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(May)

CHEMISTRY

(Major)

Course : 403

(Organic Chemistry)

(New Course)

Full Marks : 48

Pass Marks : 14

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. Choose the correct answer from the following :

1×5=5

- (a) Pyridine undergoes nucleophilic substitution with NaNH_2 to form
- | | |
|-----------------------|----------------------|
| (i) pyrimidine | (ii) 3-aminopyridine |
| (iii) 2-aminopyridine | (iv) 4-aminopyridine |
- (b) Oxidation of naphthalene with CrO_3 and CH_3COOH at 25°C forms
- | | |
|--------------------------|--------------------|
| (i) phthalic anhydride | (ii) benzoic acid |
| (iii) 1,4-naphthaquinone | (iv) phthalic acid |
- (c) Which of the following compounds is most basic?
- | | |
|---------------------------------|---|
| (i) $(\text{CH}_3)_2\text{NH}$ | (ii) $\text{C}_6\text{H}_5-\text{NH}_2$ |
| (iii) CH_3-NH_2 | (iv) $\text{CH}_3\text{CH}_2-\text{NH}_2$ |
- (d) Nicotine when oxidized with nitric acid gives
- | | |
|----------------------|---------------|
| (i) pyridine | (ii) pyrrole |
| (iii) nicotinic acid | (iv) nicotone |
- (e) When alanine is treated with nitrous acid, it gives
- | | |
|---------------------|--------------------|
| (i) tartaric acid | (ii) lactic acid |
| (iii) succinic acid | (iv) glutaric acid |

2. Answer any five from the following :

2×5=10

- How will you synthesize 3-methyl-2-pentanone from ethyl acetoacetate?
- How can you distinguish among primary, secondary and tertiary amines with the help of Hinsberg's test?
- C—N bond in peptide is stronger and shorter than the usual C—N single bond. Explain.
- What are alkaloids? How are they classified?
- Electrophilic substitution in anthracene takes place at 9 and 10 positions. Explain.
- Give two examples of reactions which suggest the enol structure of ethyl acetoacetate.

UNIT—I

3. Answer any two from the following :

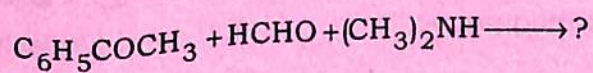
2×2=4

- How will you synthesize crotonic acid from ethyl acetoacetate?
- Starting from diethyl malonate, how will you prepare an unsaturated acid?
- How will you synthesize cyclopropane carboxylic acid from diethyl malonate?

UNIT—II

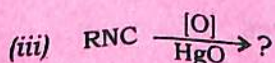
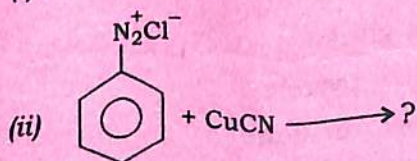
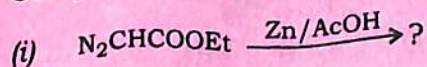
4. (a) Complete the following reaction and suggest the mechanism :

2

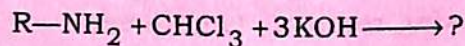


(b) Complete the following reactions (any two) :

1×2=2



5. (a) Convert pyridine to trimethylamine with the help of Hofmann exhaustive methylation. 2
- (b) Complete the following reaction : 1



UNIT—III

6. (a) Explain briefly about the secondary structure of protein. 3

Or

What is isoelectric point? What is the effect of pH on the structure of amino acids? 1+2=3

- (b) Synthesize alanine with the help of Strecker's synthesis. 2

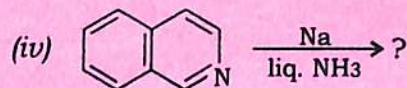
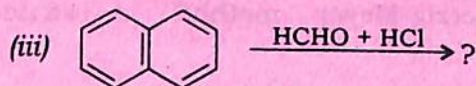
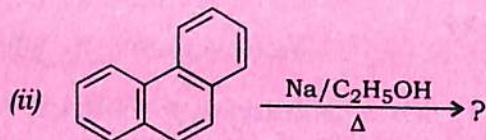
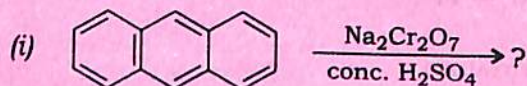
UNIT—IV

