



**ALLEN** Digital

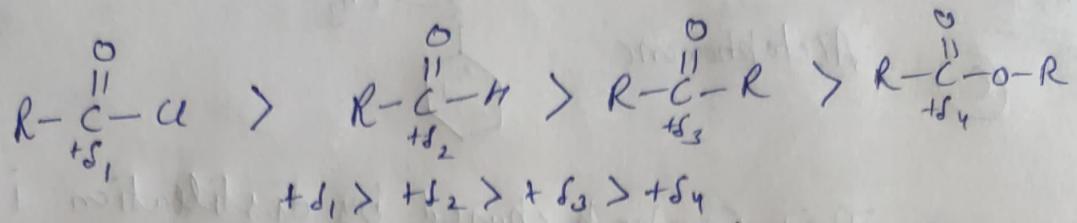


OC SHEET SOLUTION

Carbonyl Compounds

**Team  
OC  
Allen  
Kota**

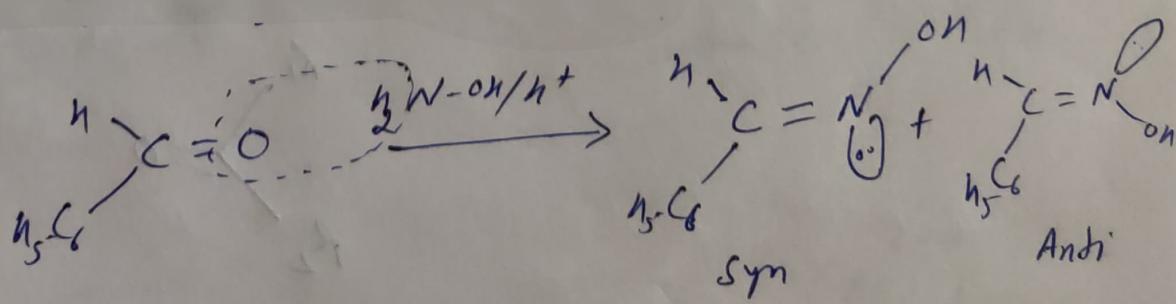
Ans 1 (A)



Due to  $-I > +R$  of Cl. Reactivity toward nucleophilicity of  $R-\overset{\underset{+S_1}{\text{C}}}{\overset{\text{O}}{\parallel}}-\alpha$  is maximum.

But in case of aldehyde, Ketone and ester  $-H, -R$  and  $-\text{O}-\text{R}$  show  $+I, +I, (+R > -I)$  respectively so reactivity of aldehyde  $>$  Ketone  $>$  ester.

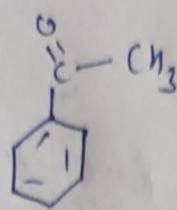
Ans 3 (C)



Ans 4

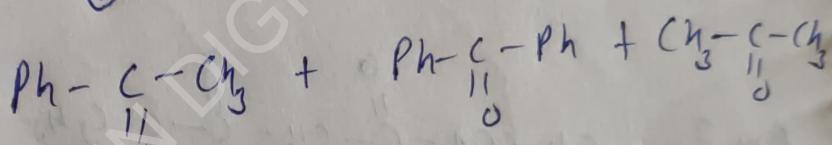
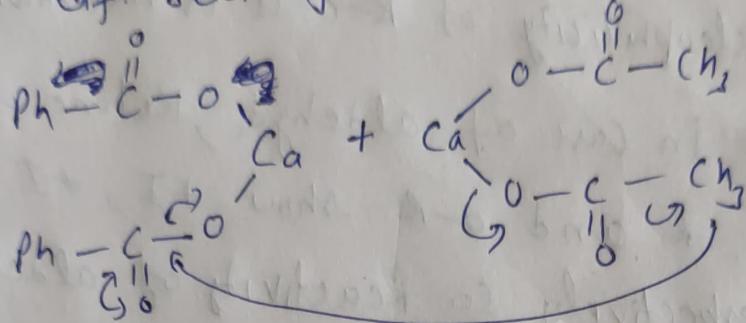
①

Acetophenone



This can be prepared by distillation if

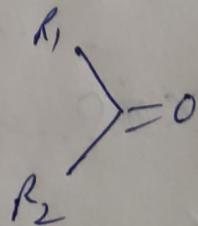
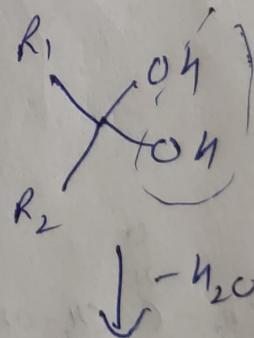
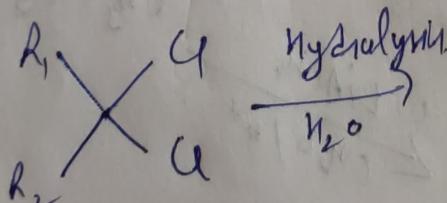
diff. salt of Calcium is use:



unintended  
Cross product.

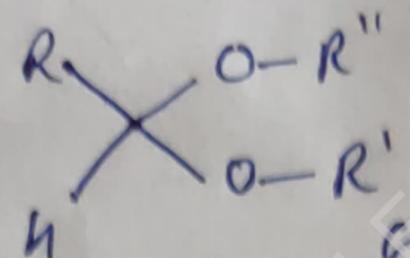
Ans 5

①

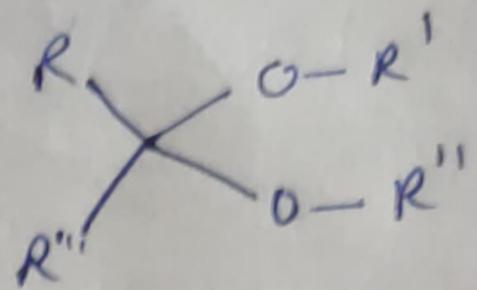


Ans 6  
①

Acetal

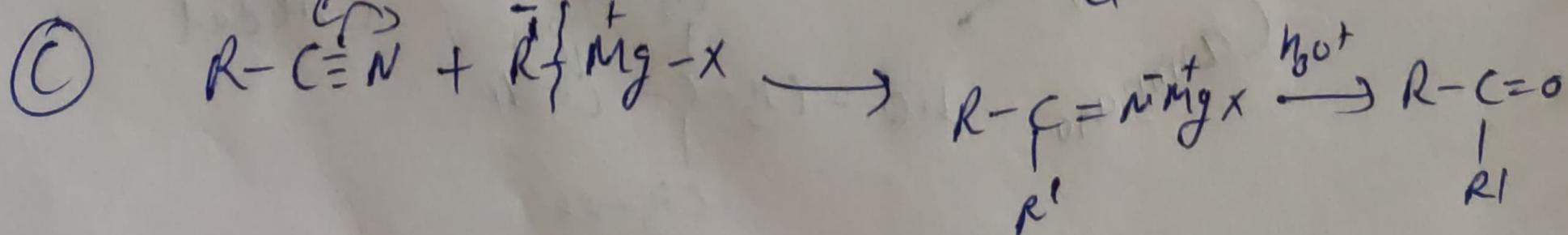
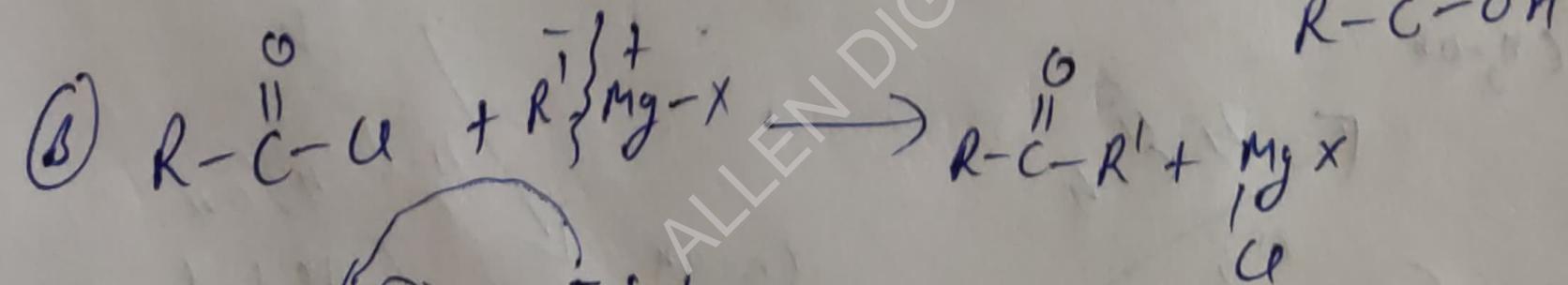
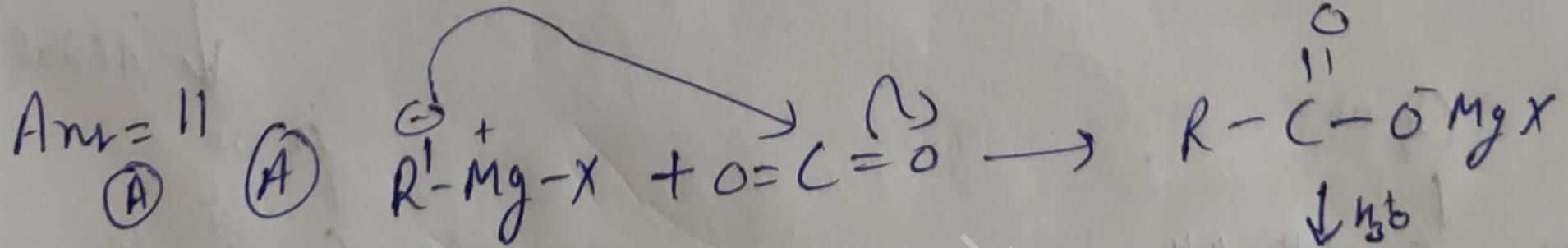


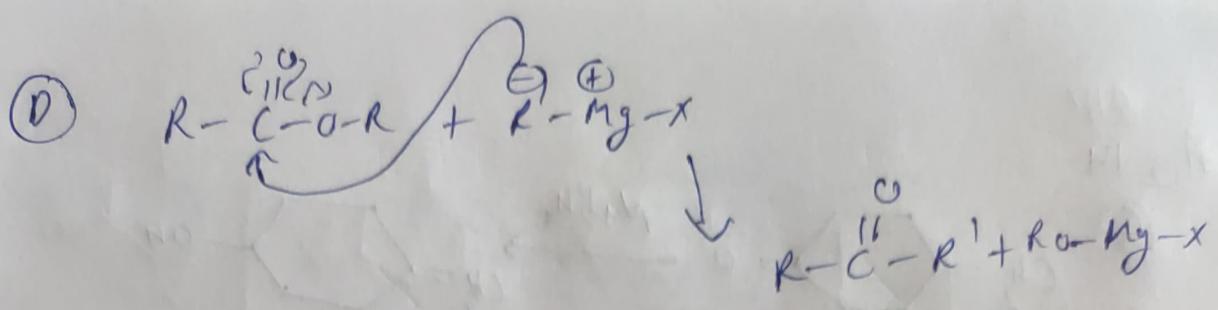
Ketal



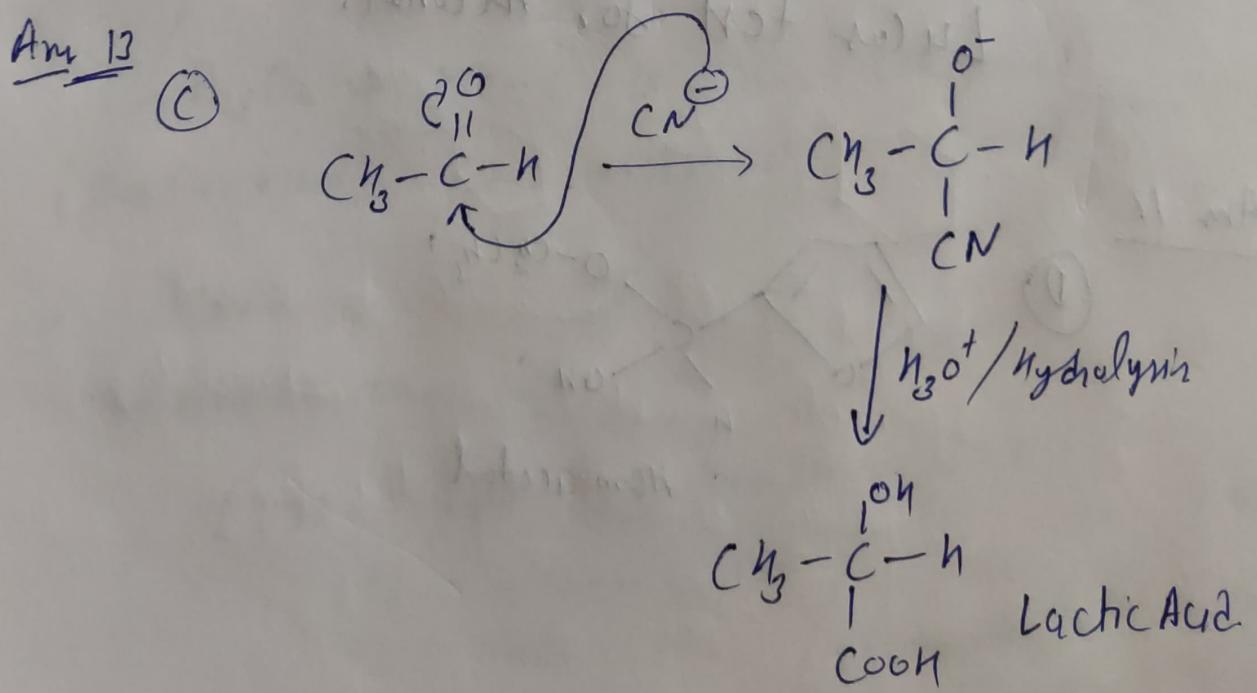
$\text{R}, \text{R}', \text{R}''$  can be  
same or dif.

