

2015

CHEMISTRY — HONOURS

Third Paper

Group - A

(Organic Chemistry)

Full Marks - 50

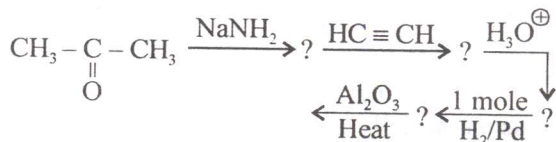
*The figures in the margin indicate full marks**Candidates are required to give their answers in their own words as far as practicable*

(CHT - 22a)

Unit - I

Answer *any three* questions

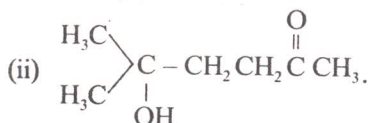
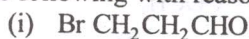
1. (a) Complete the following reaction : 3



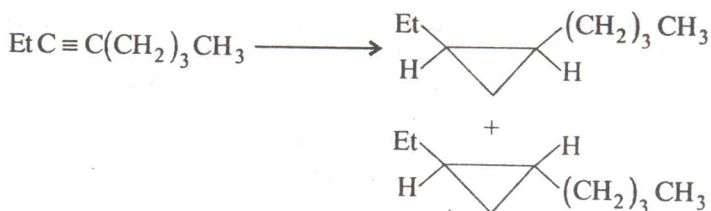
- (b) Predict the regioselectivity of the reaction of HBr with



2. (a) Select the best way for reducing carbonyl ($>\text{C} = \text{O} \longrightarrow >\text{CH}_2$) in each of the following with reasons : 3

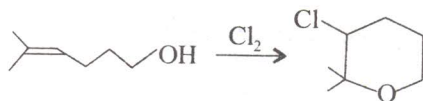


- (b) Give the appropriate reagents to carry out the following transformation : 2



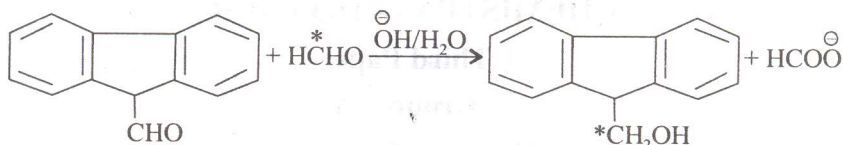
3. (a) The photocatalysed addition of HBr to $\text{Cl}_3\text{C} \cdot \text{CH} = \text{CH}_2$ yields 100% of $\text{Cl}_2\text{CH} \cdot \text{CHCl} \cdot \text{CH}_2\text{Br}$ instead of the expected $\text{Cl}_3\text{C} \cdot \text{CH}_2\text{CH}_2\text{Br}$. Explain. 3

- (b) Propose a mechanism for the following reaction : 2

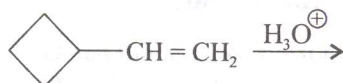


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4. (a) Give the mechanism of the following reaction : 3



- (b) Give the product and show the steps in the following reaction : 2



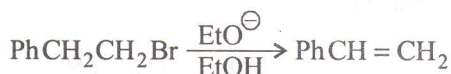
5. (a) Cyclopentadiene reacts with maleic anhydride much faster than 1,3-butadiene in a thermal Diels-Alder reaction. Explain this observation showing the adducts. 3

- (b) Convert $\text{CH}_3\text{CHO} \longrightarrow \text{CH}_3\text{CDO}$. 2

Unit - II

Answer *any two* questions

6. (a) Write the E2 and E1cB mechanism of the following reaction : 3

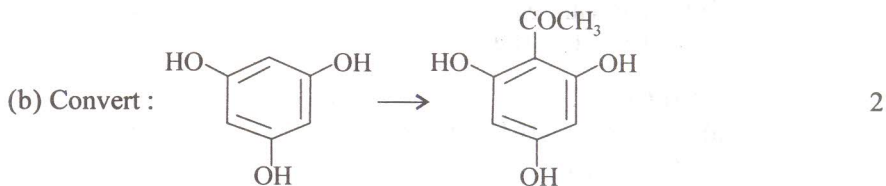


Which mechanism is actually operative ?

