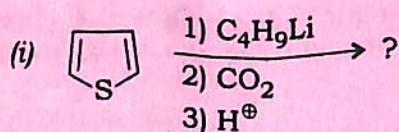
(ii) pyridine behaves as base and possess much weaker basicity than aliphatic amines. 1½+1½=3

10. (a) Name the following reaction and give mechanism (any one) : ½+2½=3



Or

(b) Complete the following reactions (any three) : 1×3=3



UNIT—VI

11. (a) What is Hoffmann's exhaustive methylation method? What product will be obtained when this method is applied to nicotine? 1+1=2
- (b) What are alkaloids? How are they classified? 1+1=2
- (c) Discuss the importance of Zeisel's method in structure determination of alkaloids. 2
- (d) Write one medicinal use of reserpine. 1

(Old Course)

Full Marks : 48

Pass Marks : 19

Time : 3 hours

1. Choose the correct answer from the following : 1×5=5
- (a) Albumin is an example of which of the following proteins?
- (i) Conjugated protein
 - (ii) Simple protein
 - (iii) Derived protein
 - (iv) None of the above
- (b) Which of the following compounds will be formed when pyrrole is treated with SO_2Cl_2 ?
- (i) 1,2,3,4,5-tetrachloropyrrole
 - (ii) 2,5-dichloropyrrole
 - (iii) 2-chloropyrrole
 - (iv) 3-chloropyrrole
- (c) What product will be formed when pyridine is heated in presence of NaNH_2 and liquid NH_3 ?
- (i) 3-aminopyridine
 - (ii) 4-aminopyridine
 - (iii) 2-aminopyridine
 - (iv) 6-aminopyridine

(d) When methylamine is treated with CHCl_3 and alcoholic KOH, which of the following compounds will be formed?

- (i) Methyl cyanide
- (ii) Ethylamine
- (iii) Methyl isocyanide
- (iv) *N*-methyl aminomethane

(e) Which of the following products will be formed when naphthalene is oxidized in presence of CrO_3 and CH_3COOH at 25°C ?

- (i) 1,4-Naphthaquinone
- (ii) 5,6-Naphthaquinone
- (iii) Phthalic anhydride
- (iv) None of the above

2. Answer any *five* from the following :

2×5=10

- (a) Why electrophilic substitution in naphthalene takes place more readily in position-1 than at position-2?
- (b) How will you convert alkyl cyanide to carboxylic acid? Give the mechanism.
- (c) Explain why pyridine is a strong base than pyrrole but weaker than aliphatic amines.
- (d) How will you prepare an unsaturated acid from diethylmalonate?
- (e) Explain why the dipole moment of pyridine (2.26 D) is higher than that of piperidine (1.17 D).
- (f) Explain briefly about the secondary structure of protein.

UNIT—I

3. Answer any *two* from the following :

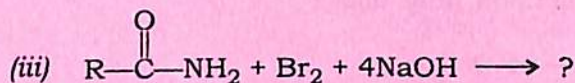
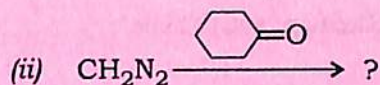
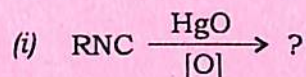
2×2=4

- (a) How will you synthesize *n*-valeric acid from diethylmalonate?
- (b) How will you synthesize glutaric acid starting from ethylacetoacetate?
- (c) Starting from diethylmalonate how will you prepare cyclopentane?

UNIT—II

4. (a) What product will be formed when nitriles are boiled with mineral acid? Give mechanism. 2

(b) Complete the following reactions : 1×3=3



5. How will you distinguish between 1°, 2°- and 3°-amines with the help of nitrous acid? 2

UNIT—III

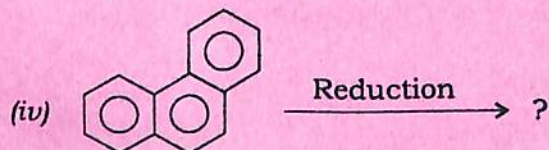
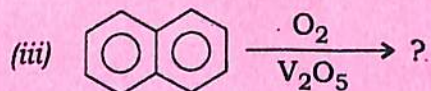
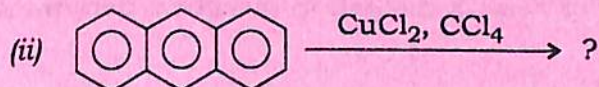
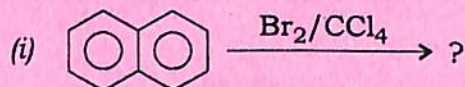
6. (a) What is polypeptide? Give one example of a tripeptide. 2+1=3

(b) Synthesize glycine with the help of Gabriel phthalimide synthesis. 2

UNIT—IV

7. (a) Synthesize phenanthrene from naphthalene by Haworth synthesis. 2

(b) Complete the following reactions (any three) : 1×3=3



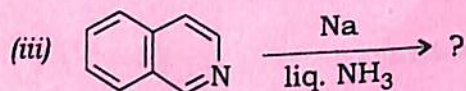
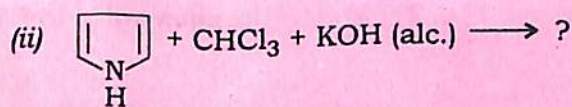
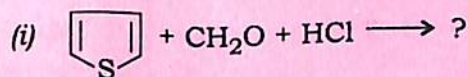
UNIT—V

8. (a) Why pyrrole shows aromatic character and gives electrophilic substitution reactions? 2
- (b) Synthesize isoquinoline by Bischler-Napieralski synthesis. 2

Or

Synthesize quinoline with the help of Skraup synthesis.

- (c) Complete the following reactions (any two) : 1×2=2



UNIT—VI

9. (a) Discuss Ladenburg's synthesis of coniine. 2
- (b) Write one medicinal use of cocaine and nicotine. 1+1=2
- (c) Explain Hoffmann's exhaustive methylation considering the example of nicotine and give the name of the product. 2

Or

Discuss the importance of Zeisel's method in structure determination of alkaloids.
