

2018
CHEMISTRY-HONOURS
Third Paper
Group-A
Full Marks : 50

The figures in the margin indicate full marks.

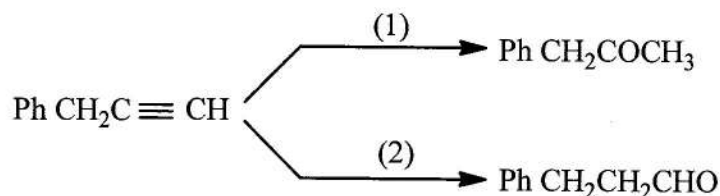
*Candidates are required to give their answers in their own words
as far as practicable.*

CHT-22a

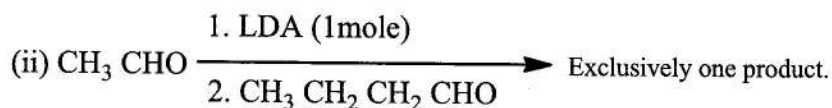
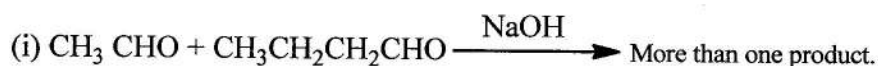
Unit-I

Answer any three questions.

1. (a) How would you carry out the following transformations? Give mechanism for the reaction (1) only. 3



- (b) Why does the addition of 2 moles of HBr to 1-pentyne produce 2, 2-dibromopentane, rather than 1, 1-dibromopentane or 1, 2-dibromopentane? Explain with mechanism. 2
2. (a) Predict the products of the following reactions with suitable explanation. 3

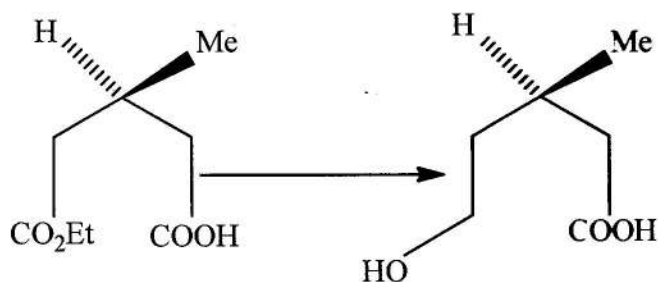


- (b) Give the mechanism of one step synthesis of ethyl ethanoate from ethanal. 2
3. (a) Cyclopentadiene undergoes thermal Diels-Alder reaction with maleic anhydride much faster than 1, 3-butadiene. Explain this observation showing the adducts. 3

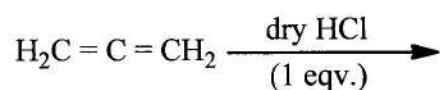
Please Turn Over

(b) Convert:

2

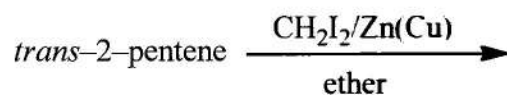


4. (a) (i) Write down the major product of the following reaction with mechanism:



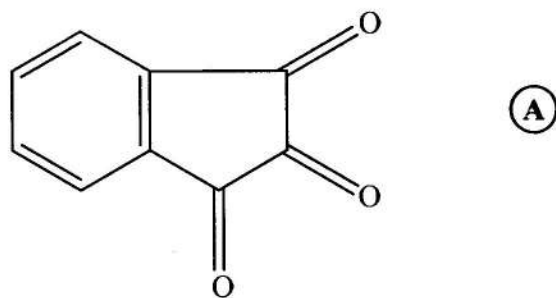
(ii) Write the product of the following reaction with proper stereochemistry:

3



(b) Compound (A) exists as a hydrate. Which carbonyl is hydrated and why? Explain.

2



5. (a) Carry out the following conversion applying intramolecular Cannizzaro reaction as one of the steps. Write down the mechanism of the Cannizzaro step in the conversion.

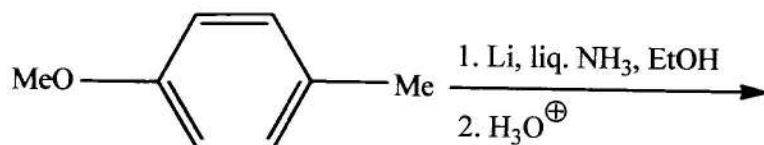
3



(3)

K(II)-Chemistry-H-3A

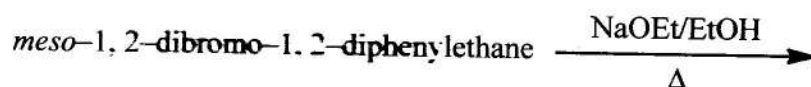
- (b) Predict the product(s) of the following reaction and write the plausible mechanisms involved. 2



Unit-II

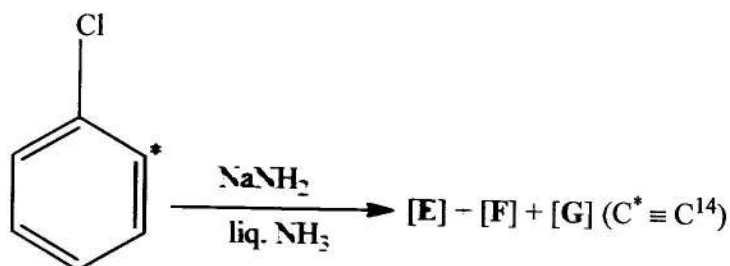
Answer any two questions.

