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3 (Sem-4/CBCS) CHE HC2

2022

CHEMISTRY

(Honours)

Paper : CHE-HC-4026

(Organic Chemistry -III)

Full Marks : 60

Time : Three hours

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

1. Answer **any seven** from the following :
1×7=7

- (i) Write the IUPAC nomenclature of pyrrole.
- (ii) What product can you expect if furfural is heated at 200 °C in presence of Pd-C ?
- (ii) Write the products of the following :



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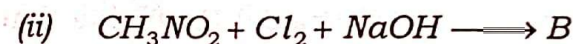
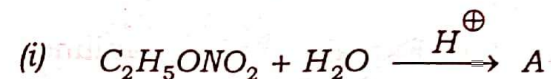
- (iv) Name the intermediate compound formed in Hofmann's degradation of amide to amine.
- (v) The rate of electrophilic substitution reactions of heterocyclic compounds is slower than benzene. Why?
- (vi) Why are alkyl isocyanides insoluble in water?
- (vii) Why is naphthalene less aromatic than benzene?
- (viii) How many number of isoprene units are present in citral?
- (ix) Which position of indole is more susceptible to electrophilic substitution?
- (x) Which bond of phenanthrene is readily attacked by reagents?

2. Answer **any four** questions from the following : 2×4=8

- (a) How can 'yellow oil' be prepared from a secondary amine? Give reaction.
- (b) What happens when $C_6H_5CON_3$ is heated? Write the mechanism of the reaction.

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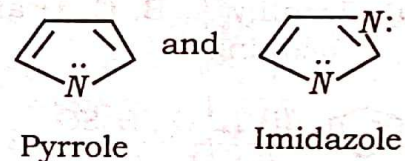
(c) Identify A and B in the following reactions, also write their names :



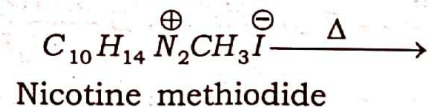
(d) Compare the aromaticities of furan and pyrrole and give explanations.

(e) Thiophene is less reactive than furan. Explain.

(f) Compare the basicities of the following :



(g) Write the products of the following :



(h) What do you mean by isoprene rule?

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3. Answer **any three** questions from the following : (A to H) 5×3=15

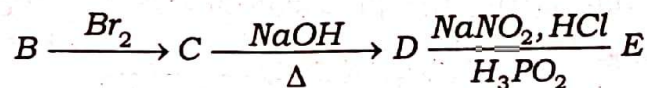
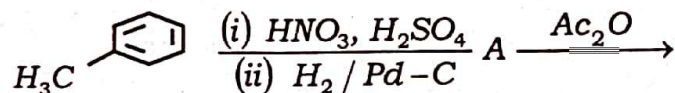
A. (a) Explain why aniline cannot undergo 1+1=2

(i) Friedel-Craft reaction

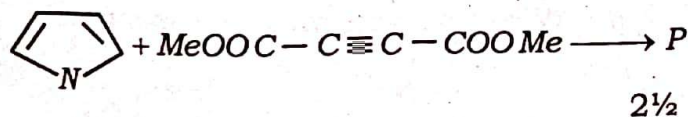
(ii) Nitration reaction with HNO_3

(b) Discuss about kinetically and thermodynamically controlled product of naphthalene, when it undergoes sulphonation reaction with conc. H_2SO_4 at $80^\circ C$ and $160^\circ C$. 3

B. (a) Identify A, B, C, D and E in the following : 2½



(b) Identify P and propose a mechanism :



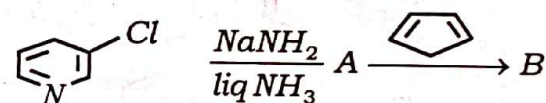
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C. (a) Write the sequence of reactions involved in the Fischer indole synthesis. 2