$\text{R}, \text{R}', \text{R}'', \text{R}'''$   
can be same / dif.



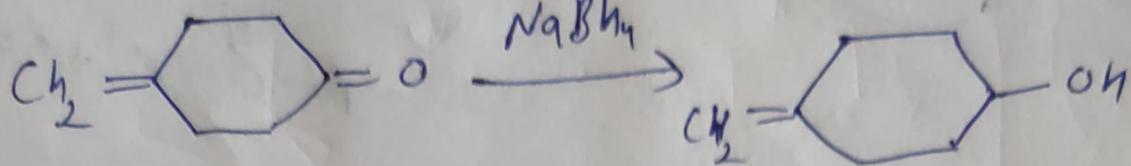


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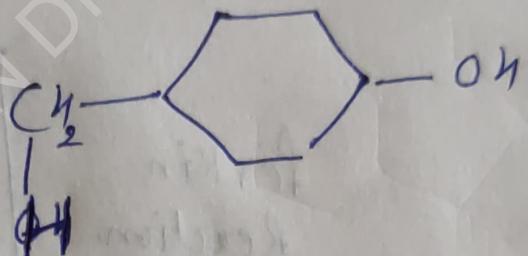
Am 14

(C)



(i)  $\text{BH}_3$

(ii)  $\text{H}_2\text{O}/\text{H}^+$  (excess.)



Am 15

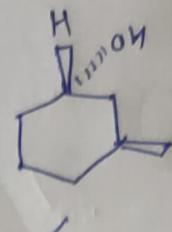
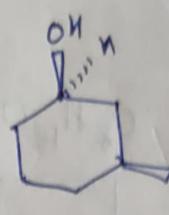
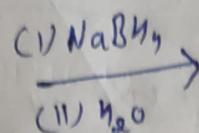
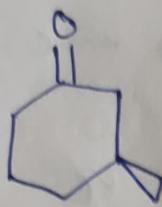
(B)

Acetaldehyde gives Positive Iodoform test,  
Benedict and Tollen's test.

Lucas test for Alcohol.

Ans 17

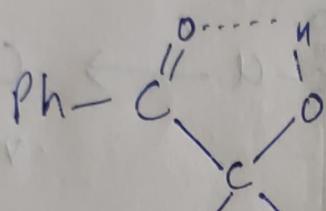
(A)



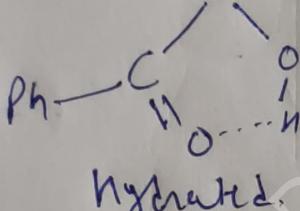
Diastereoisomers

Ans 18

(D)

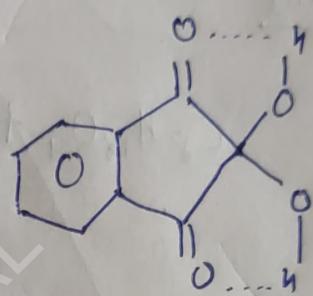


(A)



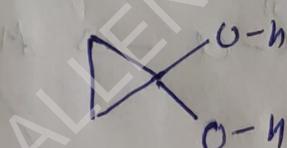
Hydrated.

(B)



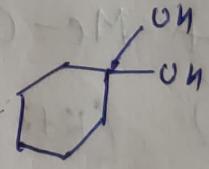
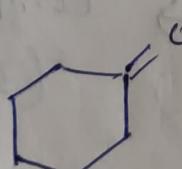
Hydrated.

(C)



Hydrated.

(D)

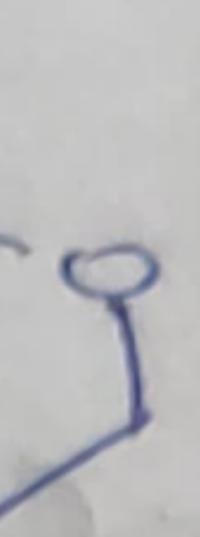
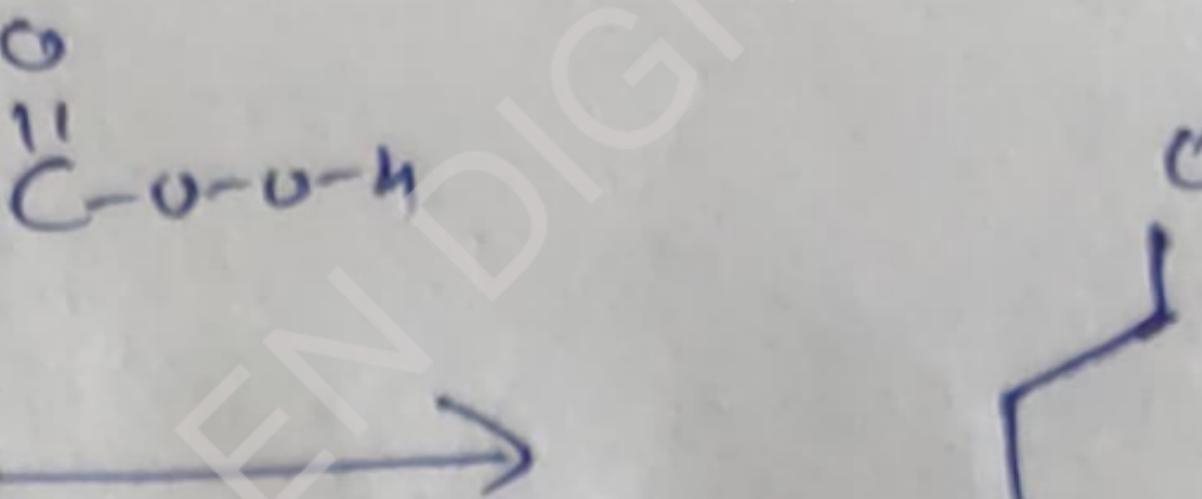
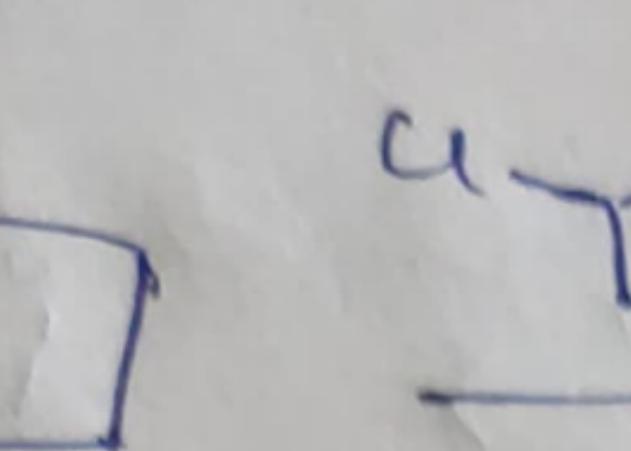
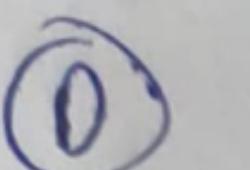


for D equilibrium shifted backward

direction due to more ~~stability~~ instability.

∴ D have Unstable hydrated form.

Ans 79



### Carbonyl Compound $\left[ \text{Ex} \Rightarrow \text{O-II} \right]$

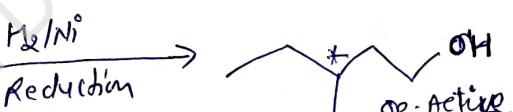
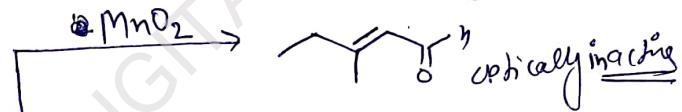
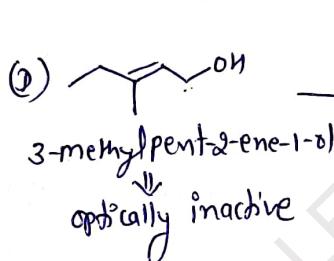
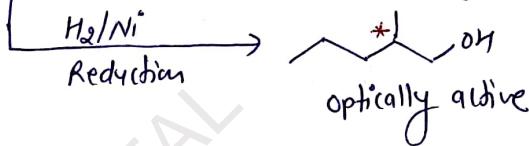
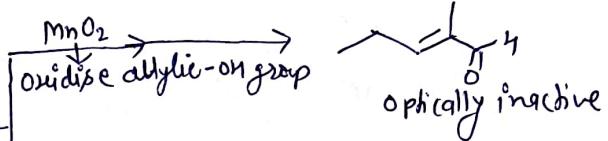
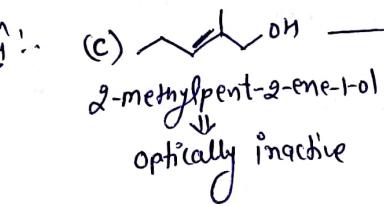
Q1) Ans - A, B

Sol<sup>n</sup> :-

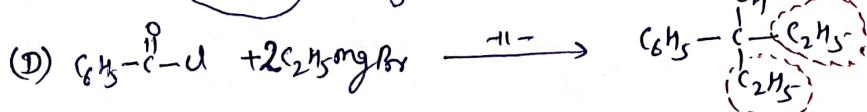
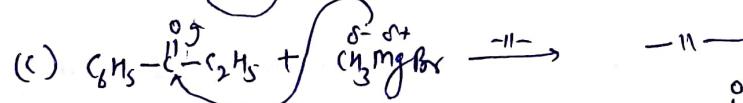
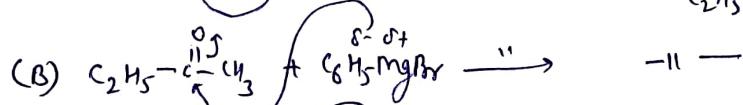
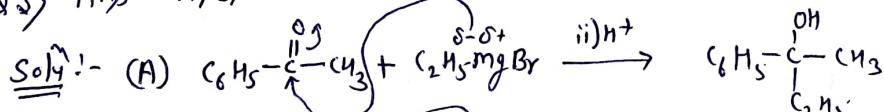
	$\text{I}_2 + \text{NaOH}$ Haloform Test	$\text{NaHSO}_3$ Test	$\text{NaCNHgCl}$ reaction	$2,4-\text{DNP}$ Test
3-Pentanone	X	X	✓	✓
2-Pentanone	✓	✓	✓	✓

