

2021

## 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.*

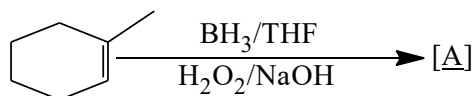
Answer **question number 1** (compulsory) and **any eight (08)** questions from the rest (from **question number 2** to **question number 12**).

1. Answer **any ten** questions :

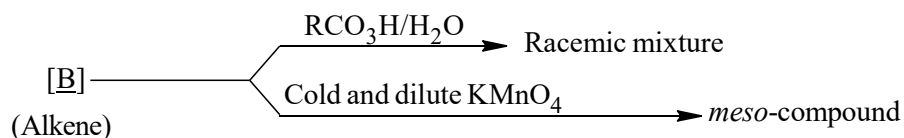
1×10

(a) Give the structural formula for the alkene that gives one mole of glyoxal and two moles of acetone after ozonolysis.

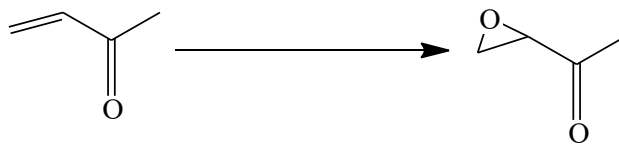
(b) Identify the product [A].



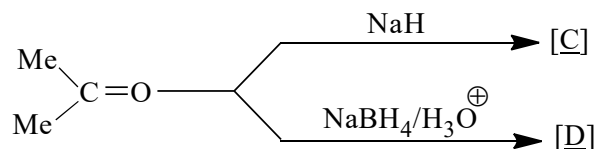
(c) Identify the alkene [B].



(d) Write the suitable reagent for the following transformation :



(e) Identify [C] and [D].

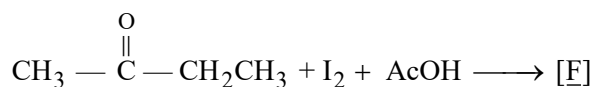
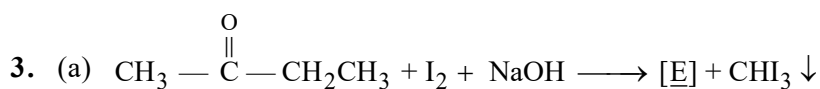


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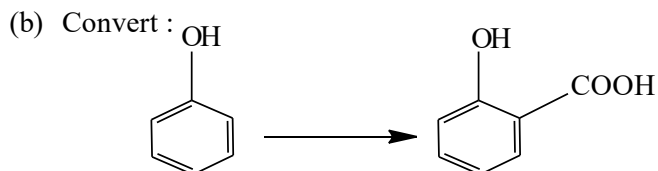
- (f) Prepare (E) -2-butene from 2-butyne.
- (g)  $R^1CHO$  reacts with  $PhNHNH_2$  to form the corresponding phenylhydrazone. What pH is suitable for this reaction?
- (h)  $Ph_3P^{\oplus}-CH_2^{\ominus}$  on reaction with  $RCH=O$  forms  $RCH=CH_2$  (alkene), whereas  $Me_2S^{\oplus}-CH_2^{\ominus}$  on treatment with  $RCH=O$  forms the compound  $RCH-O-CH_2$  (epoxide). Explain.
- (i) What will be the order of nucleophilic addition to the following carbonyl compounds?  
 $HCHO$ ,  $CH_3CHO$ ,  $CH_3COCH_3$
- (j) Write down the products of addition of  $HBr$  to  
 (i)  $O_2N-CH=CH_2$   
 (ii)  $Br-CH=CH_2$
- (k)  $CH_3COCH_3$  can be reduced to  $CH_3CH_2CH_3$  in almost neutral condition *via* thioketal. Give the method.
- (l)  $Ph_3P=CHOMe$  on treatment with  $CH_3CH=O$  gives  $CH_3CH=CHOMe$ , which on acid hydrolysis gives  $CH_3CH_2CHO$ . Give the mechanism of hydrolysis.
2. (a) Predict the product with plausible mechanism :



- (b) Benzoin ( $PhCHOHCOPh$ ) on treatment with alcoholic  $KCN$  in presence of *p*-nitrobenzaldehyde gives another benzoin. Explain. 3+2

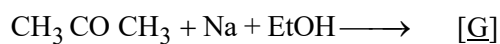


Show the mechanism of formation of [E] and [F].

