

2023

CHEMISTRY — HONOURS

Paper : CC-7

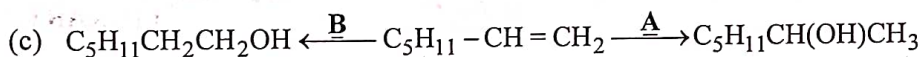
(Organic Chemistry)

Full Marks : 50

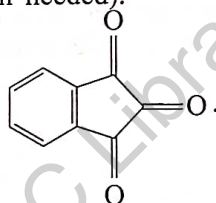
*The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.*Answer **question no. 1** (Compulsory) and **any eight (8)** questions from the rest (from **question no. 2** to **question no. 12**).1. Answer **any ten** questions :

1×10

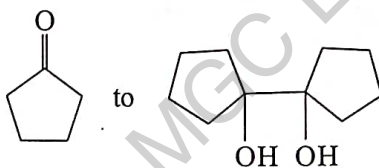
- (a) Nitrobenzene is commonly used as a solvent in Friedel-Crafts reaction. Explain why.
 (b) Convert ethanal into ethylethanoate in one step (no mechanism needed).

Indicate the reagents **A** and **B**. (No mechanism needed).

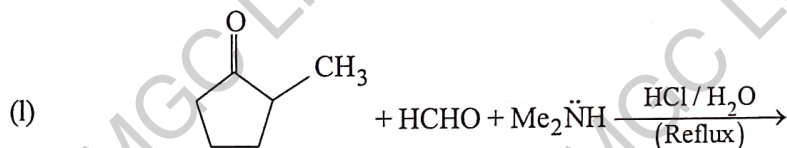
- (d) Write down the structure of stable hydrate of



- (e) Define ylide with an example.
 (f) Draw the structural formula of the alkene which on ozonolysis yields only 2-butanone.
 (g) Mention the major product formed when benzene reacts with 1-chlorobutane under Friedel-Crafts alkylation conditions.
 (h) Draw the structure of the major product formed when N, N-dimethylaniline reacts with N-phenyl-N-methylformamide and $POCl_3$ followed by hydrolysis. (No mechanism needed).
 (i) Explain briefly why β -hydroxy esters can be prepared by the Reformatsky reaction but not by Grignard reaction.
 (j) Draw the structural formula of the product formed when salicylaldehyde is condensed with anhydrous acetic anhydride in presence of sodium acetate followed by hydrolysis. (No mechanism needed).
 (k) Convert (reagents only) :



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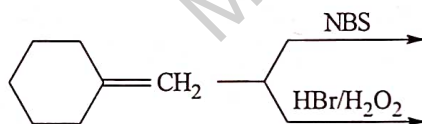
Indicate the major product only in the above reaction (No mechanism needed).

2. (a) Explain why acetone is formed when H₂C = C = CH₂ is subjected to acid catalysed hydration and not the alternative product. Give mechanism.

(b) Benzaldehyde undergoes Cannizzaro reaction whereas N, N-dimethylbenzaldehyde does not. Justify. 3+2

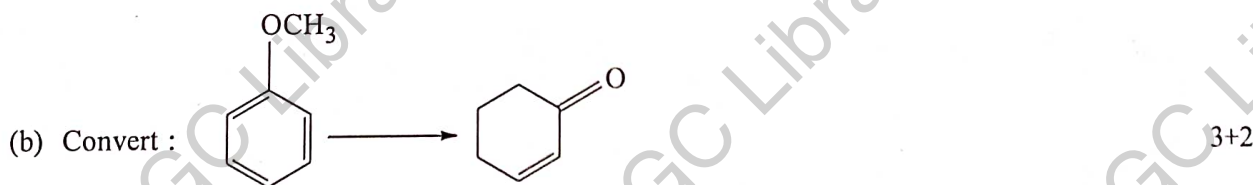
3. (a) Compound C (C₈H₁₂) produces butanedial (O=C-CH₂CH₂-C=O) as the only product when treated with O₃ followed by reductive work up with Zn/H₂O. Identify C with structural formula while justifying your answer.

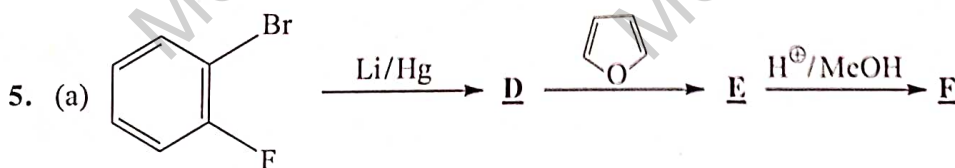
(b) Write the structure of the major products in the following reactions with explanation : 3+2



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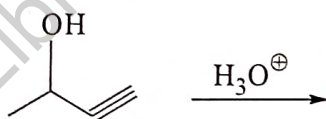
4. (a) *para*-Dimethylaminobenzaldehyde fails to undergo benzoin condensation but when mixed with benzaldehyde, the condensation does occur. Explain.

(b) Convert :  3+2



Identify D, E, and F. Suggest a mechanism for the formation of F from E.