Q2) Ans - C, D

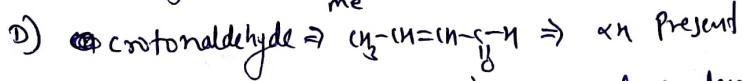
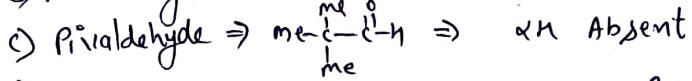
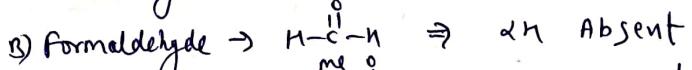
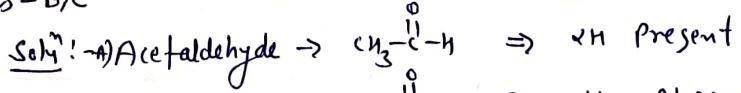
Sol<sup>n</sup> :-



Q3) Ans - A, B, C

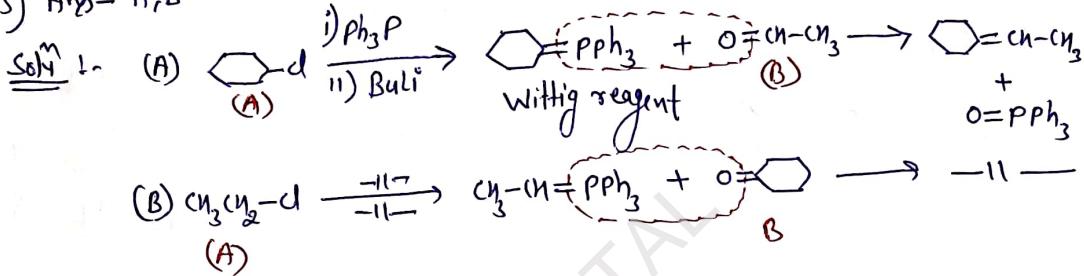


Q4) Ans - B, C



\* Carbonyl compds having  $\alpha\text{H}$  gives aldol condensation R<sup>n</sup>

Q5) Ans - A, B



Q6) Ans - ABCD

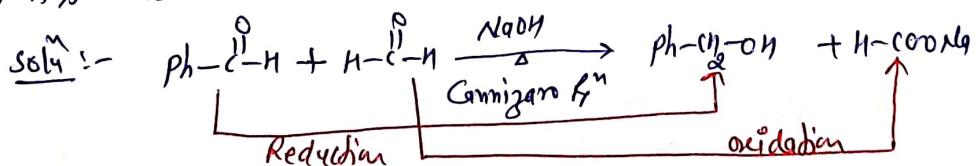
Q7) Ans - A, B, C

\* Reagents for protection  $\Rightarrow$   $2R-\text{OH}/\text{n}^+$  or  $2R-\text{SH}/\text{n}^+$   
of Carbonyl group  
 $\text{OR}^{\text{on}}/\text{n}^+$  or  $\text{O}^{\text{on}}/\text{n}^+$   
or  
 $\text{S}^{\text{m}}/\text{n}^+$  or  $\text{S}^{\text{m}}/\text{n}^+$

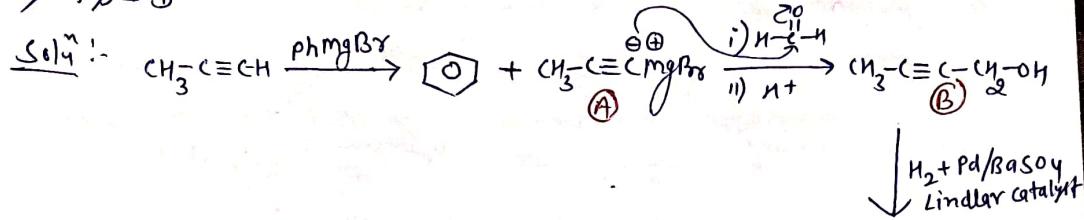
Q8) Ans - B, C

Soln:- cyclic hemiacetals are stable

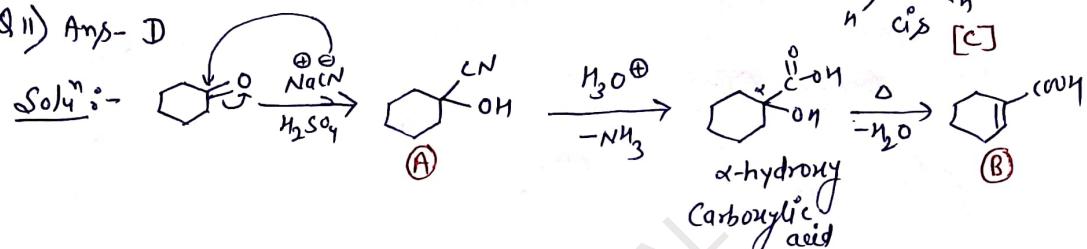
Q9) Ans - A, D



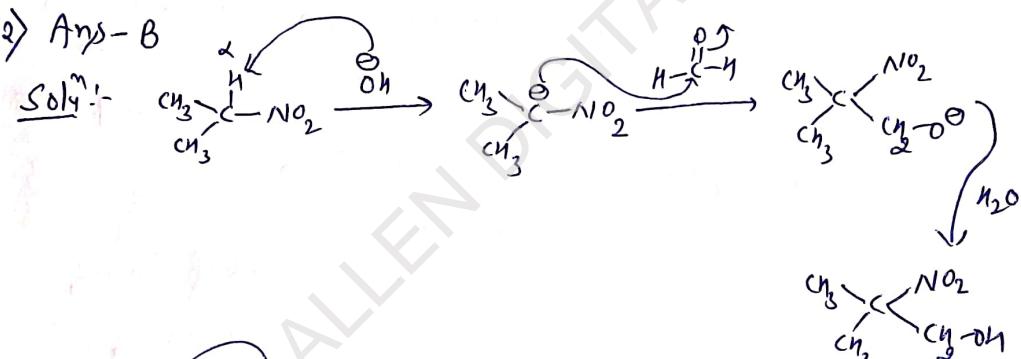
Q 10) Ans - D



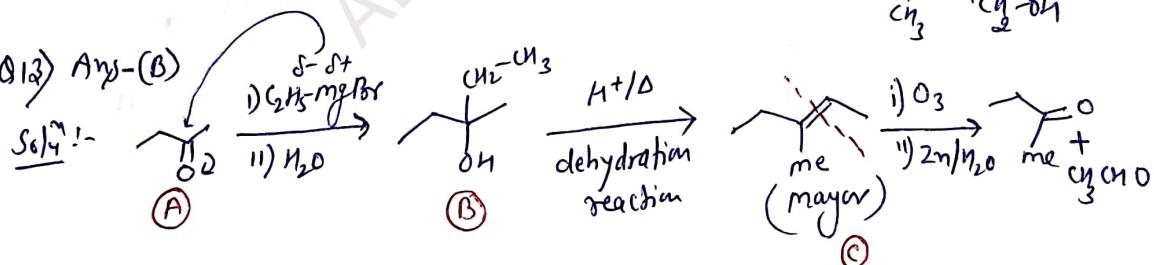
Q 11) Ans - D



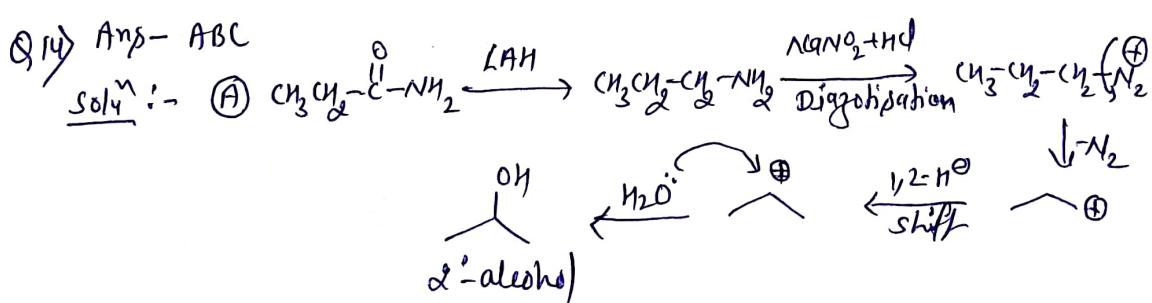
Q 12) Ans - B

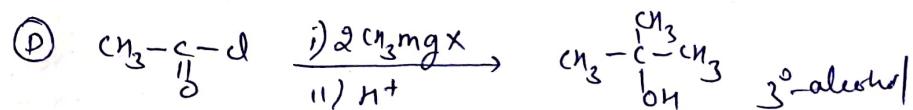
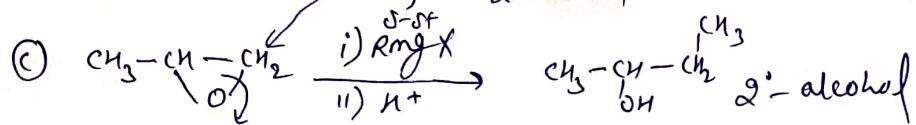
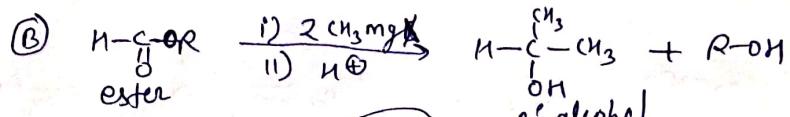


Q 13) Ans - (B)

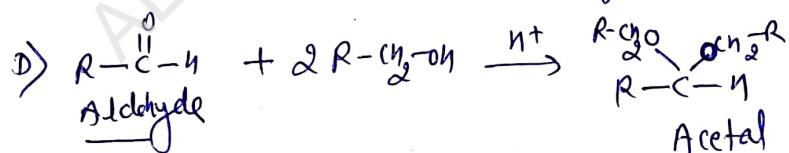
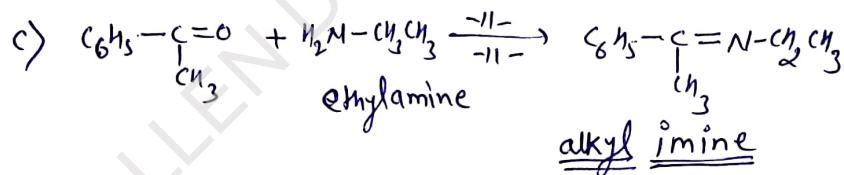
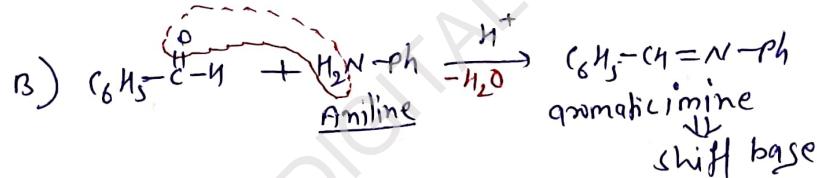
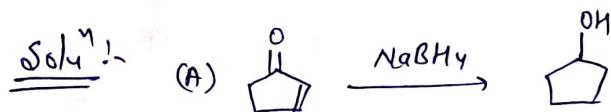


Q 14) Ans - ABC



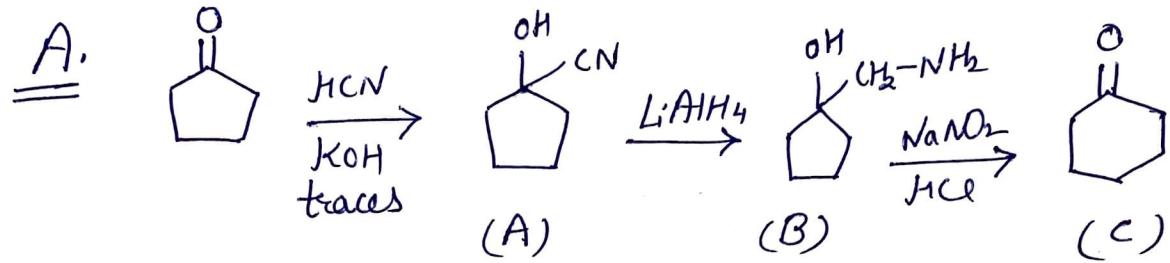


Q15) A)  $\underline{\text{Acy}}$  - A)  $\text{R}+\text{R}$       B)  $\text{-O}, \text{S}$       C)  $\text{S}$       D)  $\text{P}$



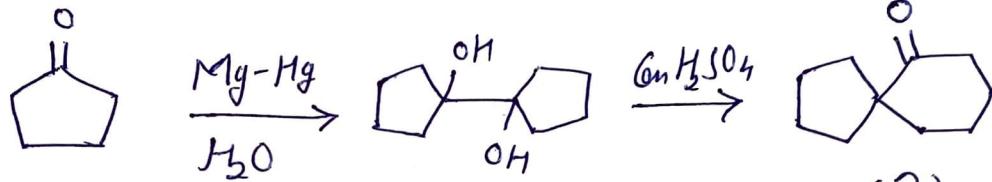
# Carbonyl Compounds Solution Ex :- S-I

Q1



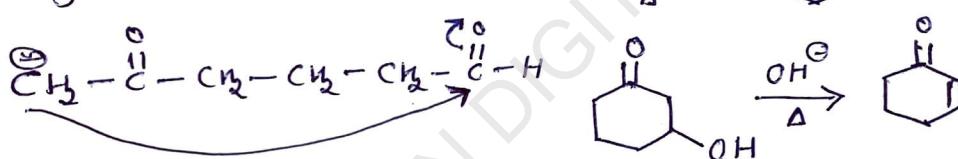
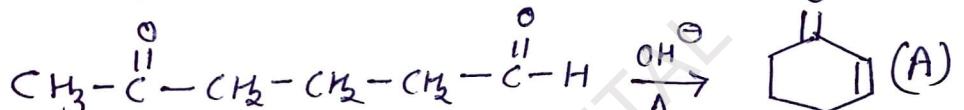
Ans: P, Q, S.

