DPP - Daily Practice Problems

Date : | **Start Time :** | **End Time :**

CHEMISTRY

CC23

SYLLABUS : Aldehydes, Ketones and Carboxylic acids

Max. Marks : 74 **Time : 60 min.**

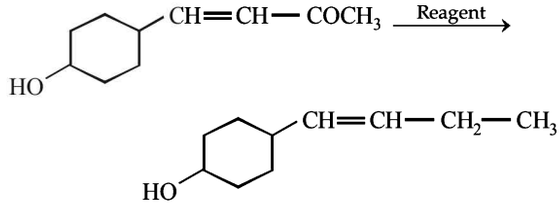
GENERAL INSTRUCTIONS

- The Daily Practice Problem Sheet contains 20 Questions divided into 5 sections.
  Section I has **5** MCQs with ONLY 1 Correct Option, **3** marks for each correct answer and **–1** for each incorrect answer.
  Section II has **4** MCQs with ONE or MORE THAN ONE Correct options.
  For each question, marks will be awarded in one of the following categories:
  Full marks: **+4** If only the bubble(s) corresponding to all the correct option(s) is (are) darkened.
  Partial marks: **+1** For darkening a bubble corresponding to each correct option provided NO INCORRECT option is darkened.
  Zero marks: If none of the bubbles is darkened.
  Negative marks: **–2** In all other cases.
  Section III has **5** Single Digit Integer Answer Type Questions, **3** marks for each Correct Answer and 0 marks in all other cases.
  Section IV has Comprehension/Matching Cum-Comprehension Type Questions having **5** MCQs with ONLY ONE correct option, **3** marks for each Correct Answer and 0 marks in all other cases.
  Section V has **1** Matching Type Questions, **2** mark for the correct matching of each row and 0 marks in all other cases.
- You have to evaluate your Response Grids yourself with the help of Solutions.

Section I - Straight Objective Type

This section contains 5 multiple choice questions. Each question has 4 choices (a), (b), (c) and (d), out of which **ONLY ONE** is correct.

1. In the given transformation, which of the following is the most appropriate reagent ?



(a) $NH_2NH_2, \bar{O}H$ (b) $Zn - Hg/HCl$

(c) $Na, Liq.\ NH_3$ (d) $NaBH_4$

2. An organic compound A upon reacting with NH_3 gives B. On heating B gives C. C in presence of KOH reacts with Br_2 to given $CH_3CH_2NH_2$. A is :

(a) CH_3COOH

(b) $CH_3CH_2CH_2COOH$

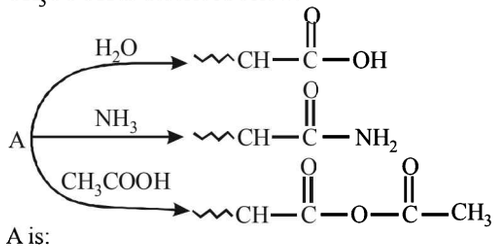
(c) $CH_3 - \underset{\underset{CH_3}{|}}{CH} - COOH$

(d) CH_3CH_2COOH

RESPONSE GRID	1. ⓐⓑⓒⓓ 2. ⓐⓑⓒⓓ

Space for Rough Work

3. An organic compound A, C_5H_8O; reacts with H_2O, NH_3 and CH_3COOH as described below:



A is:

(a) $CH_3CH=C(CH_3)-CHO$

(b) $CH_2=CH-CH(CH_3)-CHO$

(c) $CH_3-CH_2-C(CH_3)=C=O$

(d) $CH_3-CH_2-C(=CH_2)-C(=O)-H$

4. An ester (A) with molecular fomula, $C_9H_{10}O_2$ was treated with excess of CH_3MgBr and the complex so formed was treated with H_2SO_4 to give an olefin (B). Ozonolysis of (B) gave a ketone with molecular formula C_8H_8O which shows positive iodoform test. The structure of (A) is