7. (a) Synthesize 1-methylnaphthalene starting from benzene. 2

Or

Synthesize phenanthrene from naphthalene by Haworth synthesis. 2

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



UNIT—V

8. (a) Synthesize isoquinoline from β -phenylethylamine. 2

Or

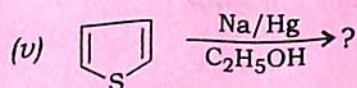
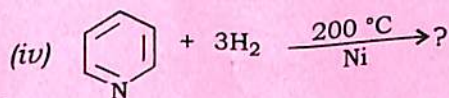
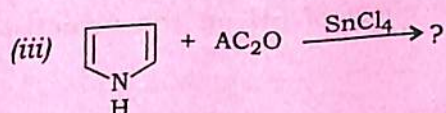
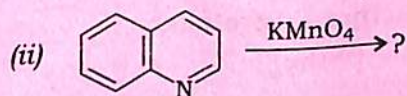
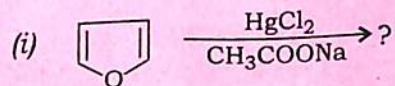
How will you synthesize quinoline with the help of Skraup synthesis? 2

(b) Electrophilic substitution in pyrrole takes place at C-2 position. Explain. 2

Or

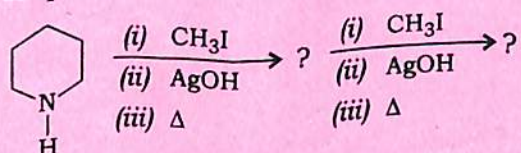
Pyridine is a stronger base than pyrrole. Explain. 2

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



UNIT—VI

9. (a) Complete the following transformation : 2



(b) Discuss the importance of Herzig-Meyer method in structure determination of alkaloids. 2

(c) Write one medicinal use of morphine. 1

(Old Course)

Full Marks : 48

Pass Marks : 19

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) Amine that cannot be prepared by Gabriel phthalimide synthesis is

- (i) methylamine
- (ii) aniline
- (iii) benzylamine
- (iv) isobutylamine

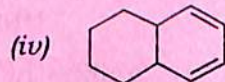
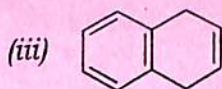
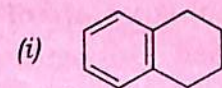
(b) To which of the following groups of alkaloids does hygrine belong?

- (i) Pyrrolidine group
- (ii) Indole group
- (iii) Phenanthrene group
- (iv) Quinoline group

(c) Nucleophilic substitution of pyridine with NaNH_2 gives

- (i) pyrimidine
- (ii) 3-aminopyridine
- (iii) 2-aminopyridine
- (iv) 4-aminopyridine

(d) Reduction of naphthalene with H_2/Ni at 150°C gives



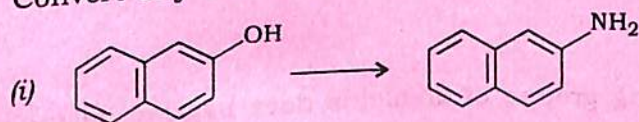
(e) Ethyl acetoacetate, when hydrolyzed with dilute HCl and then heated, gives

- (i) acetone
- (ii) acetoacetic acid
- (iii) acetic acid
- (iv) ethyl acetate

2. Answer any five from the following :

2×5=10

- (a) How will you synthesize cyclobutane carboxylic acid from diethyl malonate?
- (b) Pyrrole shows resemblance to phenol and aromatic amines. Explain with example.
- (c) What happens when diazomethane reacts with (i) ethylene and (ii) phenol?
- (d) Synthesize phenylalanine with the help of Strecker's synthesis.
- (e) Electrophilic substitution in naphthalene takes place at the α -position and not at the β -position. Explain.
- (f) Convert any one of the following :