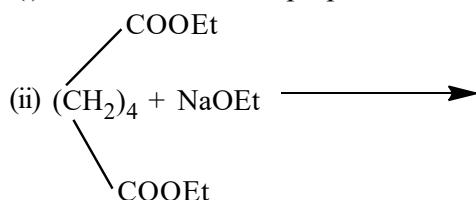
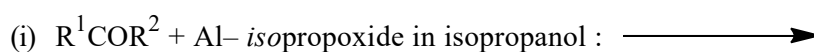


4. (a) How can you obtain 100%  $\text{CH}_3\text{CH}(\text{OH})-\underset{\text{CH}_3}{\text{CH}}-\text{CHO}$  from  $\text{CH}_3\text{CHO}$  and  $\text{CH}_3\text{CH}_2\text{CHO}$ ?

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



5. (a) Predict the products with plausible mechanism :

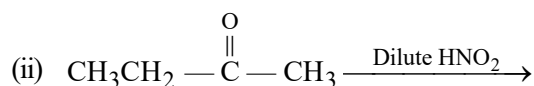
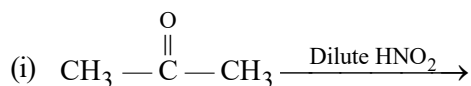


(b) The compound  $\begin{array}{c} \text{H}_3\text{C} \quad \text{OH} \\ \diagdown \quad \diagup \\ \text{C} \\ \diagup \quad \diagdown \\ \text{H}_3\text{C} \quad \text{C} \equiv \text{CH} \end{array}$  in presence of  $\text{H}_2\text{SO}_4$  gives  $\alpha, \beta$ -unsaturated carbonyl compound.

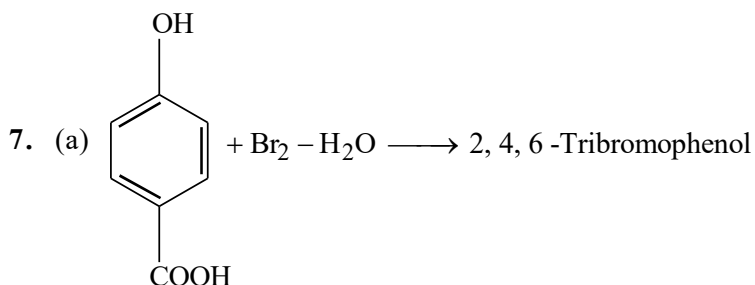
Explain the reaction with mechanism.

3+2

6. (a) Predict the products with plausible mechanism :

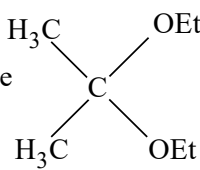


(b) Which product do you expect when *trans*-2-butene is treated with  $\text{CH}_2\text{I}_2$  and Zn-Cu couple? 3+2

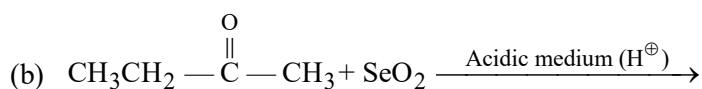
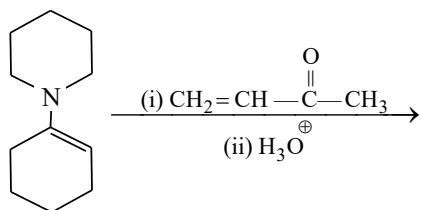


What kind of substitution is involved at *p*-position of the abovesaid reaction?

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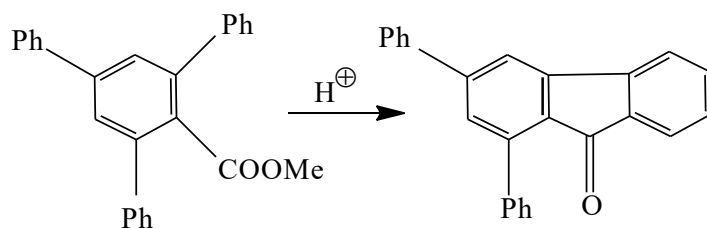
- (b) The molecule  is stable in alkali but cleaves to  $\text{CH}_3\text{COCH}_3$  under acidic condition. Explain. 3+2