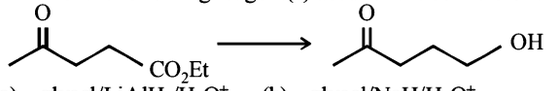
(a) $C_6H_5COOC_2H_5$

(b) $C_2H_5COOC_6H_5$

(c) $H_3CCOOCH_2C_6H_5$

(d) $p-H_3C-C_6H_4-COCH_3$

5. Which of the following reagent(s) used for the conversion?



(a) glycol/$LiAlH_4/H_3O^+$ (b) glycol/NaH/H_3O^+

(c) $LiA1H_4$ (d) $NaBH_4$

Section II - Multiple Correct Answer Type

This section contains 4 multiple correct answer(s) type questions. Each question has 4 choices (a), (b), (c) and (d), out of which **ONE OR MORE** is/are correct.

6. $2C_6H_5CHO \xrightarrow[H_2O]{OH^-} C_6H_5CH_2OH + C_6H_5COO^-$

Which of the following statement(s) is/are correct regarding the above reduction of benzaldehyde to benzyl alcohol?

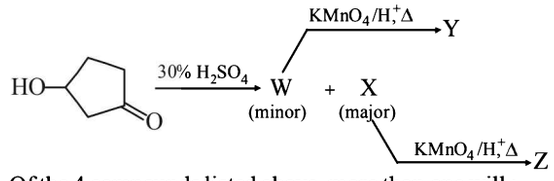
(a) One hydrogen is coming from H_2O as H^+ and another from C_6H_5CHO as H^-

(b) One hydrogen is coming from H_2O as H^- and another from C_6H_5CHO as H^+

(c) One hydrogen from H_2O and another from C_6H_5CHO, both in the form of H^-

(d) The reduction is an example of disproportionation reaction

7.



Of the 4 compounds listed above, more than one will :

(a) exhibit resonance due to conjugation in their structure

(b) show $NaHCO_3$ test

(c) have a cyclic structure

(d) show 2, 4-DNPh precipitation

8. One mole of $C_6H_5COCH_2CH_3$ is treated with one mole of Br_2 in basic solution, the product(s) formed is (are)

(a) 1 mole of $C_6H_5COCBr_2CH_3$

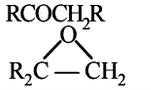
(b) 1 mole of $C_6H_5COCHBrCH_2Br$

(c) 0.5 mole of $C_6H_5COCBr_2CH_3$

(d) 0.5 mole of unreacted $C_6H_5COCH_2CH_3$.

9. $R-C(=O)-R + CH_2N_2 \longrightarrow$ Product(s) is/are

(a) $RCOCH_2R$ (b) $RCH(OCH_3)$

(c)  (d) All the three

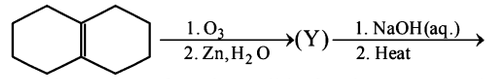
Section III - Integer Type

This section contains 5 questions. The answer to each of the questions is a single digit integer ranging from 0 to 9.

10. $CH_3\overset{O}{\overset{\|}{C}}CH_3 + CH_3CH_2\overset{O}{\overset{\|}{C}}CH_3 \xrightarrow[\Delta]{KOH(aq)} (A)$

(A) = number of aldol condensation product (including stereoisomer).

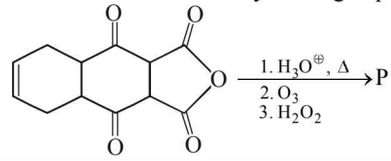
11. In the scheme given below, the total number of intramolecular aldol condensation products formed from (Y) is



12. Total number of enol possible for the compound formed during given reaction will be (including stereoisomer):

$CH_3MgBr + CH_3CH_2\overset{O}{\overset{\|}{C}}Cl \rightarrow$

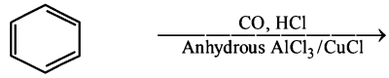
13. The total number of carboxylic acid groups in the product P is

