**3 (Sem–4/CBCS) CHE HC2**

**2023**

# CHEMISTRY

( Honours Core )

Paper : CHE–HC–4026

***( Organic Chemistry–III )***

*Full Marks : 60*

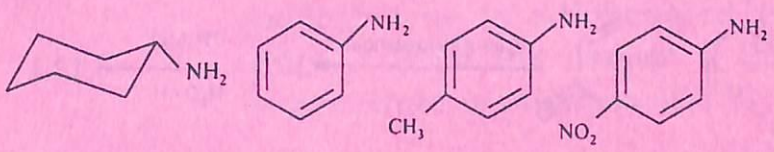
Time : Three hours

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

1. Answer the following questions : 1×7=7

   *(i)* Draw and name the isomer of nitromethane.

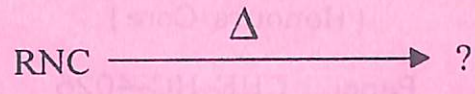
   *(ii)* Arrange the following in the decreasing order of basicity :



(iii) Mention one medicinal importance of hygrine.

(iv) Draw the *Z*-form of citral.

(v) Write the product of the following :



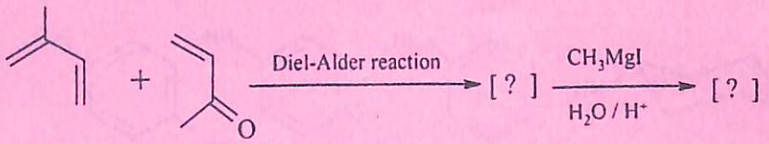

(vi) What happens when a mixture of acetylene and HCN is passed through red hot tube ?

(vii) What class of alkaloid does nicotine belong to ?

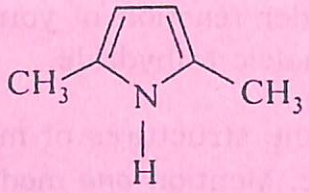
2. Answer the following questions : 2×4=8

(a) Define terpenoids using special isoprene rule.

(b) Identify the products :



(c) Write down the Paal-Knorr synthesis of the following :




(d) Define and classify PAH.

3. Answer ***any three*** questions from the following : 5×3=15

(a) How will you prepare $CH_3CH_2NH_2$ by Gabriel synthesis ? Elaborate Hinsberg test to distinguish $1^0, 2^0$ and $3^0$ amine. 2+3=5

(b) Alkylhalide reacts with KCN to give alkylcynide while it reacts with AgCN to give alkylisocynide. Explain with mechanism.

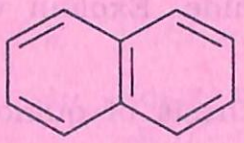
(c) Write Skraup synthesis of quinoline with mechanism.

(d) Give the structure and name of a 5-membered heterocyclic compound which shows Diel-Alder reaction. Write Diel-Alder reaction of your compound with maleic anhydride. 2+3=5

(e) Write the structures of morphine and cocaine. Mention *one* medicinal use in each case. 2+2+1=5

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

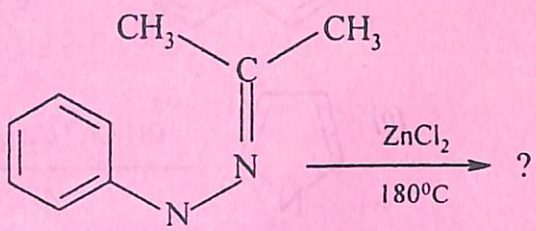
(a) Mention a method of synthesis of naphthalene. Draw the resonating structures of naphthalene and apply Fries rule to identify the most stable structures. Explain why naphthalene undergoes electrophilic substitution reaction preferably at $\alpha$-position. Write down the product of the following reaction :



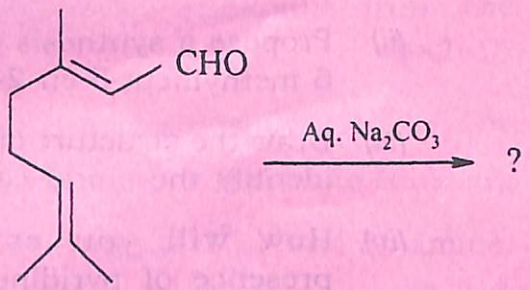

2+2+2+3+1=10

(b) Write the product/products of the following reactions : 2×5=10

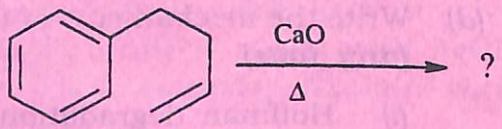
(i)

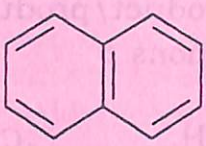



(ii)




(iii)



(iv)  $\xrightarrow[CS_2]{CH_3COCl / AlCl_3}$ ?

(v)  $\xrightarrow[\Delta]{CH_2Cl_2 / C_2H_5OC_2H_5}$ ?

(c) (i) How will you confirm that citral contains an aldehydic group ? 2

(ii) Propose a synthesis of citral from 6-methylhept-5-en-2-one. 4

(iii) Draw the structure of nicotine and identify the chiral carbon. 1

(iv) How will you establish the presence of pyridine nucleus in nicotine. 3

(d) Write the mechanisms of the following : ***(any four)*** 2½×4=10

(i) Hoffman degradation of amide

(ii) Reaction of diazotised aniline with alkaline $\beta$-naphthol

(iii) Chicibabin reaction

(iv) Hydrolysis of alkyl cynide

(v) Conversion of indole into quinoline

(vi) Mannich reaction

(vii) Bischler-Napieralskiol synthesis of isoquinoline

(e) Starting from Ph-$NO_2$ (Nitrobenzene), how will you prepare the following ? 2×5=10

(i) Ph-OH

(ii) Ph-COOH

(iii) Ph-H

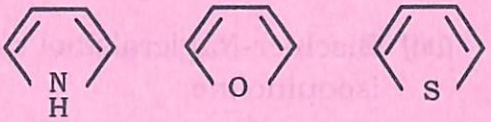
(iv) Ph-Br

(v) *Sym*-tribromobenzene

(f) (i) How can you detect the presence of amino group in anline using the diazotisation process ? Write the reactions involved. 3

(ii) What product is obtained when naphthalene is sulphonated at 80 °C ? What will happen if the temperature is raised to 165 °C ? 2

*(iii)* Arrange the following in order of decreasing reactivity towards electrophiles and explain : 2




*(iv)* How are terpenoids classified ? Give *one* example each of the different class of terpenoids. 3

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