B.



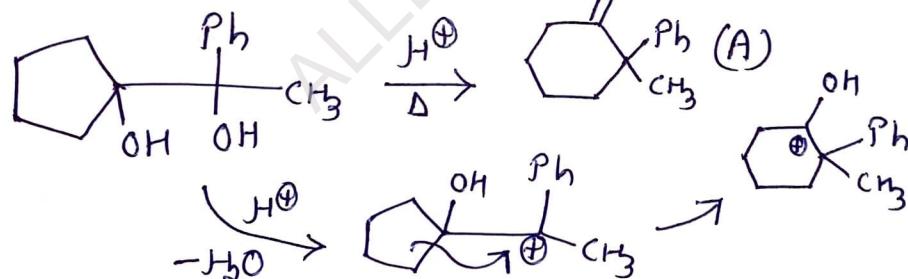
Ans:- P, Q, S.

5



Ans - P, Q, S

D.



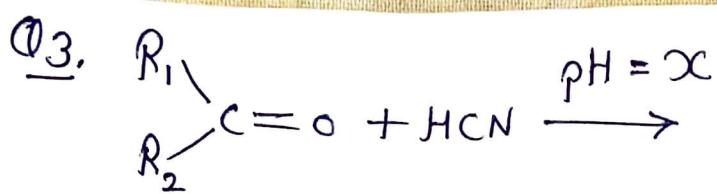
Ans- P, Q, S.

Q2

Key for Hydrate formation & Electrophilic nature of carbonyl carbon.

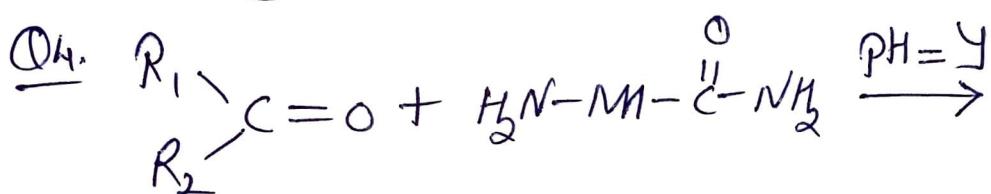
Presence of withdrawing grp will increase the reactivity of carbonyl grp towards attack of Nucleophile which is  $\text{H}_2\text{O}$  here for hydrate formation

$$\text{Ans} \rightarrow 3 > 2 > 1 > 4$$



Here presence of base will support the reaction by increasing conc. of  $\text{CN}^-$  ion. Thus pH needs to be more than 7

Ans = C

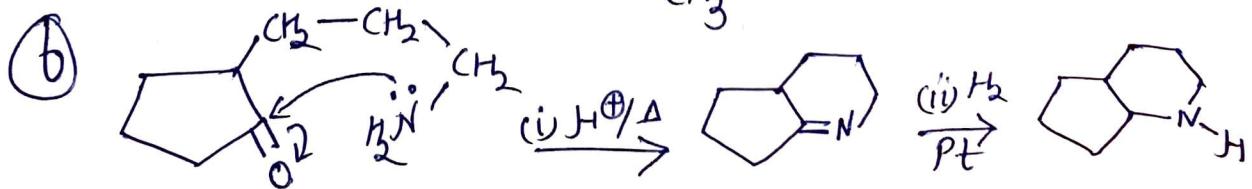
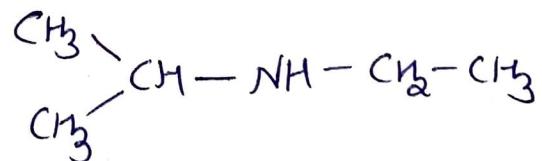
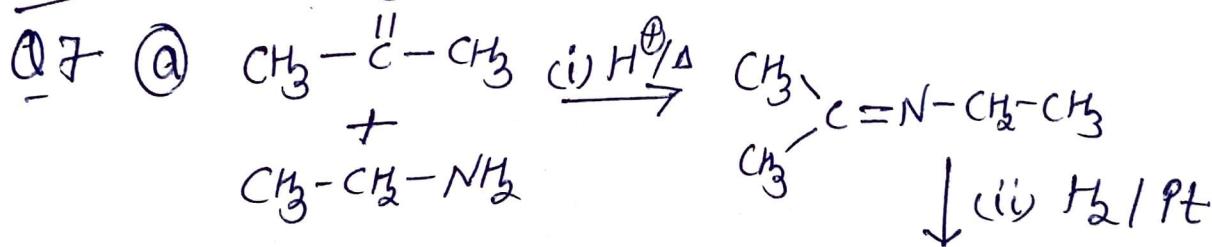


Here presence of mild acidic medium will favour the reaction in forward direction i.e. pH between 4 to 6.

Ans = (A)

Q5. Solution given in Sheet Answer Key section.

Q6. Solution given in Sheet Answer Key section

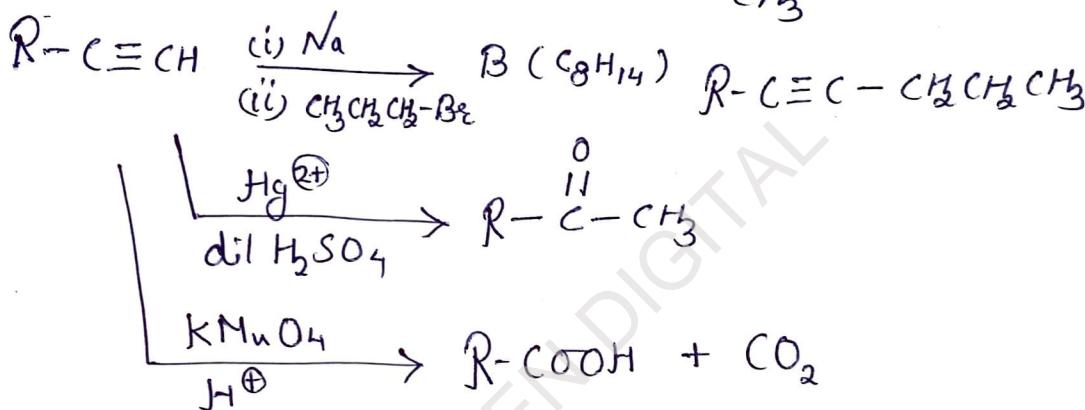
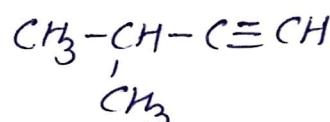
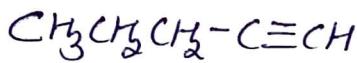


⑦ It is Haloform reaction  $\text{C}_6\text{H}_5-\overset{\overset{\bullet}{O}}{C}-OH + \text{CHCl}_3$

For Q8 and Q9

Hydrocarbon with molecular weight 68 having 88.24% carbon. It suggests it is an alkyne as indicated from the reactions given and it is also indicated as terminal alkyne.

$C_5H_8$  and possible structures are

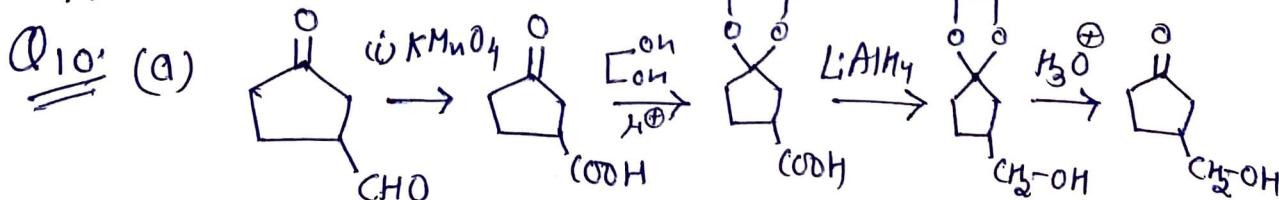


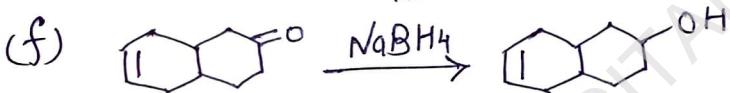
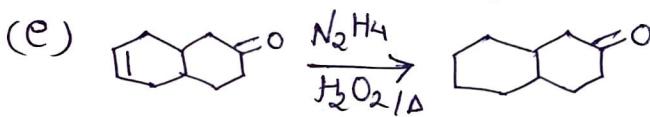
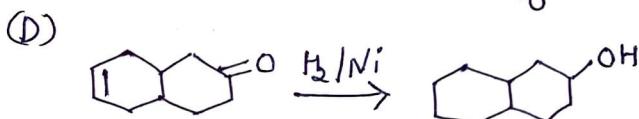
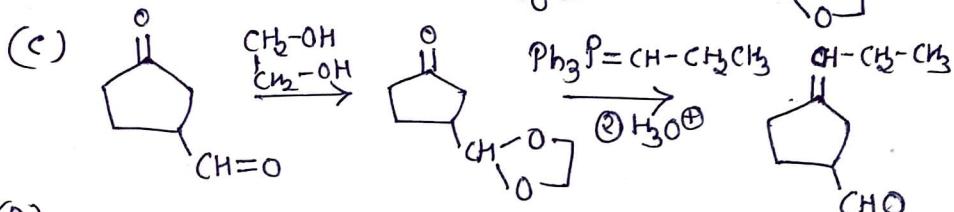
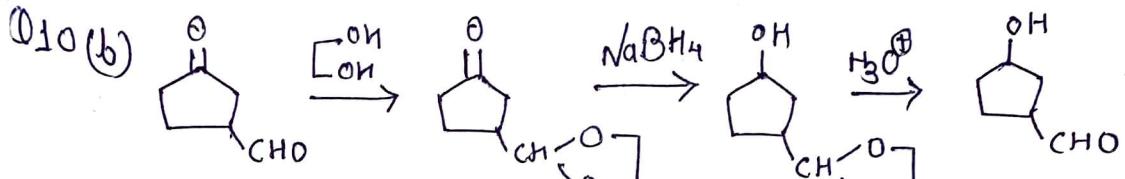
As both the possible structures qualifies given reactions.

Q8. Ans  $\rightarrow$  B and C.