(b) Why is catalytic reduction of thiophene difficult ? 1

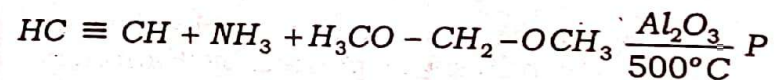
(c) Compare and explain the basicity of indole and quinoline. 2

D. (a) Find the product of the following reactions : 2



(b) Compare the basicities of 2-methyl pyridine and 3-methyl pyridine. 2

(c) Write the product P : 1



E. (a) Write the mechanism of diazotization of an aromatic amine. 3

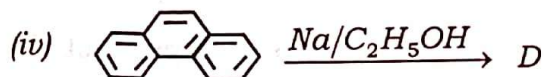
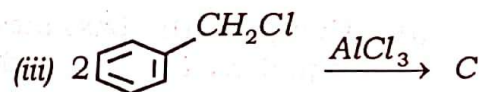
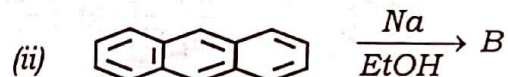
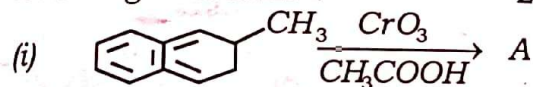
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- (b) Can you prepare secondary amines using Gabriel's phthalimide synthesis? Give reasons. 2

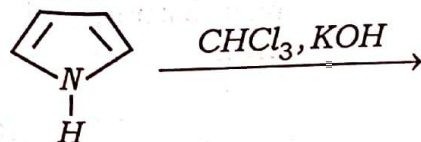
F. (a) Write the reactions involved in Haworth synthesis of naphthalene. 3

(b) Identify A, B, C and D in the following reactions: 2



G (a) Write the reaction mechanism of synthesis of pyrrole by Hantzsch method. 3

(b) Find the product of the following reaction: 2



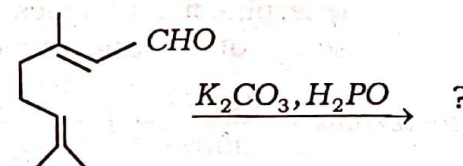
- H. How will you distinguish 1°, 2° and 3° nitroalkanes? What products are obtained when nitrobenzene is reduced in (i) acidic medium, and (ii) alkaline medium? 3+2=5

4. Answer **any three** questions from the following A to H: 10×3=30

A. (a) How will you ascertain the nature of oxygen and number of double bonds in citral? $1\frac{1}{2} + 1\frac{1}{2} = 3$

(b) Write different steps involved in the synthesis of citral from acetone and acetylene. 5

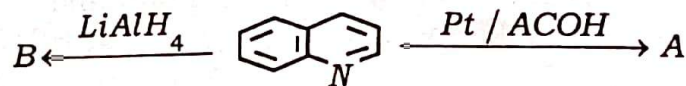
(c) Write the product and name it: 2



B. (a) Write the sequence of reactions that takes place in the synthesis of quinoline by Doebner-Miller method. 5

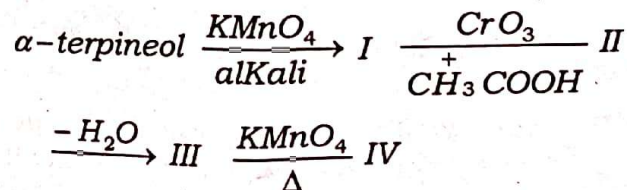
- (b) Find the products of the following :

2



Also name the products.