Give evidence in favour of your answer.

- (b) Acetanilide undergoes nitration by $\text{Ac}_2\text{O} - \text{HNO}_3$ predominantly at the ortho position. Explain with plausible mechanism. 2

7. (a) Show how a benzyne intermediate accounts for the formation of $m\text{-MeOC}_6\text{H}_4\text{NH}_2$ from either $o\text{-MeOC}_6\text{H}_4\text{Br}$ or $m\text{-MeOC}_6\text{H}_4\text{Br}$. 3



8. (a) Reimer-Tiemann reaction with p-cresol affords two products. Explain their formation mechanistically. 3

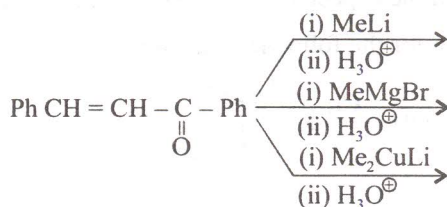
- (b) When aniline is subjected to the Friedel-Crafts alkylation in presence of catalytic amount of AlCl_3 , alkylation does not occur; while in presence of a large excess of AlCl_3 , a very small amount of meta-alkylaniline is obtained. Explain. 2

(CHT - 22b)

Unit - I

Answer *any three* questions

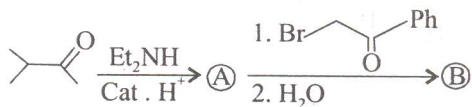
9. (a) Give the products of the following reactions and explain : 3



(b) Give the products showing plausible mechanism of the following reaction :



10. (a) Identify (A) and (B) with mechanism



(b) Convert : *m* - Dinitrobenzene \longrightarrow *m* - Bromophenol.

11. (a) Explain mechanistically the difference in the pattern of coupling of benzene diazonium cation with (i) aniline and (ii) N, N - dimethyl aniline.

(b) Convert using an organometallic compound :

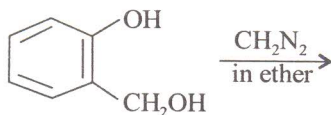


12. (a) Illustrate the use of diazomethane for conversion to higher homologues of both acyclic and cyclic ketones. Show possibilities of formation of any other compound.

(b) Explain why diazoacetic ester is more stable than diazomethane.

13. (a) Write down the steps for the synthesis of *n*-butyl amine by Gabriel's phthalimide synthesis. Why is this method not viable for synthesizing tert-butyl amine ?

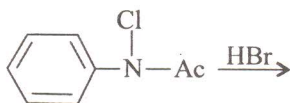
(b) Write the product and explain its formation :



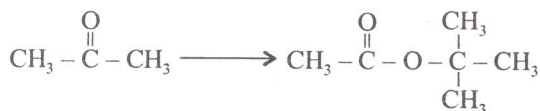
Unit - II

Answer *any two* questions

14. (a) Give the products and mechanism of the following reaction with explanation :

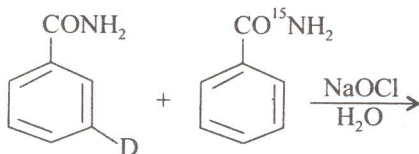


(b) How would you carry out the following transformation ?



15. (a) How will you prepare phenol from benzene via cumene ? Give the mechanism of the reactions involved.

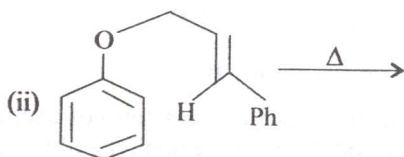
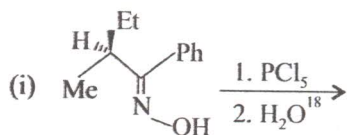
(b) Predict the products of the following reaction and explain their formation :



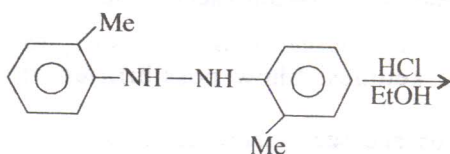
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16. (a) Write down the product of each of the following reactions :

3



(b) Predict the product and explain the mechanism involved :



2