

Total number of printed pages-12

3 (Sem-4/CBCS) CHE HC2

2022

## CHEMISTRY

(Honours)

Paper : CHE-HC-4026

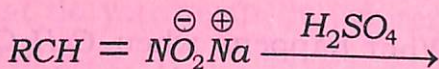
**(Organic Chemistry -III)**

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 :



Contd.

(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?

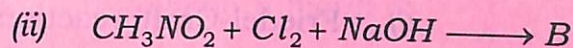
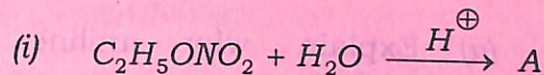
(x) Which bond of phenanthrene is readily attacked by reagents?

2. Answer **any four** questions from the following :  
 $2 \times 4 = 8$

(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.

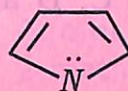
(c) Identify *A* and *B* in the following reactions, also write their names :



(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 :

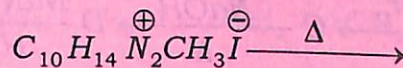


Pyrrole



Imidazole

(g) Write the products of the following :



Nicotine methiodide

(h) What do you mean by isoprene rule?

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

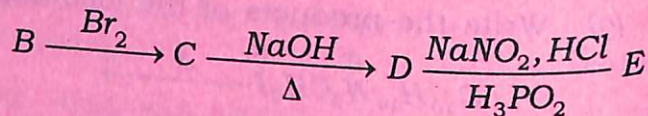
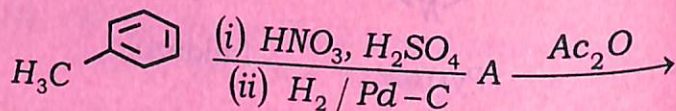
A. (a) Explain why aniline cannot undergo  $1 + 1 = 2$

(i) Friedel-Craft reaction

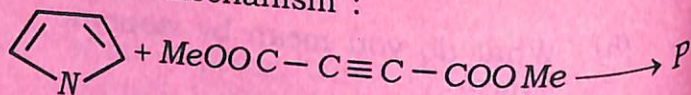
(ii) Nitration reaction with  $HNO_3$

(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 :  $2\frac{1}{2}$



(b) Identify P and propose a mechanism :



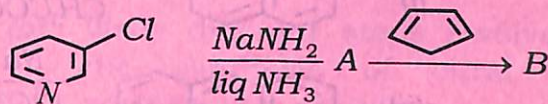
$2\frac{1}{2}$

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 :  $1$

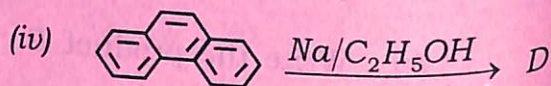
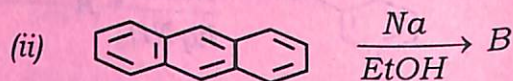
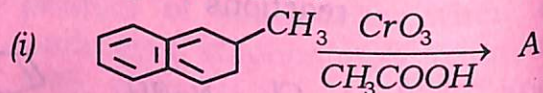


E. (a) Write the mechanism of diazotization of an aromatic amine.  $3$

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

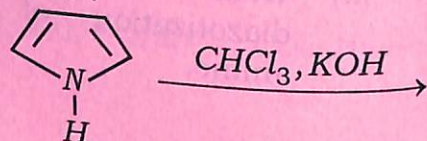
F. (a) Write the reactions involved in Haworth synthesis of naphthalene. 3

- (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



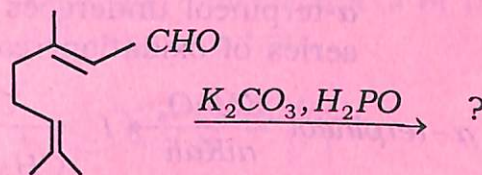
- H. How will you distinguish  $1^\circ$ ,  $2^\circ$  and  $3^\circ$  nitroalkanes? What products are obtained when nitrobenzene is reduced in (i) acidic medium, and (ii) alkaline medium? 3+2=5