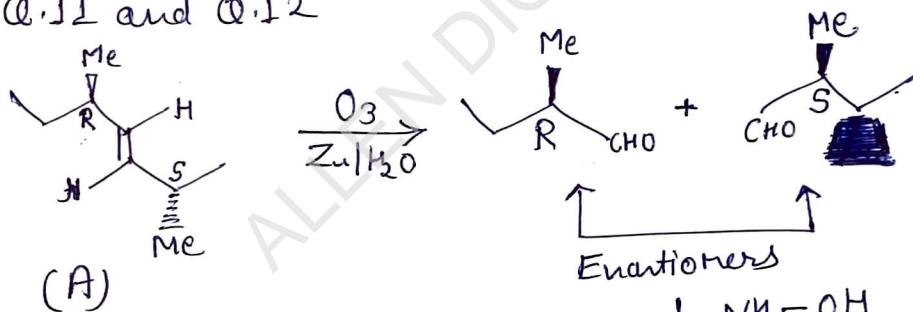
Q9. C can be  $CH_3-CH_2-CH_2-\overset{||}{C}-CH_3$  or  $CH_3-\overset{|}{CH}-\overset{||}{C}-CH_3$  and both can give fine  $^3$ iodoform test.

Ans  $\rightarrow$  B.



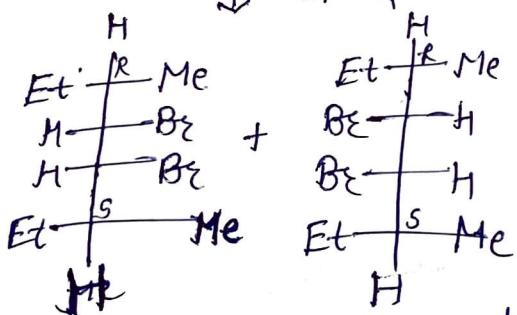
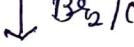


For Q.11 and Q.12



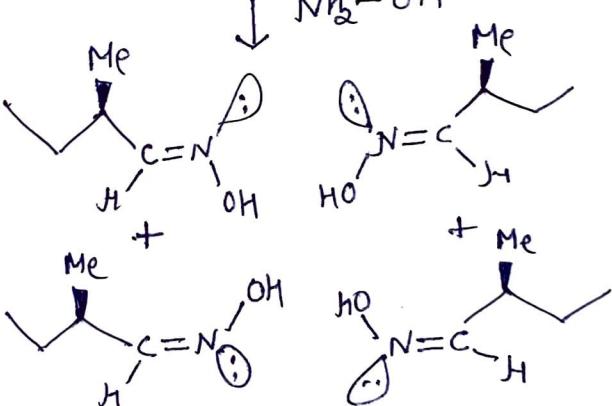
(A)

It is having CO<sub>2</sub>  
so optically inactive



Two Meso Compounds

Q.11 - Ans → B.



Four oximes.

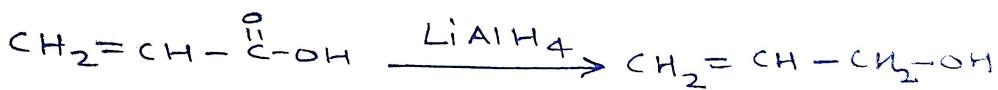
Q.12. Ans → D.

## CARBONYL COMPOUNDS

### EXERCISE - MAINS

Ques. 1

Ans. 4

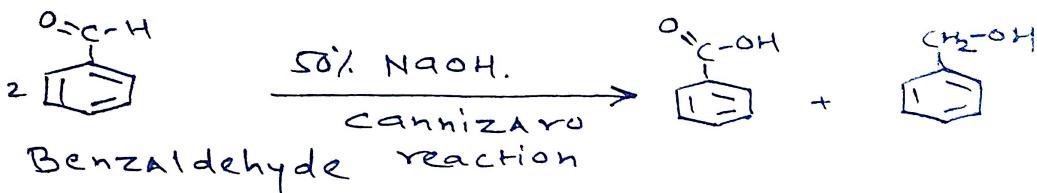


$\text{LiAlH}_4$  reduce Acid into Alcohol

But alkene is not affected by  $\text{LiAlH}_4$

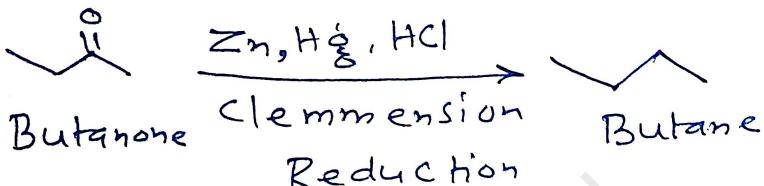
Ques. 2

Ans. 2



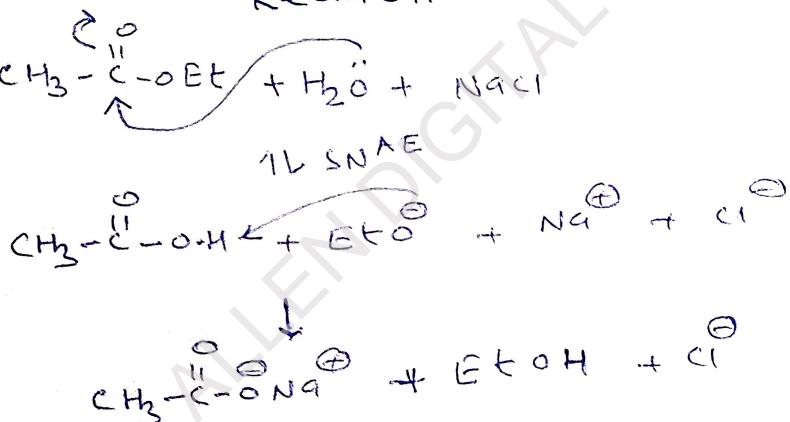
Ques. 3

Ans. 1



Ques. 4

Ans. 2



Ques. 5

Ans. 4

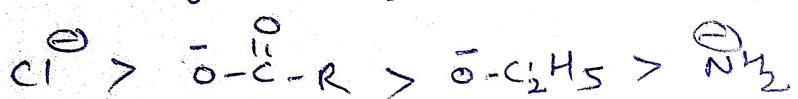
⊖  $\text{CrO}_3$  in Glacial acetic acid  
is the best mild oxidising agent among given options.

Ques. 6.

x is leaving group

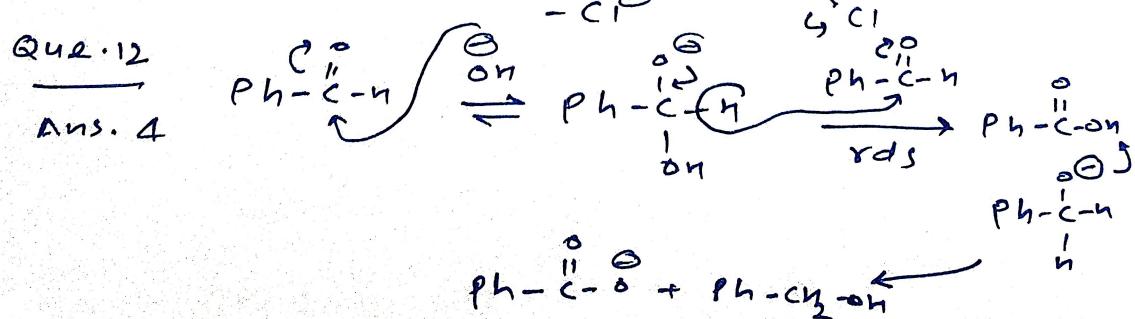
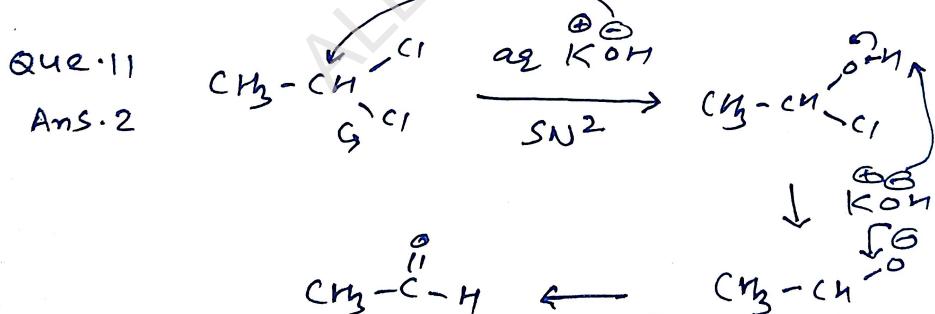
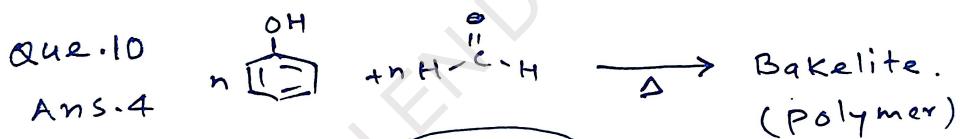
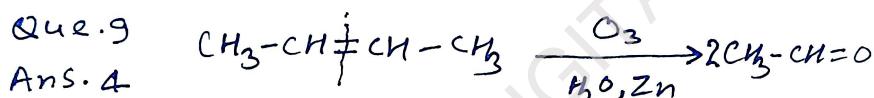
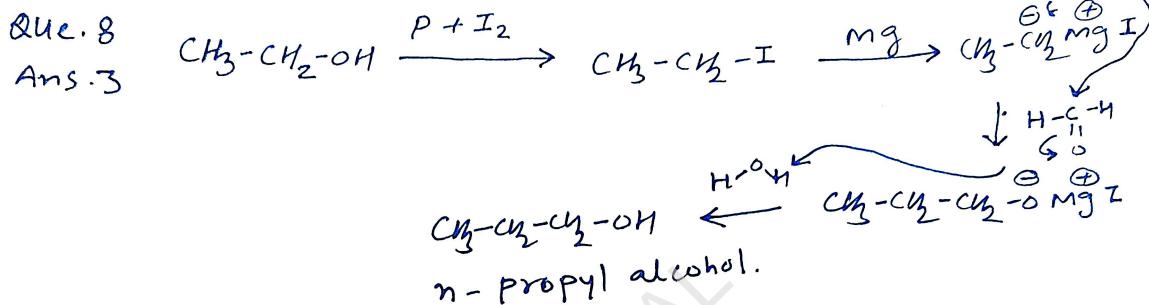
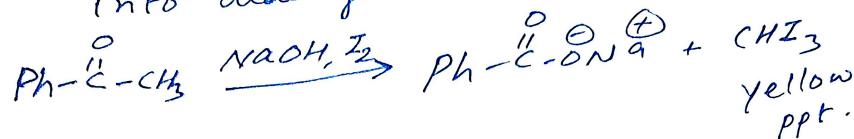
Ans. 2

order of leaving tendency of lg





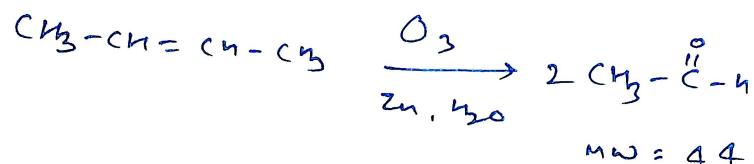
NaO<sub>I</sub> is mild oxidising agent which convert 1° alcohol into aldehyde and 2° alcohol into ketone.



It is Cannizaro reaction, in which Hydride transfer is rds.

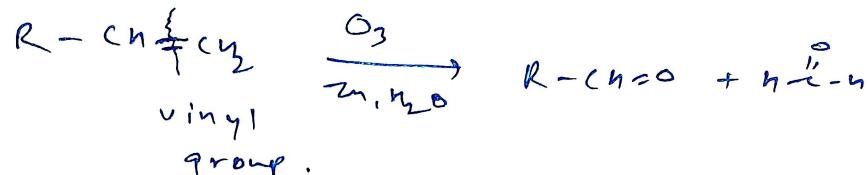
Que. 13

Ans. 4



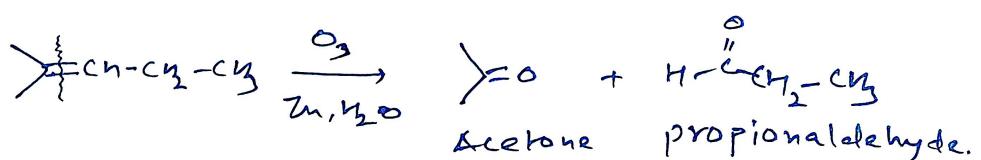
Que. 14

Ans. 4



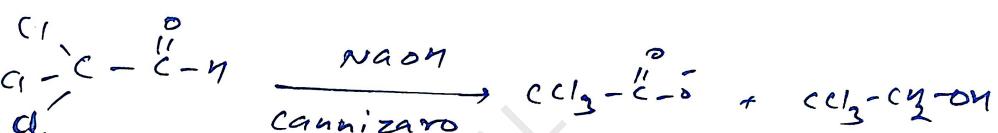
Ans. 15

Ans. 4



Que. 16.