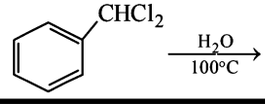


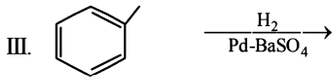
RESPONSE GRID						
3. ⓐⓑⓒⓓ	4. ⓐⓑⓒⓓ	5. ⓐⓑⓒⓓ	6. ⓐⓑⓒⓓ	7. ⓐⓑⓒⓓ		
8. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ	10. ⓪①②③④⑤⑥⑦⑧⑨				
11. ⓪①②③④⑤⑥⑦⑧⑨		12. ⓪①②③④⑤⑥⑦⑧⑨				
13. ⓪①②③④⑤⑥⑦⑧⑨						

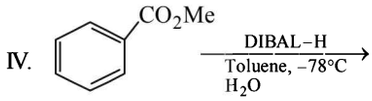
Space for Rough Work

14. Among the following, the number of reaction(s) that product(s) benzaldehyde is

I. 

II. 

III. 

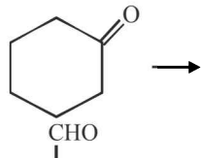
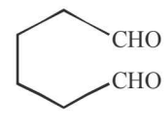
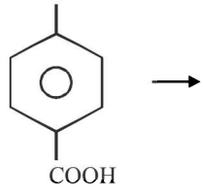
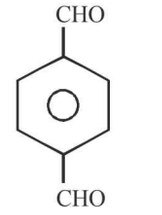
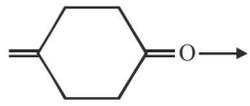
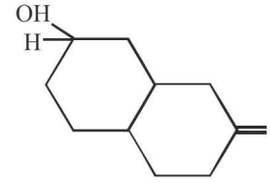
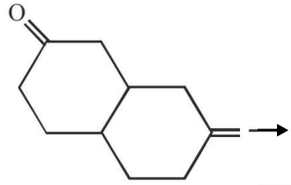
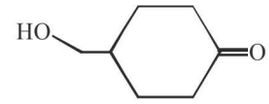
IV. 

Section IV - Comprehension Type

Directions (Qs. 15-19) : Based upon the given paragraphs, 4 multiple choice questions have to be answered. Each question has 4 choices (a), (b), (c) and (d), out of which **ONLY ONE** is correct.

PARAGRAPH-1

Column I contains some reaction and Column II & Column III contains Reagent used and Products formed respectively.

Column I (Reaction)	Column II (Reagent)	Column III (Product)
(I) 	(i) (i) BH_3/THF (ii) $H_2O_2/\overset{\ominus}{O}H$	(P) 
(II) 	(ii) (i) $NaBH_4$/EtOH	(Q) 
(III) 	(iii) (i) Glycol + HCl (ii) $SOCl_2$ (iii) DIBAL–H (iv) $H_3O^{\oplus}$	(R) 
(IV) 	(iv) (i) LAH (ii) Conc. H_2SO_4/Δ (iii) O_3 / Zn or Me_2S	(S) 

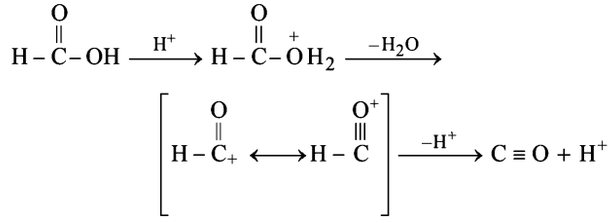
15. Find the correct combination
(a) (I) (iii) (P) (b) (II) (iv) (Q)
(c) (I) (iv) (P) (d) (IV) (i) (R)

16. Find the combination where acid group is converting into aldehyde group
(a) (I) (iv) (Q) (b) (I) (iii) (S)
(c) (II) (iii) (P) (d) (II) (iii) (Q)

17. Find suitable combination which follows hydroboration-oxidation reaction
(a) (III) (i) (R) (b) (IV) (iv) (S)
(c) (III) (i) (S) (d) (I) (iii) (S)

PARAGRAPH-2

Methanoic acid, the first member of carboxylic acid series, when warmed with concentrated sulphuric acid decomposes in the following way and evolves carbon monoxide.



The driving force for this reaction lies in the fact that the $HC \equiv O^+$ ion is very unstable acid and thus easily loses H^+.