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?  $1\frac{1}{2}+1\frac{1}{2}=3$

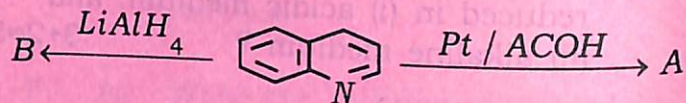
(b) Write different steps involved in the synthesis of citral from acetone and acetylene. 5

(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

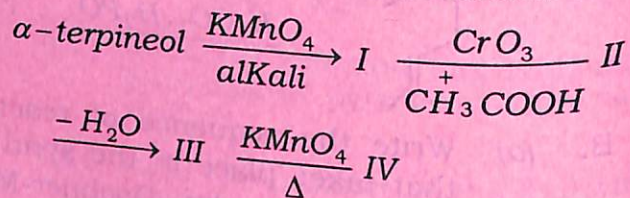


Also name the products.

- (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  $\alpha$ -terpineol from *p*-toluidic acid. 4

- (b) Write the products when  $\alpha$ -terpineol undergoes following series of oxidation reaction : 4



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

- 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

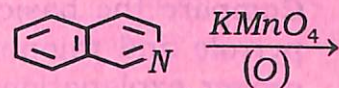
- (c) How can you show the presence of pyrrolidine ring in nicotine? 4

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

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

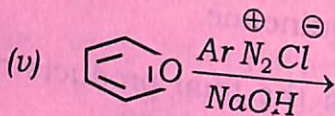
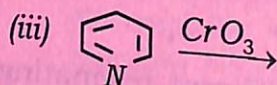
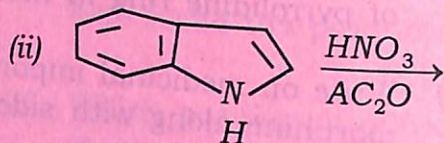
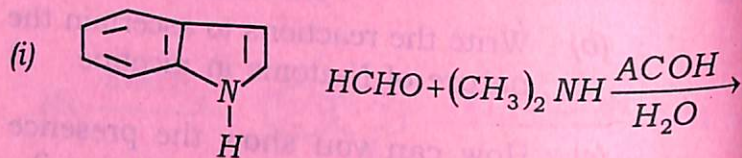
- (b) Suggest mechanism of Bischler-Napieralskiol synthesis of isoquinoline. 4

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



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

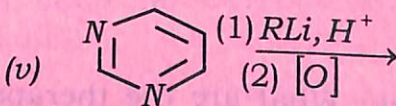
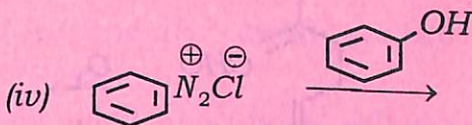
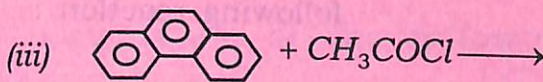
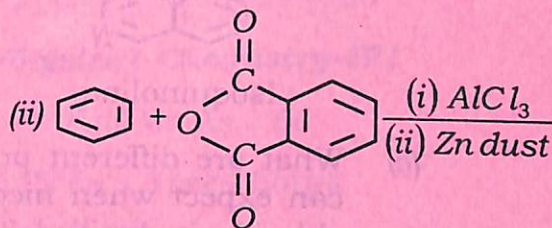
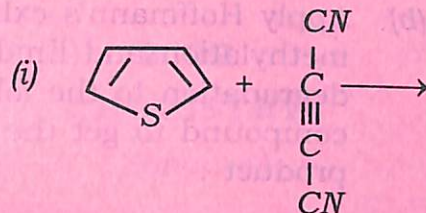
F. Write the products of the following reactions :  $2 \times 5 = 10$



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

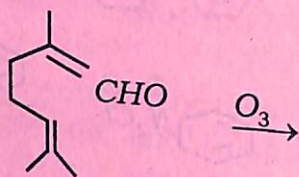
(b) Apply Hoffmann's exhaustive methylation and Emde's degradation to the following compound to get the final product : 4



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