Ans. 3



Que. 17

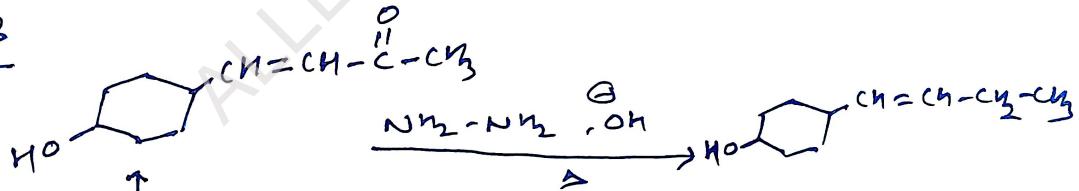
Ans. 1, 3



both are aldehyde which gives silver mirror test.

Que. 18

Ans. 2

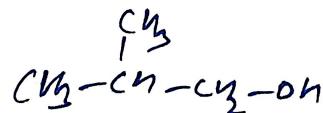


It is acid sensitive compound.

so Clemmensen reduction is not done.

Que. 19

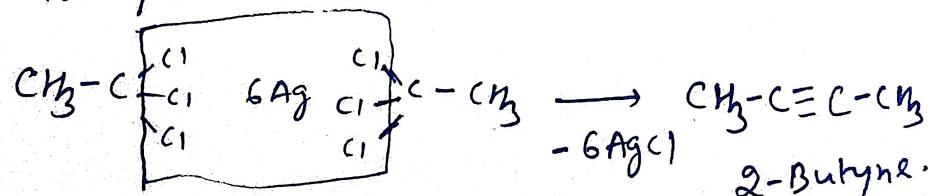
Ans. 1



isobutyl alcohol do not give iodoform test.

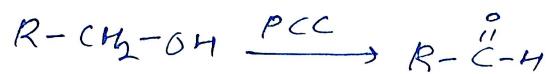
Que. 20

Ans. 1



Que. 21

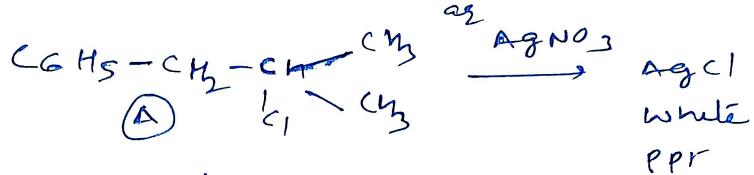
Ans. 2



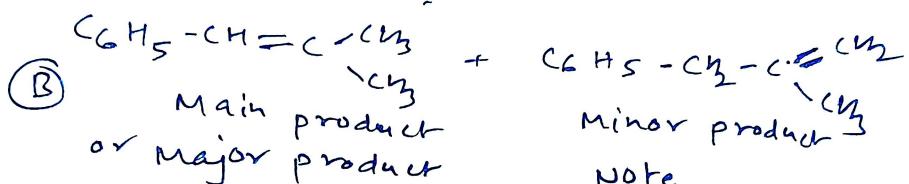
PCC is mild oxidising agent.

Que. 22

Ans. 2

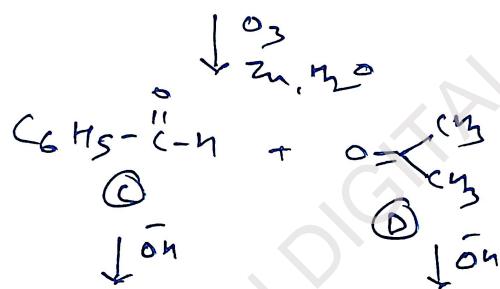


E2  $\downarrow$  AlCO  
KOH  $\Delta$



Note

option c is not correct, because it gives only one Elimination product with AlCO. KOH.

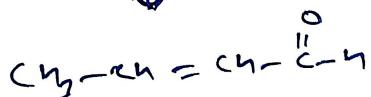
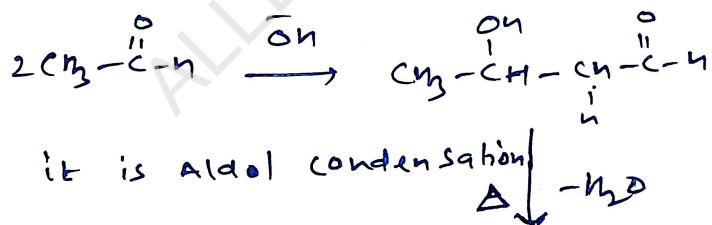


Gives Cannizaro

Gives Aldol.

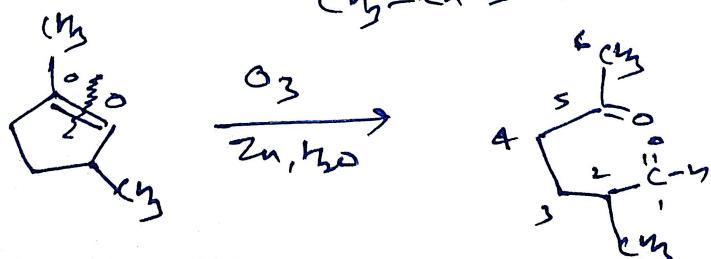
Que. 23

Ans. 1



Que. 24

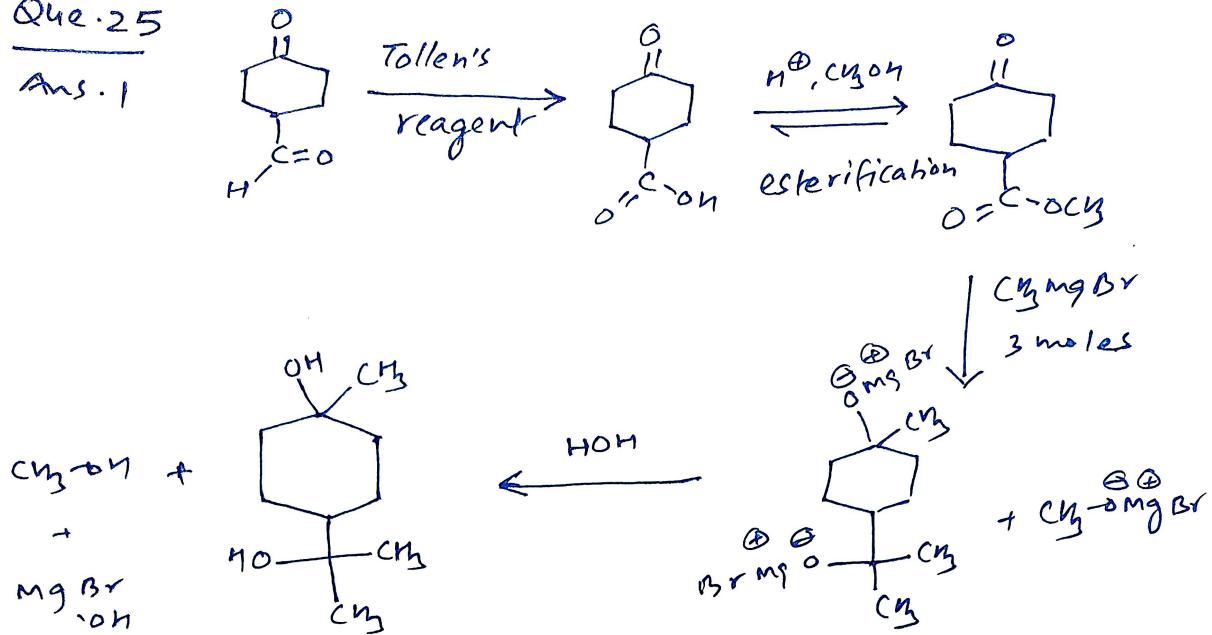
Ans. 4



5-Keto-2-methyl hexanal.

Ques. 25

Ans. 1



Ques. 26

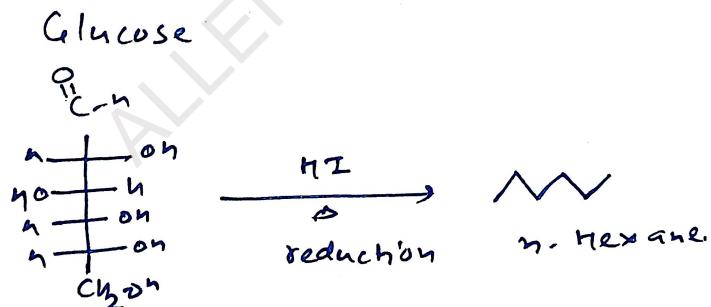
Ans. 3



max. dipole moment.

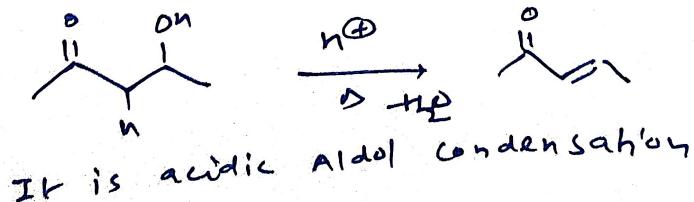
Ques. 27

Ans. 4



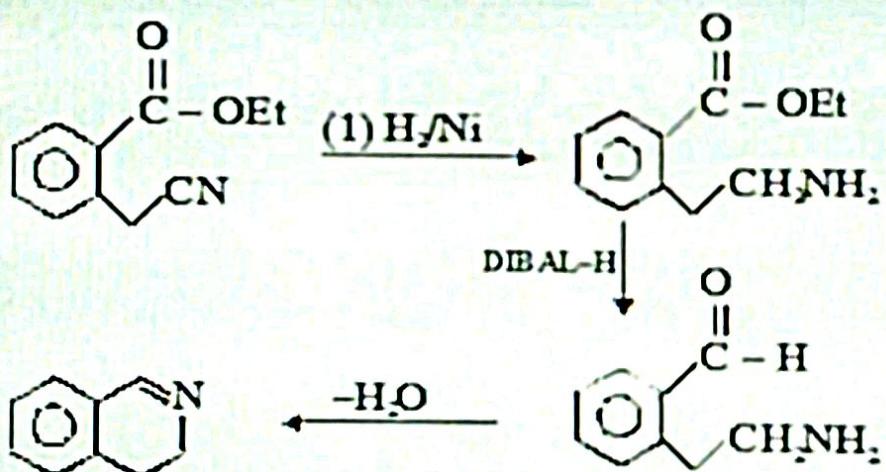
Ques. 28

Ans. 1



Que. 29

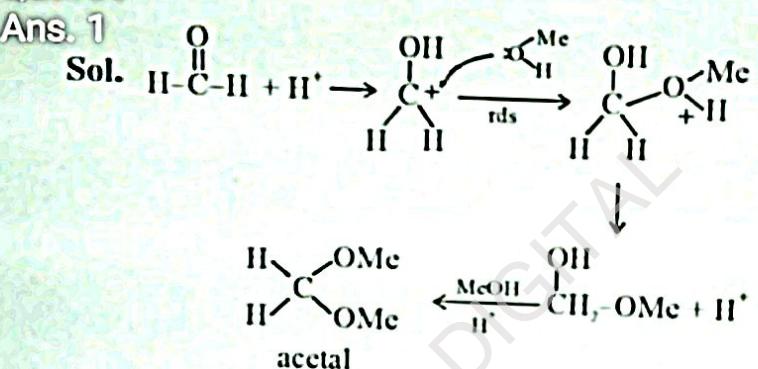
Ans. 2



Sol.