RESPONSE GRID	14. ⓪①②③④⑤⑥⑦⑧⑨	15. ⓐⓑⓒⓓ	16. ⓐⓑⓒⓓ	17. ⓐⓑⓒⓓ

Space for Rough Work

18. What happens when acetic acid is treated with conc. H_2SO_4?

(a) $CO + H_2O$ (b) $CH_4 + CO_2$

(c) $CO + CH_4$ (d) No reaction

19. If formic acid is replaced by benzoylformic acid, $C_6H_5COCOOH$ the product formed will be

(a) $C_6H_5COOH + CO + CO_2$

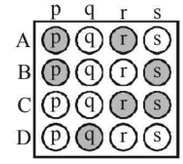
(b) $C_6H_5COOH + CO_2$

(c) $C_6H_5COOH + CO$

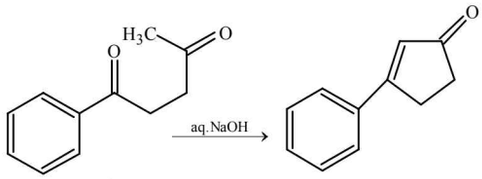
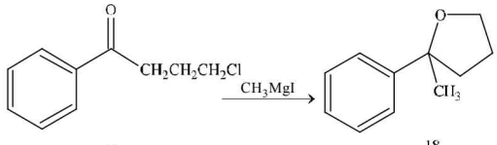
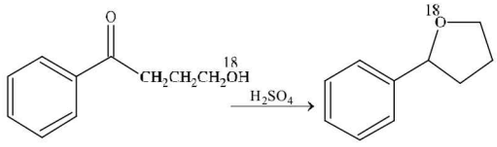
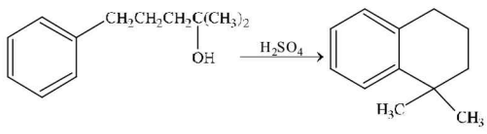
(d) $C_6H_5CHO + CO_2$

Section V - Matrix-Match Type

This section contains 1 questions. It contains statements given in two columns, which have to be matched. Statements in column I are labelled as A, B, C and D whereas statements in column II are labelled as p, q, r and s. The answers to these questions have to be appropriately bubbled as illustrated in the following example. If the correct matches are A-p, A-r, B-p, B-s, C-r, C-s and D-q, then the correctly bubbled matrix will look like the following:



20. Match the columns.

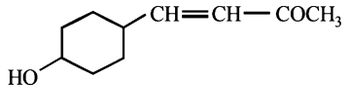
Column-I	Column-II
(A) 	p. Nucleophilic substitution
(B) 	q. Electrophilic substitution
(C) 	r. Dehydration
(D) 	s. Nucleophilic addition

RESPONSE GRID	**18.** ⓐⓑⓒⓓ **19.** ⓐⓑⓒⓓ **20. A -** ⓟⓠⓡⓢ; **B -** ⓟⓠⓡⓢ; **C -** ⓟⓠⓡⓢ; **D -** ⓟⓠⓡⓢ

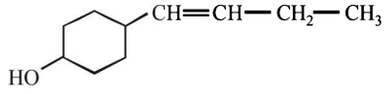
DAILY PRACTICE PROBLEM DPP CHAPTERWISE 23 - CHEMISTRY			
Total Questions	20	Total Marks	74
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	24	Qualifying Score	35
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

Space for Rough Work

1. (a) Aldehydes and ketones can be reduced to hydrocarbons by the action (i) of amalgamated zinc and concentrated hydrochloric acid (Clemmensen reduction), or (b) of hydrazine (NH_2NH_2) and a strong base like NaOH, KOH or potassium *tert*-butoxide in a high-boiling alcohol like ethylene glycol or triethylene glycol (Wolf-Kishner reduction)



$\xrightarrow[\text{Wolf-kishner Reduction}]{NH_2NH_2/OH^-}$



–OH group and alkene are acid-sensitive groups so clemmensen reduction can not be used. Acid sensitive substrate should be reacted in the Wolf-Kishner reduction which utilise strongly basic conditions.