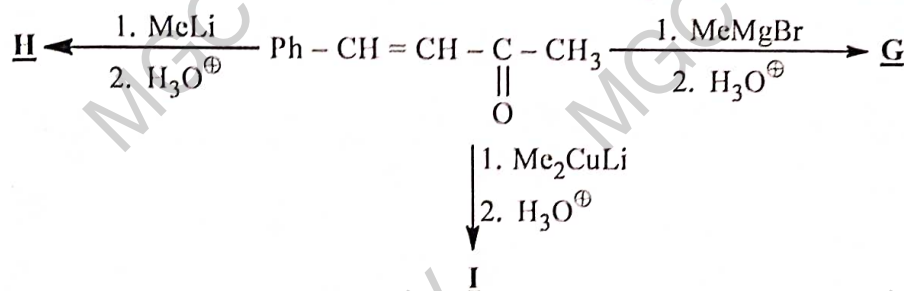
(b) Give the product of the following reaction with plausible mechanism : 3+2



(3)

Z(3rd Sm.)-Chemistry-II/CC-7/CBCS

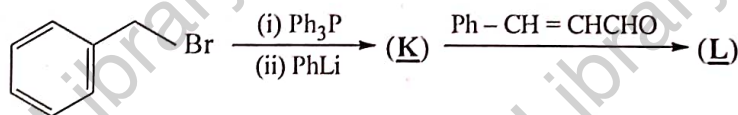
6. (a) Give the products of the following reactions with plausible mechanism :



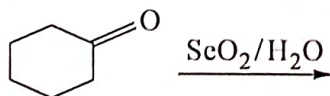
- (b) Acetanilide undergoes nitration with $\text{Ac}_2\text{O} - \text{HNO}_3$ predominantly at the *ortho* position. Explain the observation with plausible mechanism. 3+2
7. (a) Which of the following two compounds will undergo nucleophilic substitution reaction at a faster rate and why?
- 2, 6 - Dimethyl - 4 - nitrochlorobenzene
 - 3, 5 - Dimethyl - 4 - nitrochlorobenzene
- (b) Predict the product of the following reaction with mechanism.

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8. (a) Identify the products (**K**) and (**L**) in the following reactions with plausible mechanism in each case :



- (b) Chloral ($\text{Cl}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$) does not undergo Cannizzaro reaction though it has no α -hydrogen atom. Explain. 3+2
9. (a) Give the product and mechanism of the following reaction ;

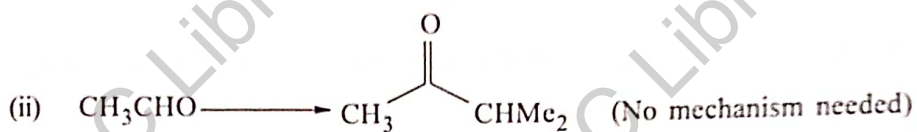
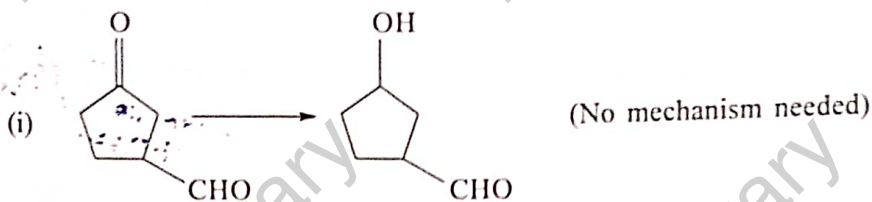


- (b) Convert : $\text{CH}_3\text{CH}_2\text{C}\equiv\text{C}-\text{H} \longrightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$ (No mechanism needed). 3+2

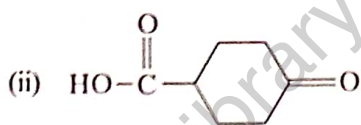
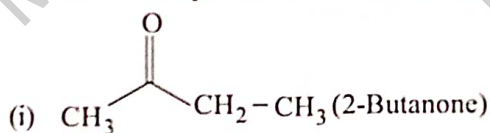
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10. (a) CF_3CHO reacts rapidly with ethanol to form the corresponding hemiacetal. However, it gives acetal very slowly in the presence of anhydrous acid. Explain for the observation with reaction mechanism.

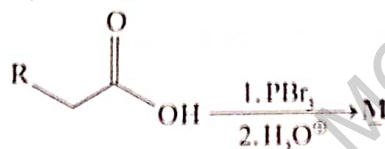
(b) How can you accomplish the following transformations?



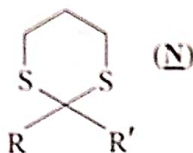
11. (a) Show how diethyl malonate can be used to prepare the following molecules :



(b) Predict the product(s) of the following reaction with plausible mechanism : 3+2



12. (a) 1,3-Dithiane (**N**) is cleaved to the corresponding carbonyl compound in presence of $\text{HgCl}_2/\text{CdCO}_3$ but not with acid or alkali. Explain.



(b) Give the mechanism for the reduction of a ketone with LiAlH_4 followed by acid treatment. Explain the role of Li^+ ion regarding this reduction. 3+2