Que. 30

Ans. 1



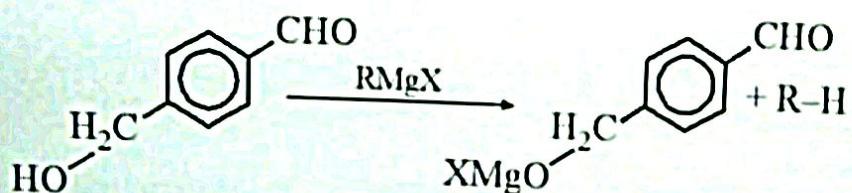
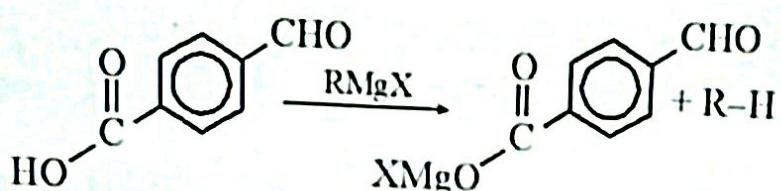
$$\text{rate} \propto \frac{1}{\text{steric crowding of aldehyde}}$$

t-butanol can show formation of carbocation in acidic medium.

Que. 31

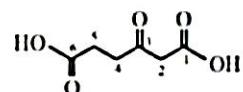
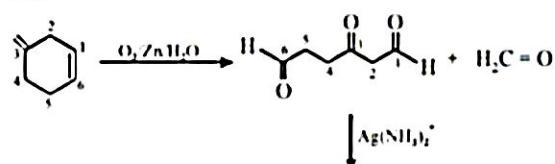
Ans. 2

Sol. Acid-base reaction of G.R are fast.



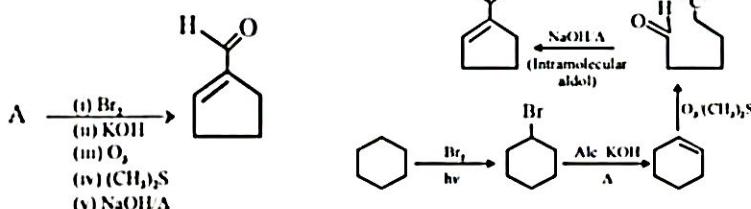
**32. Ans. (1)**

**Sol.**



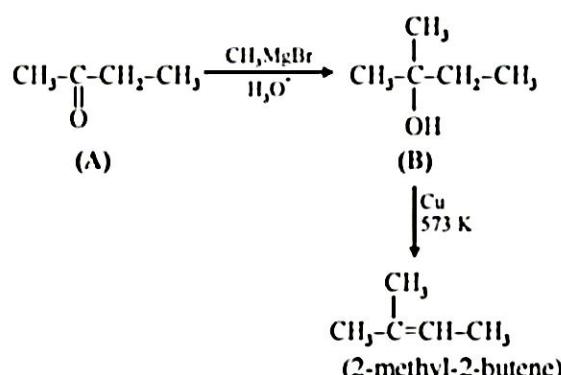
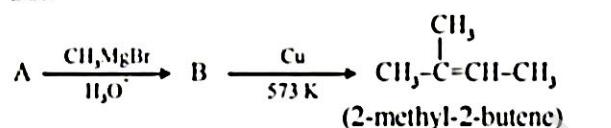
**33. Ans. (3)**

**Sol.**



**34. Ans. (66.65 to 66.70)**

**Sol.**



$$\text{C} \Rightarrow 12 \times 4 = 48$$

$$\text{H} \Rightarrow 8 \times 1 = 8$$

$$\text{O} \Rightarrow 16 \times 1 = 16$$

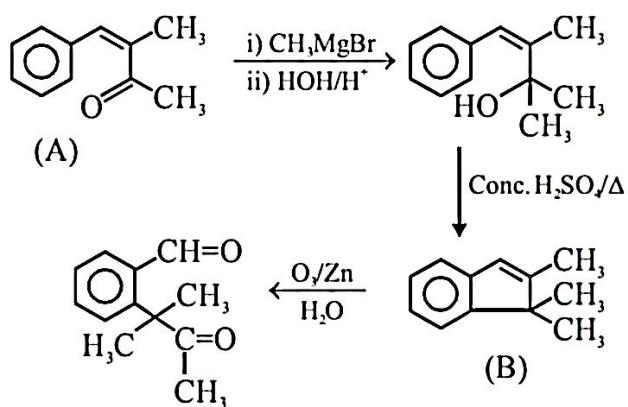
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Total      72

$$\% \text{ of C} = \frac{48}{72} \times 100 = 66.66\%$$

**35. Ans. (4)**

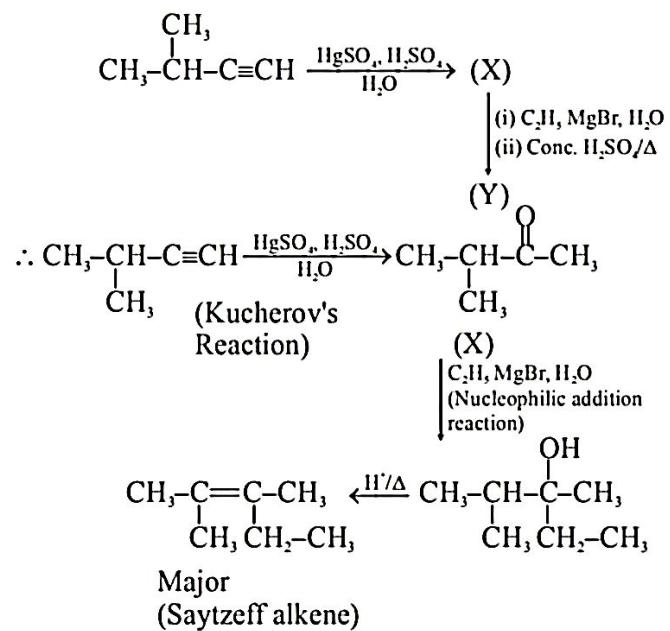
Sol.



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**36. Ans. (3)**

Sol.



## CARBONYL COMPOUNDS (Solutions)

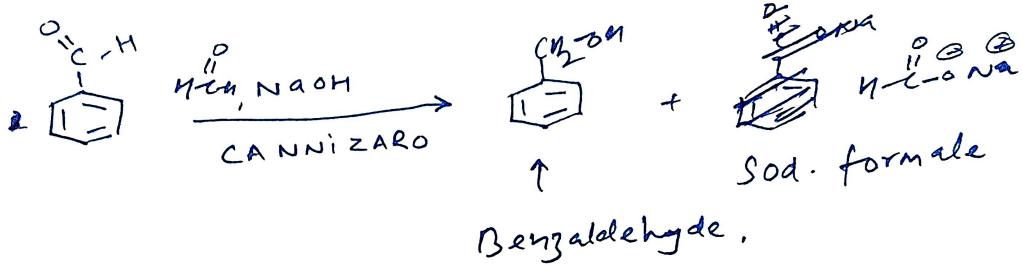
### EXERCISE : IIT Adv. Questions

Que. 1  
Ans. B

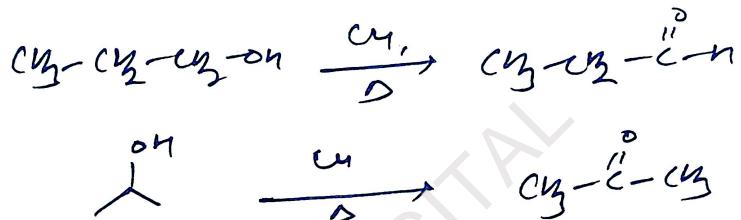


conjugate base is resonance stabilized.

Que. 2  
Ans. A

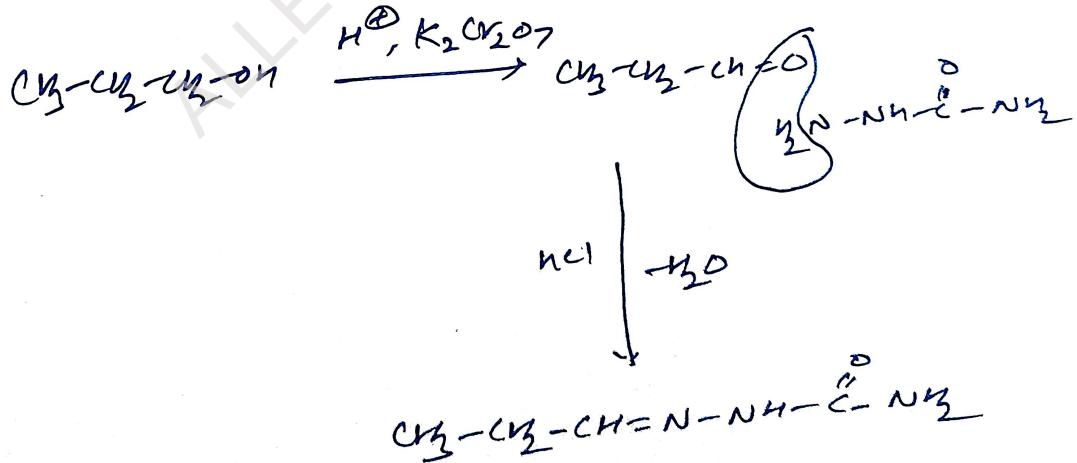


Que. 3  
Ans. C

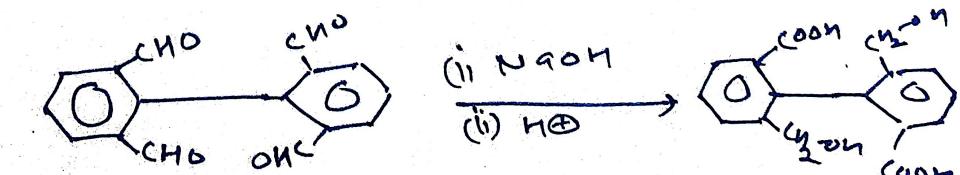


Aldehyde and ketone can be distinguished by Fehling solution, (Aldehyde gives Red ppt)

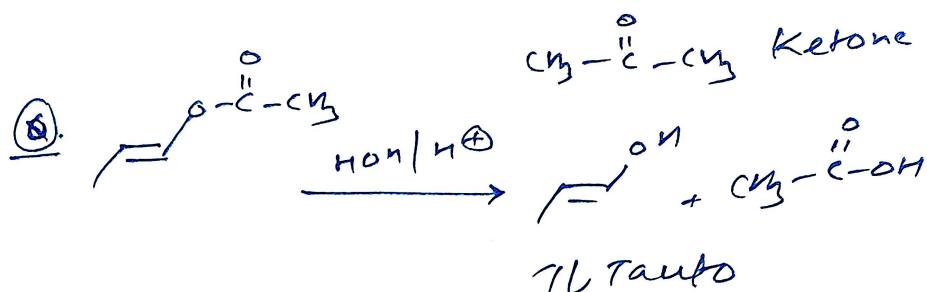
Que. 4  
Ans. A



Que. 5  
Ans. C



It is intramolecular CANNIZARO



# Aldehyde and Ketone are differentiated by Fehlings solution.

Que. 7  
Ans. C order of electrophilicity of carbonyl compounds.



Que. 8 or is perkin condensation

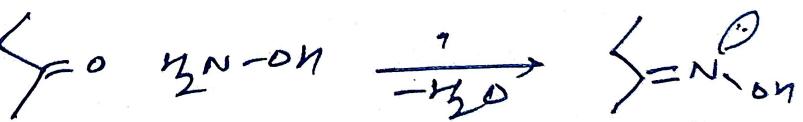
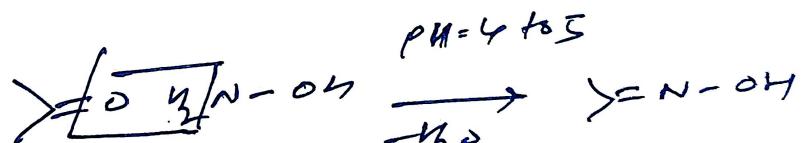
Ans. C so X is Anhydride  $\text{C}_6\text{H}_5-\overset{\overset{\text{O}}{\parallel}}{\text{C}}-\text{O}-\overset{\overset{\text{O}}{\parallel}}{\text{C}}-\text{C}_6\text{H}_5$

Ans. 9

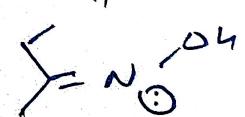
Ans. B

Smallest ketone

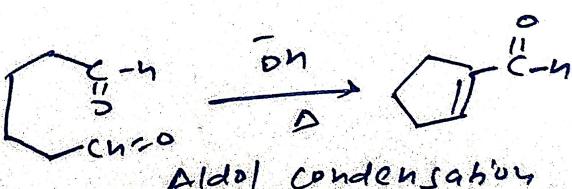
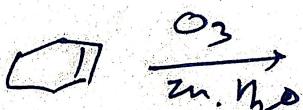
Next homologous



Total 3 oximes.