2. (d) $A \xrightarrow[(I)]{NH_3} B \xrightarrow[II]{\Delta} C \xrightarrow[KOH,(III)]{Br_2} CH_3CH_2NH_2$

Reaction (III) is a Hofmann bromamide reaction. Now formation of $CH_3CH_2NH_2$ is possible only from a compound $CH_3CH_2CONH_2$(C) which can be obtained from the compound $CH_3CH_2COO^-NH_4^+$(B).

Thus (A) should be CH_3CH_2COOH

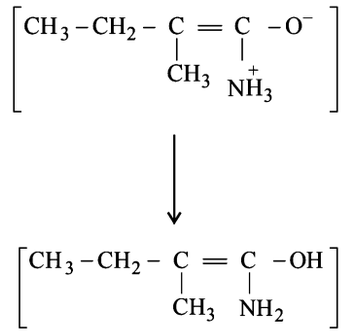
$$\underset{(A)}{CH_3CH_2-\overset{O}{\overset{\|}{C}}-OH} \xrightarrow{NH_3} \underset{(B)}{CH_3CH_2COO^-NH_4^+} \xrightarrow{\Delta} CH_3CH_2CONH_2 \quad (C)$$

$$CH_3CH_2CONH_2 \xrightarrow[KOH]{Br_2} CH_3CH_2NH_2$$

3. (c) Given compound A is $CH_3-CH_2-\underset{\displaystyle CH_3}{\overset{}{C}}=C=O$

Reactions given are as following :

$$CH_3-CH_2-\underset{\displaystyle CH_3}{\overset{}{C}}=C=O \xrightarrow{NH_3}$$



$$CH_3-CH_2-\underset{\displaystyle CH_3}{\overset{}{C}}=C=O \xrightarrow{H_2O}$$

$$CH_3-CH_2-\underset{\displaystyle CH_3}{\overset{}{CH}}-COOH$$

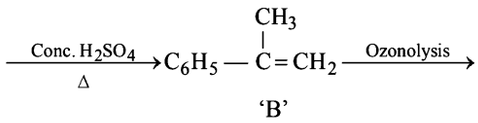
$$CH_3-CH_2-\underset{\displaystyle CH_3}{\overset{}{C}}=C=O \xrightarrow{CH_3COOH}$$

$$CH_3-CH_2-\underset{\displaystyle CH_3}{\overset{}{CH}}-\overset{O}{\overset{\|}{C}}-O-\overset{O}{\overset{\|}{C}}-CH_3$$

4. (a) $\underset{\text{'A'}}{C_6H_5COOC_2H_5} \xrightarrow{CH_3MgBr} C_6H_5-\underset{\displaystyle CH_3}{\overset{\displaystyle OMgBr}{\overset{}{C}}}-OC_2H_5$

$$\xrightarrow{-Mg(OC_2H_5)Br} C_6H_5-\overset{O}{\overset{\|}{C}}-CH_3 \xrightarrow[CH_3MgBr]{Excess}$$

$$C_6H_5-\underset{\displaystyle CH_3}{\overset{\displaystyle OMgBr}{\overset{}{C}}}-CH_3 \xrightarrow{H_2O} C_6H_5-\underset{\displaystyle OH}{\overset{\displaystyle CH_3}{\overset{}{C}}}-CH_3$$

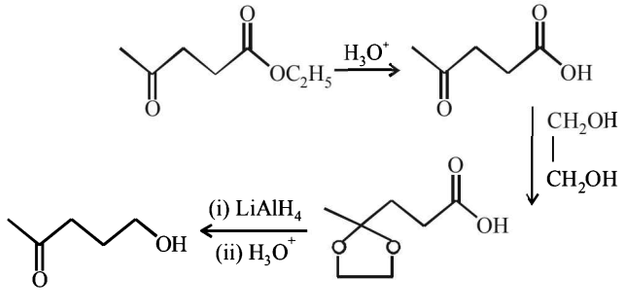


'B'