6. (a) Write down the product(s) of the following reaction with mechanism. 3

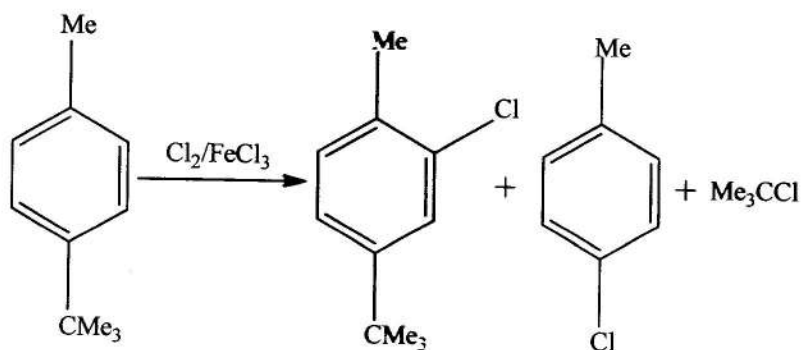


- (b) Both phenol and salicylic acid on treatment with bromine-water form 2, 4, 6-tribromophenol. Explain the observation with mechanism. 2

7. (a) Identify the products and explain their formation: 3



- (b) Account for the following reaction with mechanism: 2



8. (a) Predict the favoured position of electrophilic substitution of the following compounds and justify your answer in each case. 3

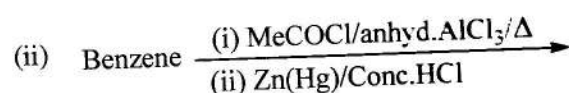
(i) Cinnamic acid

(ii) Benzoic acid

(b) Which of the following methods is suitable for preparation of ethylbenzene? 2



Or,



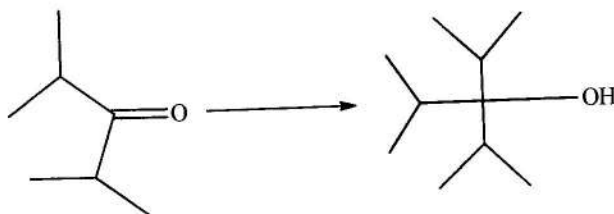
Explain your answer.

CHT-22b

Unit-I

Answer any three questions.

9. (a) Can Grignard reagent be used to convert 3



If not, why? Which organometallic reagent should be used for this conversion? Give mechanism.

(b) $\text{Ph N}_2^{\oplus} \text{Cl}^{\ominus}$ couples with PhNMe_2 but not with $2,6\text{-Me}_2\text{C}_6\text{H}_3\text{NMe}_2$. Explain with mechanism. 2

10. (a) Carry out the following transformations: 3

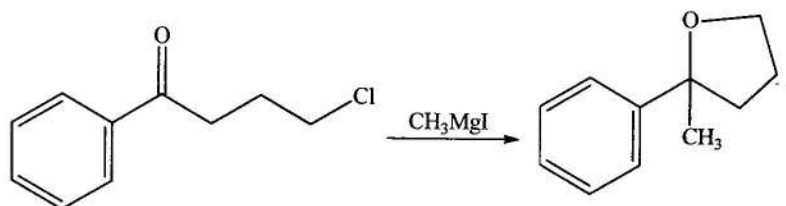
(Mechanism not necessary)

(i) *p*-Nitrotoluene to *m*-nitrotoluene

(ii) Nitrobenzene to *m*-anisidine

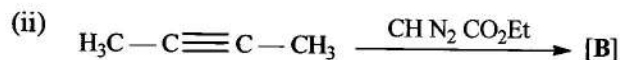
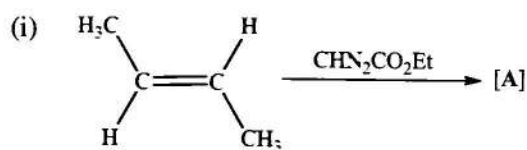
(b) Delineate the mechanism of the following reaction:

2

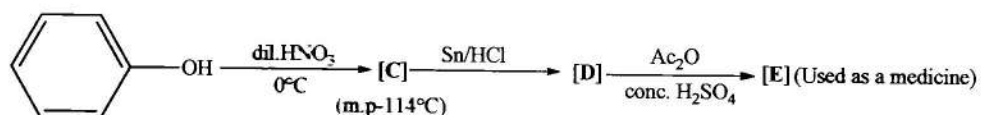


11. (a) Prepare *n*-butylamine by Gabriel synthesis. Why is the synthesis not a viable method for preparing (i) *t*-butylamine (ii) *neopentylamine*? 3

(b) Write down the products of the following reactions: 2

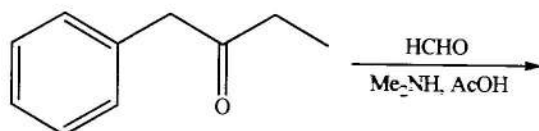


12. (a) Identify [C], [D] and [E] in the following reaction sequence. Also give the mechanism of conversion of phenol to [C]. 3



Write the commercial name of [E].