8. (a) Show the product of the reaction along with plausible mechanisms for both the steps :

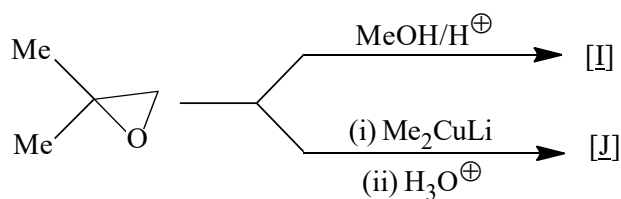


Predict the product and show the mechanism. 3+2

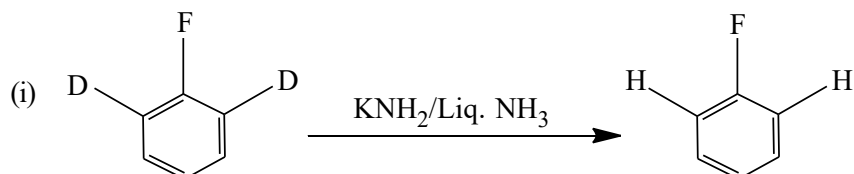
9. (a) Show the steps of the transformation shown below.



- (b) Predict the products of the following transformations : 3+2

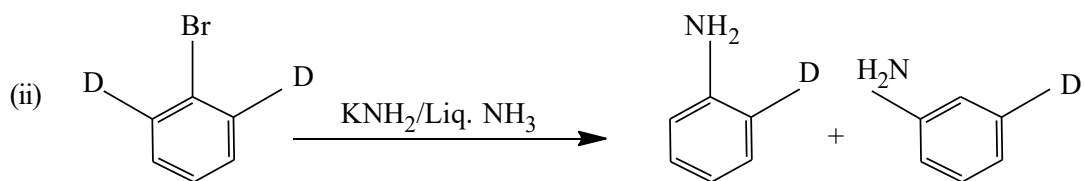


10. (a) Explain with mechanism, the formation of products in the following transformations :

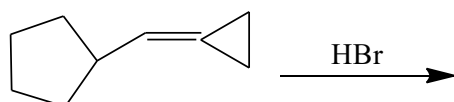


(5)

V(3rd Sm.)-Chemistry-H/CC-7/CBCS

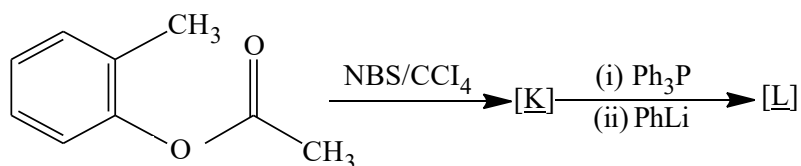


(b) Predict the product with plausible mechanism of the following reaction :



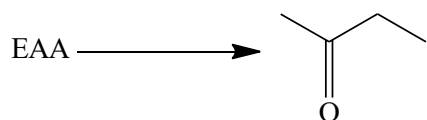
3+2

11. (a) Identify the products [K] and [L] of the following reactions with mechanism.

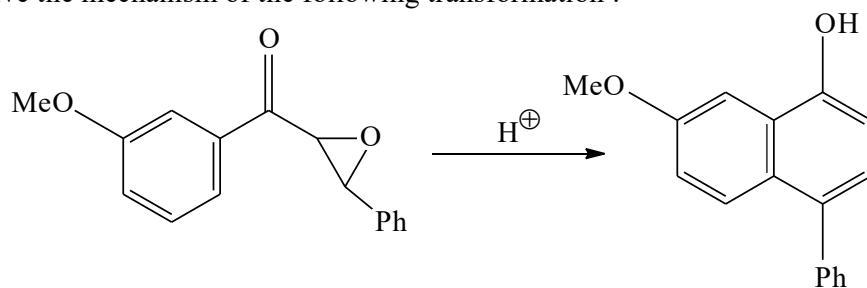


(b) Carry out the following transformation :

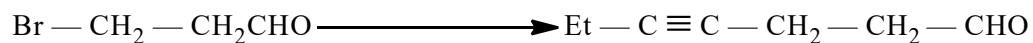
3+2



12. (a) Give the mechanism of the following transformation :



(b) Carry out the following transformation :



3+2