$C_6H_5COCH_3 + HCHO$

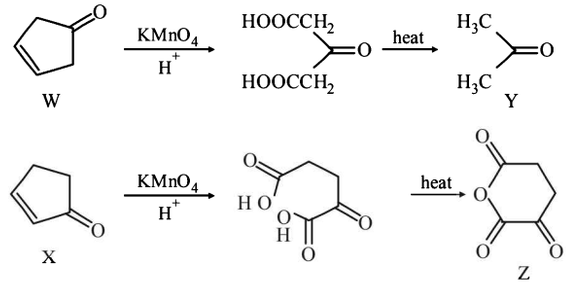
$C_6H_5COCH_3 \xrightarrow{3I_2+4NaOH} CHI_3 + C_6H_5COO^-Na^+$

5. (a)

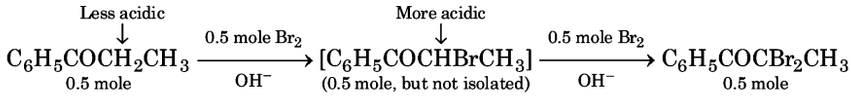


6. (a, d) The hydrogen atom that is added to the carbonyl carbon of the aldehyde in the reduction is derived directly from the other aldehyde molecule as a hydride ion. The second hydrogen that is added to the negatively charged oxygen is coming from the solvent (consult mechanism of Cannizzaro reaction). Oxidation of one molecule of the compound at the expense of other molecule of the same compound is known as disproportionation.

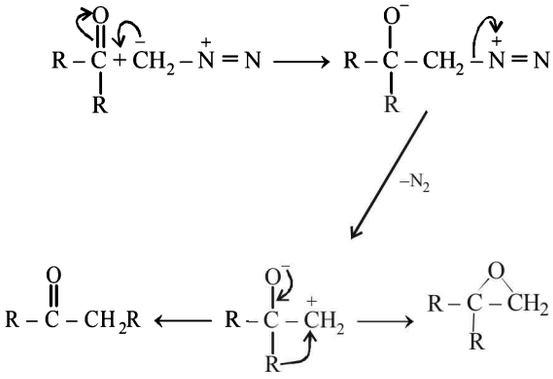
7. (a, c, d)



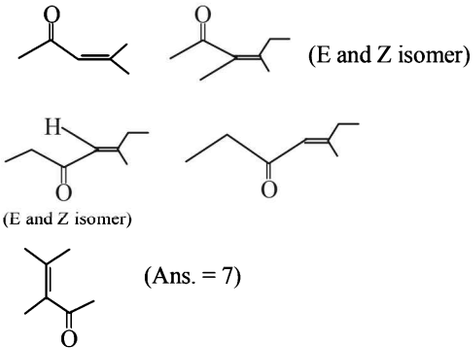
8. (c,d) Substitution by one Br gives $C_6H_5COCHBrCH_3$, the electron-withdrawing Br increases the acidity of the remaining α hydrogen which reacts more rapidly than the hydrogens on the unsubstituted ketones.



9. (a,c)



10. (9)

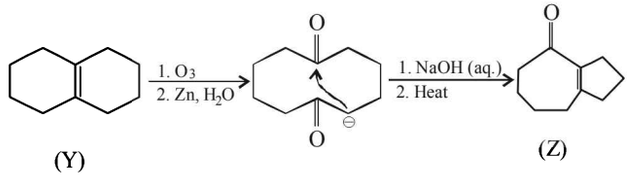


(E and Z isomer)

(E and Z isomer)

(Ans. = 7)

11. One product (Z).



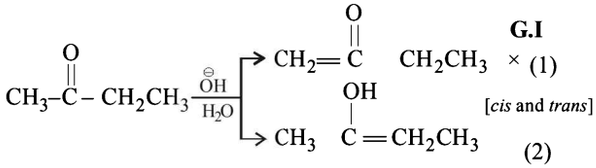
(Y) (Z)

12. **(3)** $CH_3MgBr + CH_3CH_2-\overset{\overset{O}{\|}}{C}-Cl \rightarrow$

$CH_3-\overset{\overset{O}{\|}}{C}-CH_2CH_3 + Mg\begin{matrix}Br\\Br\end{matrix}$