- (c) Which position of quinoline is more susceptible to undergo electrophilic substitution reaction? Explain with proper reasoning. 3
- C. (a) Write the method of synthesis of α -terpineol from *p*-toluidic acid. 4
- (b) Write the products when α -terpineol undergoes following series of oxidation reaction : 4



- (c) What conclusion can you draw from the above oxidation reactions ? 2

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- D. (a) Write how alkaloids can be extracted from plants. 2

- (b) Write the reactions to ascertain the nature of N-atoms in nicotine. 3

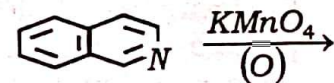
- (c) How can you show the presence of pyrrolidine ring in nicotine ? 4

- (d) Write on medicinal importance of morphine along with side effects. 1

- E. (a) Write different resonating structures of isoquinoline. 2

- (b) Suggest mechanism of Bischler-Napieralskiol synthesis of isoquinoline. 4

- (c) Find the final products of the following reaction. 2

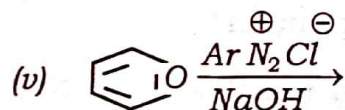
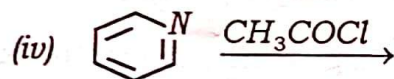
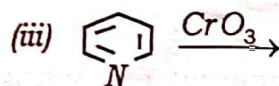
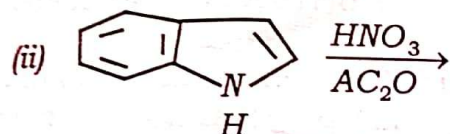
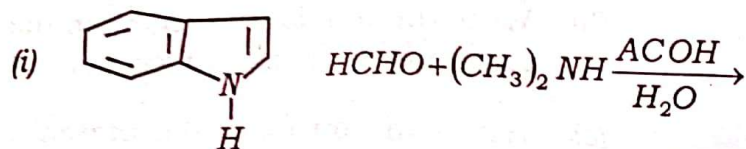


- (d) Compare the basicities of isoquinoline with pyridine. 2

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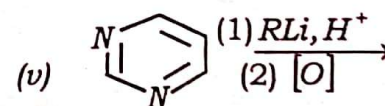
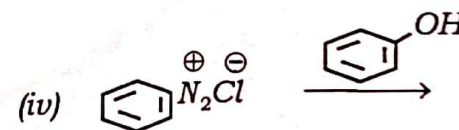
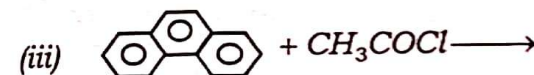
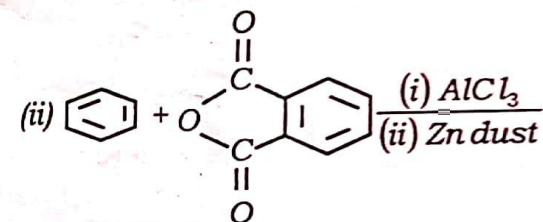
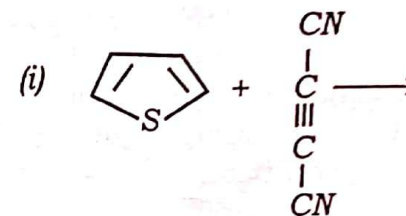
F. Write the products of the following reactions : $2 \times 5 = 10$



G. (a) Compare the basicities of furan, pyrrole and thiophene with proper explanations. 3

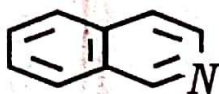
(b) Furan is less reactive than pyrrole. Explain. 2

(c) Find the products of the following reactions : $1 \times 5 = 5$



H. (a) What is Hoffmann's exhaustive methylation ? 2

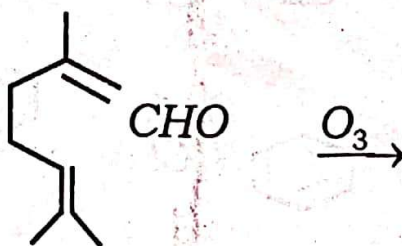
(b) Apply Hoffmann's exhaustive methylation and Emde's degradation to the following compound to get the final product : 4



Isoquinoline

(c) What are different products you can expect when nicotine zinc chloride is distilled ? 1½

(d) Find all the products of the following reaction : 1½



(e) What are the therapeutic uses of reserpine ? 1