

Total number of printed pages-11

3 (Sem-5) CHM M3



2021
(Held in 2022)

CHEMISTRY

(Major)

Paper : 5.3

(Organic)

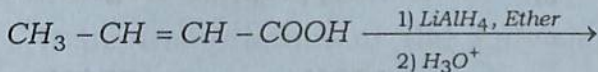
Full Marks : 60

Time : Three hours

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

1. Answer the following questions : **(any seven)**
1×7=7

(a) Give the product of the following reaction :



- (b) What happens when acetylene and H_2S are passed over alumina at 400°C ?

Contd.

(c) Why is naphthalene less aromatic than benzene?

(d) Write the IUPAC name of



(e) How is Lindlar's catalyst prepared?

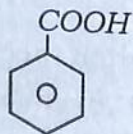
(f) What is Schiff's base?

(g) Define 'frontier orbital' with appropriate example.

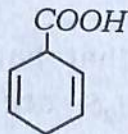
(h) Write 'aciform' structure of nitromethane.

(i) Why does diethyl malonate undergo alkylation?

(j) Write the appropriate reagent to convert



to



(k) Why does electrophilic aromatic substitution of indole occur preferably at the 3-position?

2. Answer the following questions : **(any four)**

2×4=8

(a) What happens when secondary amines react with HNO_2 ? Write the equation.

(b) How will you synthesise $\text{CH}_3\text{CH}_2\text{SH}$ from $\text{H}_2\text{N}-\text{C}(=\text{S})-\text{NH}_2$? Write the reaction.

(c) Which position(s) of quinoline undergo(es) nucleophilic aromatic substitution easily? Give reason.

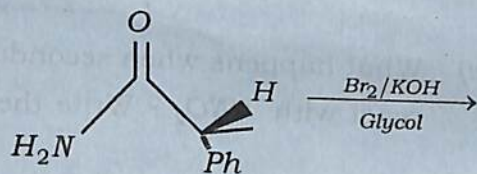
(d) Explain the basic character of pyridine.

(e) Write the product of the following reaction :



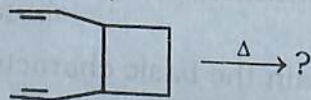
3. Answer the following questions [**any one** from (a) and (b) and **two** from (c), (d) and (e)]:
 $5 + (5 \times 2) = 15$

(a) Write the product of the following reaction along with mechanism:

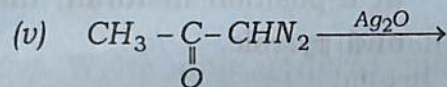
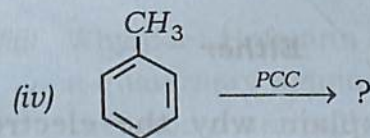
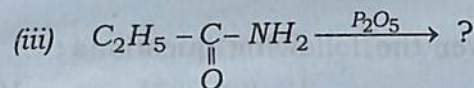
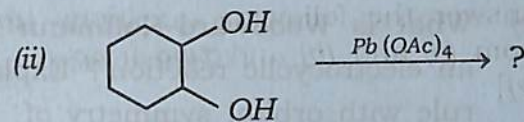
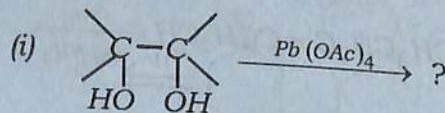


Also justify the configuration of the product.
 $1 + 2 + 2 = 5$

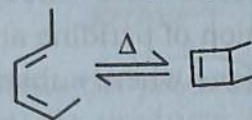
- (b) What will happen if 3-hydroxy-1,5-diene is heated? Propose a mechanism. Write the product(s) expected to be formed in the following reaction:
 $2 + 2 + 1 = 5$



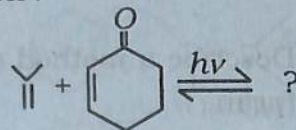
- (c) Complete the following reactions:
 $1 \times 5 = 5$



- (d) Explain why (2E,4Z) hexadiene thermally cyclizes to give cis-3,4-dimethyl-cyclobutane.