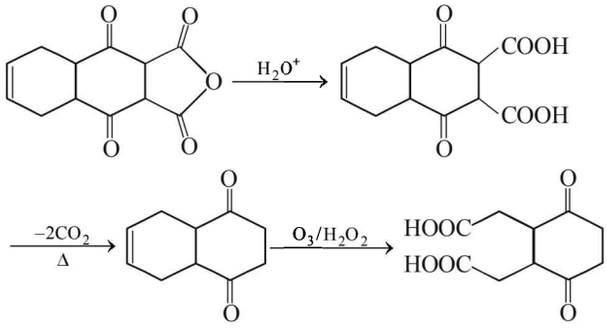
2-Butanone

2-Butanone will show tautomerism.



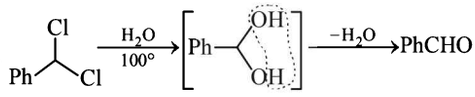
Total enol products = 1 + 2 = 3.

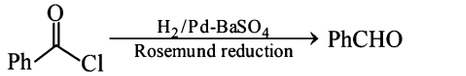
13. **(2)**

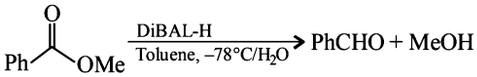


14. **(4)** **I.** Benzene $\xrightarrow[\text{Anhydrons } AlCl_3/CuCl]{CO+HCl}$ PhCHO (Benzaldehyde)

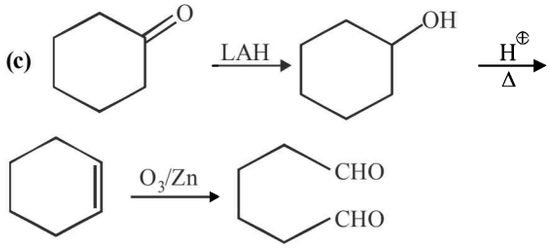
(Gattermann KOCH Aldehyde reaction)

II. 

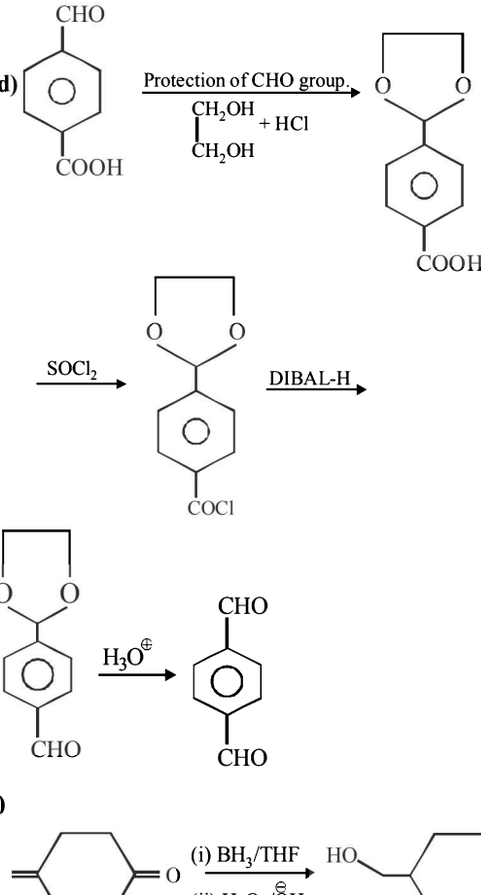
III. 

IV. 