(b) Predict the product of the following reaction with plausible mechanism. 2



13. (a) The diazocoupling reaction with phenol should be carried out at $\text{pH} = 9.0$. What will happen if diazocoupling reaction with phenol is carried out at $\text{pH} > 10$? Why the diazocoupling reaction with aromatic tertiary amine is carried out at $\text{pH} = 5-6$? 3

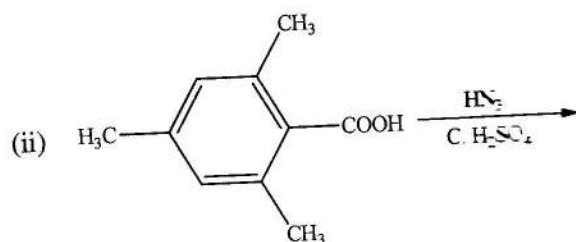
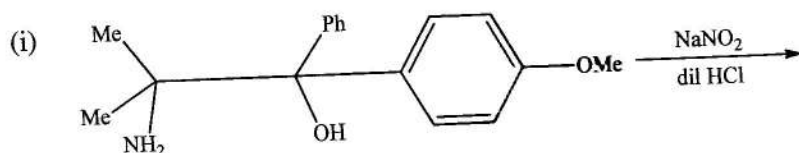
(b) Distinguish chemically between *N*-methylaniline and *N,N*-dimethylaniline. 2

Unit-II

Answer any two questions.

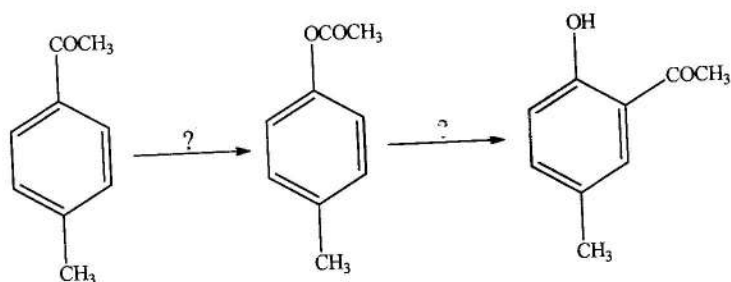
14. (a) Predict the major product of the following reactions with plausible mechanism:

3



(b) Give the reagents and conditions for the following sequence of reaction (Mechanism not necessary):

2

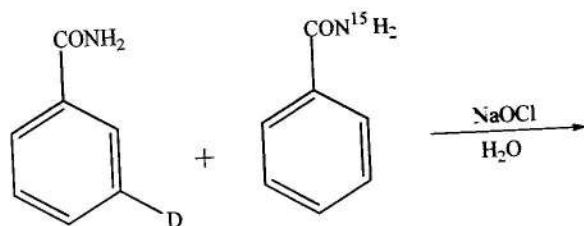


15. (a) Both $\text{Ph}_2\text{C}(\text{OH})\text{C}(\text{OH})\text{Me}_2$ and $\text{Ph}(\text{Me})\text{C}(\text{OH})\text{C}(\text{OH})(\text{Me})\text{Ph}$ yield same ketone on treatment with 70% H_2SO_4 . Explain with mechanism.

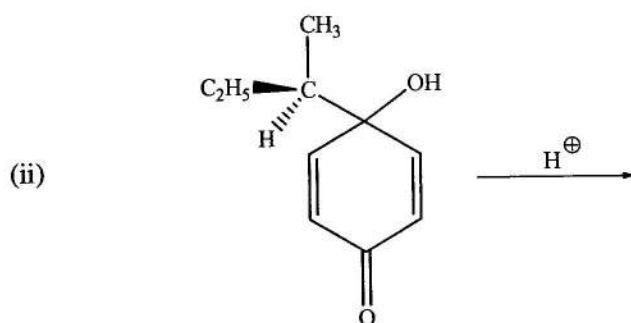
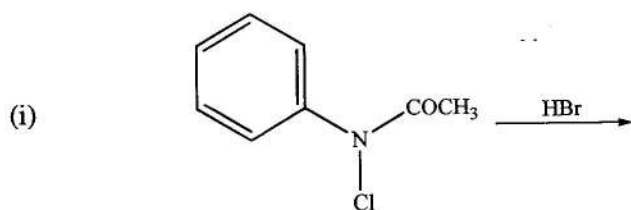
3

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

2



16. (a) Identify the products with proper mechanism.



(b) Predict the major product of the following reaction with plausible mechanism.

2