Write the product of the following reaction:
 $4 + 1 = 5$



- (e) What is Woodward-Hoffmann rule of an electrocyclic reaction? Explain the rule with orbital symmetry of 1,3-butadiene. 5

4. Answer the following questions :

10×3=30

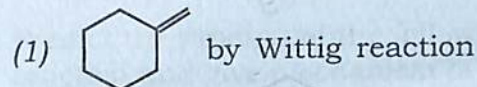
Either

- (a) (i) Explain why the electrophilic substitution takes place preferably at α -position in furan, thiophene and pyrrole. 3
- (ii) Pyrrole is acidic in character like phenol. Explain. 2
- (iii) Describe the mechanism of nitration of pyridine and justify the positions where substitution takes place. 5

Or

- (b) (i) Describe a method of synthesis of furan. 3

- (ii) How can you prepare the following? 2



- (2) Ph-COOMe by Baeyer-Villiger reaction.

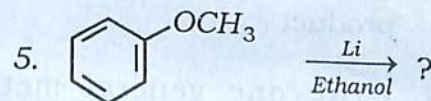
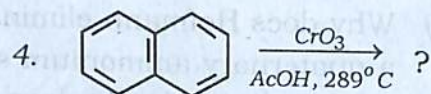
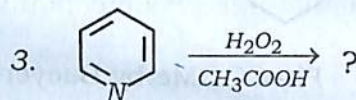
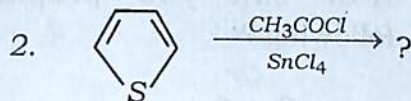
- (iii) Why does Hofmann elimination of a quaternary ammonium salt give thermodynamically less stable alkene as the predominant product? 2

- (iv) Write one general method of synthesis of thiols, RSH. How can RSH be converted to (1) RSSR, and (2) RSR? 1+1+1=3

Either

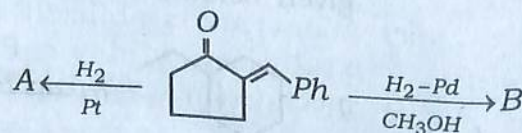
- (c) (i) Write the products and the names of the products for the reactions given below: 1×5=5





(ii) Why cannot LiAlH_4 be used in protic solvent? 1

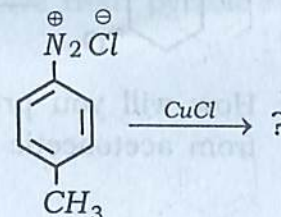
(iii) Identify A and B in the following reactions (Give the structure and name): 2



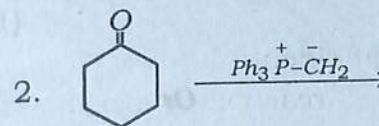
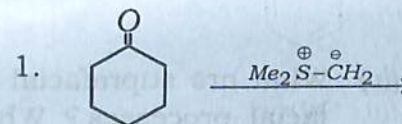
(iv) Explain why furan is less reactive than pyrrole. 2

Or

(d) (i) Predict the product of the following reaction and give mechanism of it: 3



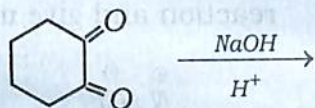
(ii) Give the products in each of the following reactions: 2



(iii) What are stabilized and non-stabilized ylides? Propose a mechanism for Wittig reaction. 2+3=5

Either

- (e) (i) Write the product and name the rearrangement involved : 2



- (ii) How will you prepare pentanone from acetoacetic ester ? 2

- (iii) Why is K_b of pyridine 2.3×10^{-9} and that of pyrrole 2.5×10^{-4} ?

1

- (iv) What are suprafacial and antarafacial processes ? Which is more common and why ?

$$(1+1)+(1+2)=5$$

Or

- (f) (i) How is Jones reagent different from Collins reagent ? Propose a mechanism for the conversion of a primary alcohol to aldehyde with a Cr(VI) reagent. 2+3=5

- (ii) Write the IUPAC names of pyrrole, thiophene and pyridine. Write down the steps involved in the Bischler-Napieralski reaction leading to synthesis of isoquinoline. Why is indole less reactive than pyrrole ?

$$1\frac{1}{2}+2+1\frac{1}{2}=5$$

Write the IUPAC names of pyrole,
thiophene and pyridine. Write
down the steps involved in the
Bischler-Napieralski reaction
leading to the synthesis of
tryptophan. Why is indole less
reactive than pyrole?

CHEMISTRY

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