15. **(c)**



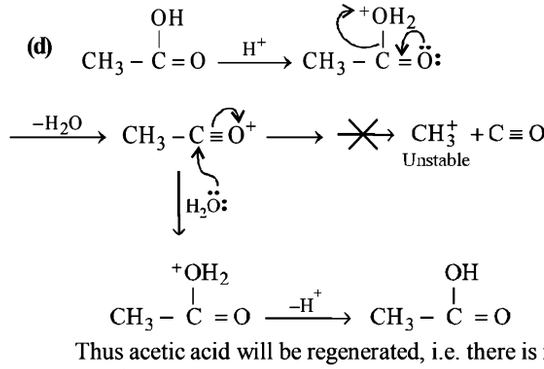
16. **(d)**



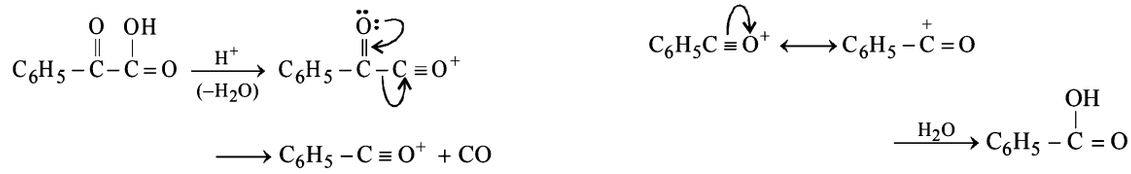
17. **(c)**

Preferentially oxidises (C = C) bond.

18. **(d)**

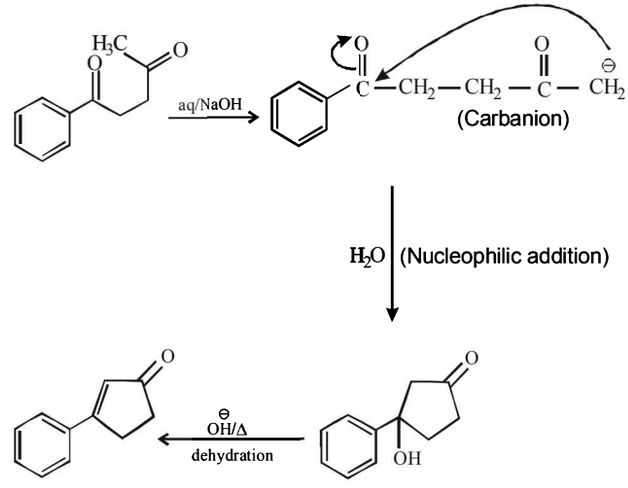


Thus acetic acid will be regenerated, i.e. there is no reaction.

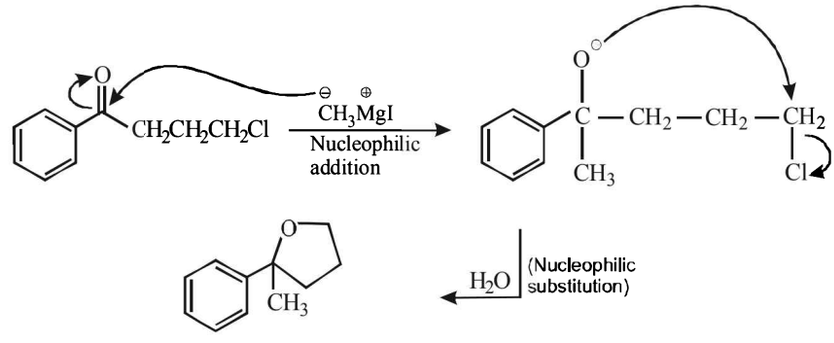
19. **(c)** 

20. **(A) → r, s ; (B) → p, s ; (C) → r, s; (D) → q, r**

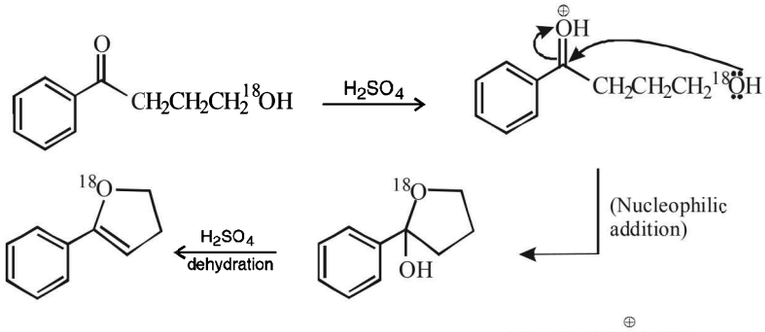
(A)



(B)



(C)



(D)