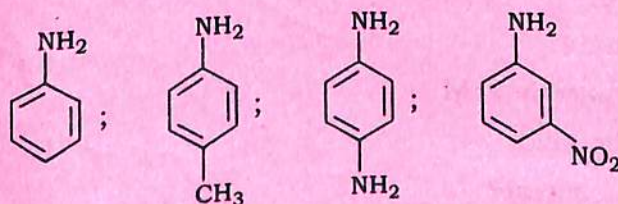


UNIT—I

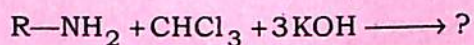
3. (a) Starting from diethyl malonate, synthesize any one from the following : 2
- (i) Succinic acid
- (ii) *n*-Valeric acid
- (b) Give examples of two reactions which suggest the enol structure of ethyl acetoacetate. 2

UNIT—II

4. (a) How will you convert aniline to *m*-nitroaniline? 2
- (b) Arrange the following compounds in order of their increasing basic strength : 1



(c) Complete the following reaction and suggest the mechanism : 2



(d) Starting from diazomethane, how will you prepare (i) epoxide and (ii) acid chloride? 1+1=2

UNIT—III

5. (a) Discuss the α -helical structure of protein. 2

(b) Synthesize alanine by Gabriel phthalimide synthesis. 2

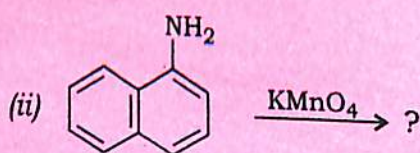
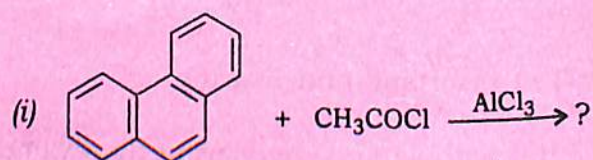
6. (a) What happens when alanine reacts with nitrous acid? Give reaction. 1

(b) What is isoelectric point? 1

UNIT—IV

7. (a) Synthesize naphthalene with the help of Haworth synthesis. 2

(b) Complete the following reactions (any one) : 1



UNIT—V

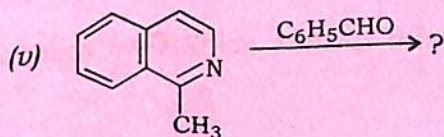
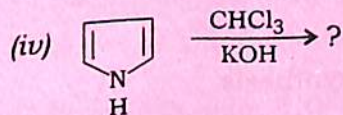
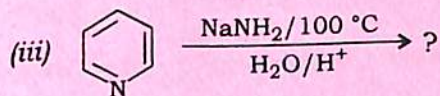
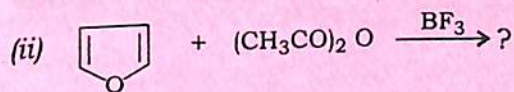
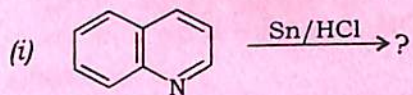
8. (a) Synthesize 2,5-dimethyl pyrrole from 1,4-diketone with the help of Paal-Knorr synthesis. 2

(b) Synthesize quinoline with the help of Pfitzinger synthesis. 2

[P.T.O.]

(b) Complete the following reactions (any two) :

1×2=2



(c) Explain why electrophilic substitution in furan takes place at C-2 position.

2

UNIT—VI

9. (a) Discuss the importance of Herzig-Meyer method in structure determination of alkaloids.

2

(b) Write one medicinal use each of reserpine and hygrine.

1+1=2

(c) Explain the Hofmann exhaustive methylation considering the example of coniine.

2

(d) What are alkaloids?

1