Que. 10  
Ans. A



Ques. 11  
Ans. C



Reddish  
Brown  
ppt

Ques. 12

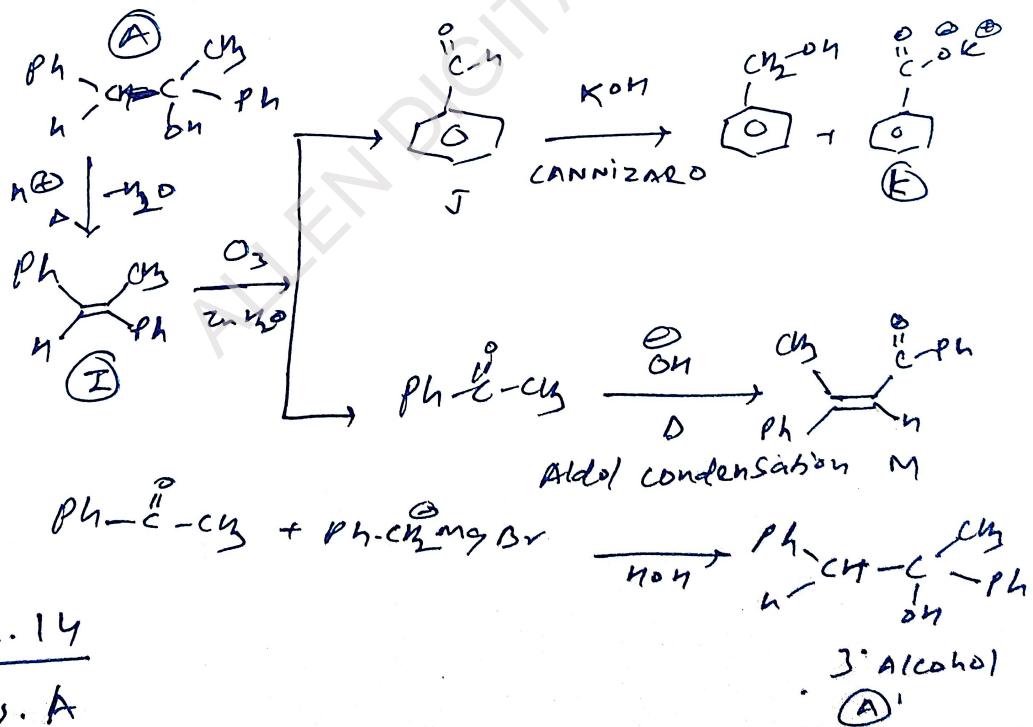
- Ans. A - P, S,  
B - Q  
C - Q, R, S  
D - Q, R

$\text{CH}_3\text{C}_6\text{H}_5\text{CHO}$  is Electrophile  
and it gives ppt with 2,4-DNP  
and also form cyanohydrin  
with  $\text{HCN}$  or  $\text{KCN}, \text{H}^+$ .

Ques. 13

Ans. B.

PASSAGE Ques. 13, 14, 15



Ques. 14

Ans. A

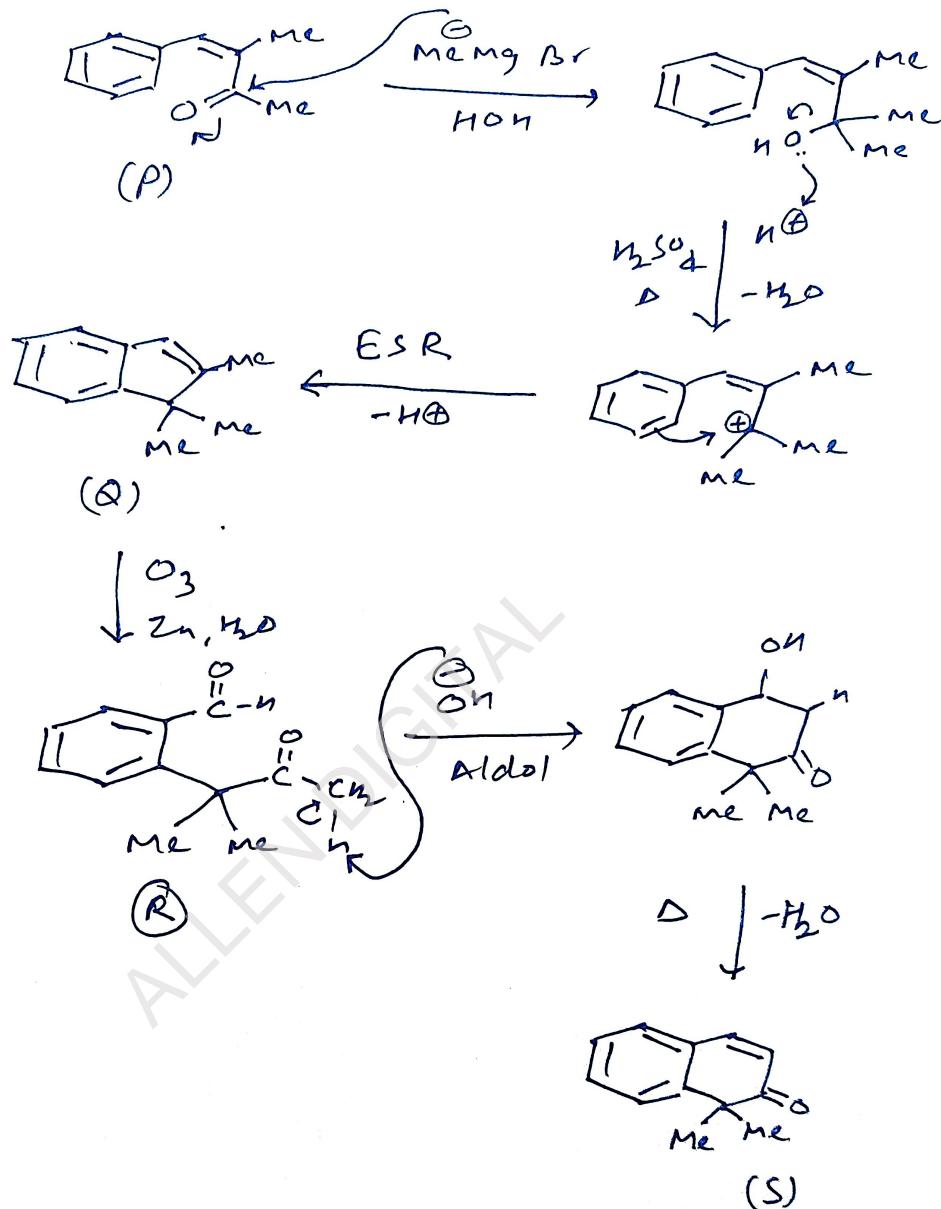
Ques. 15

Ans. D.

PARAGRAPH Que. 16, 17, 18

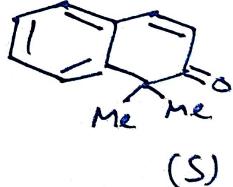
Que. 16

Ans. B



Que. 17

Ans. A

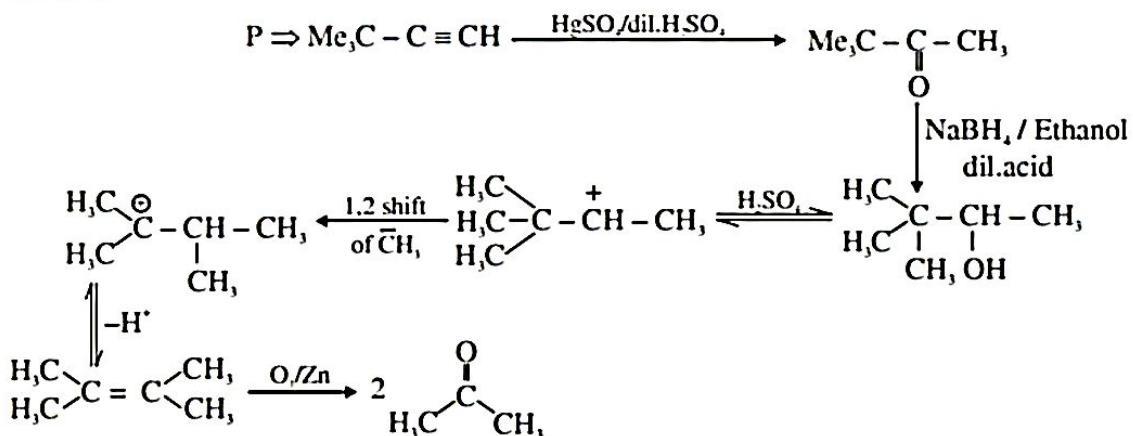


Que. 18

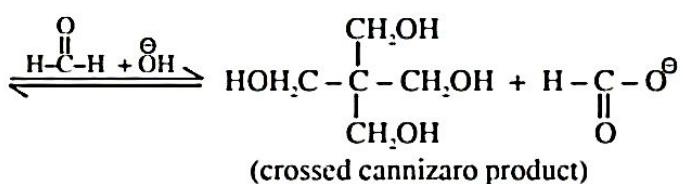
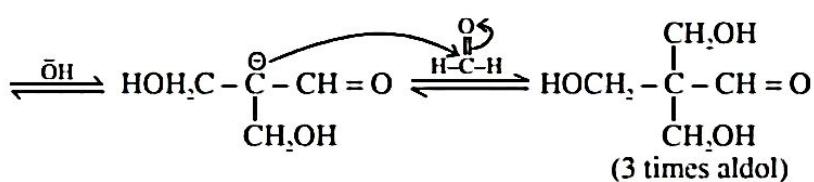
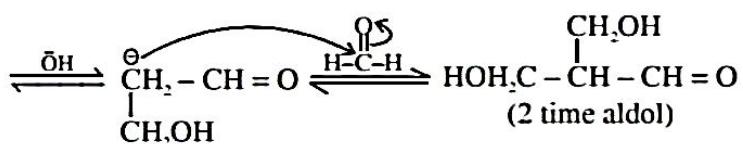
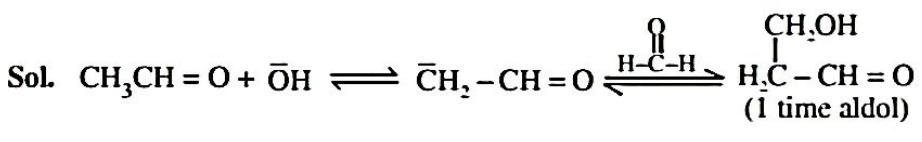
Ans. B.

19. Ans. (D)

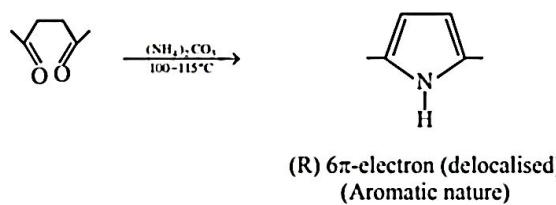
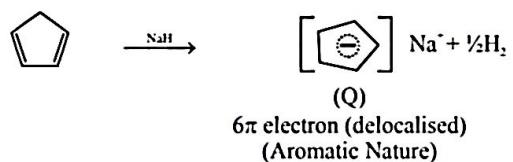
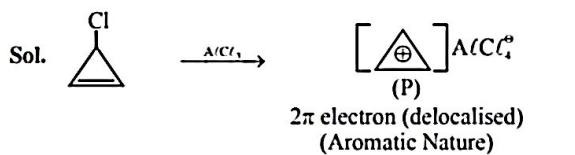
20. Ans.(B)



21. Ans. (C)



22. Ans. (A,B,C,D)



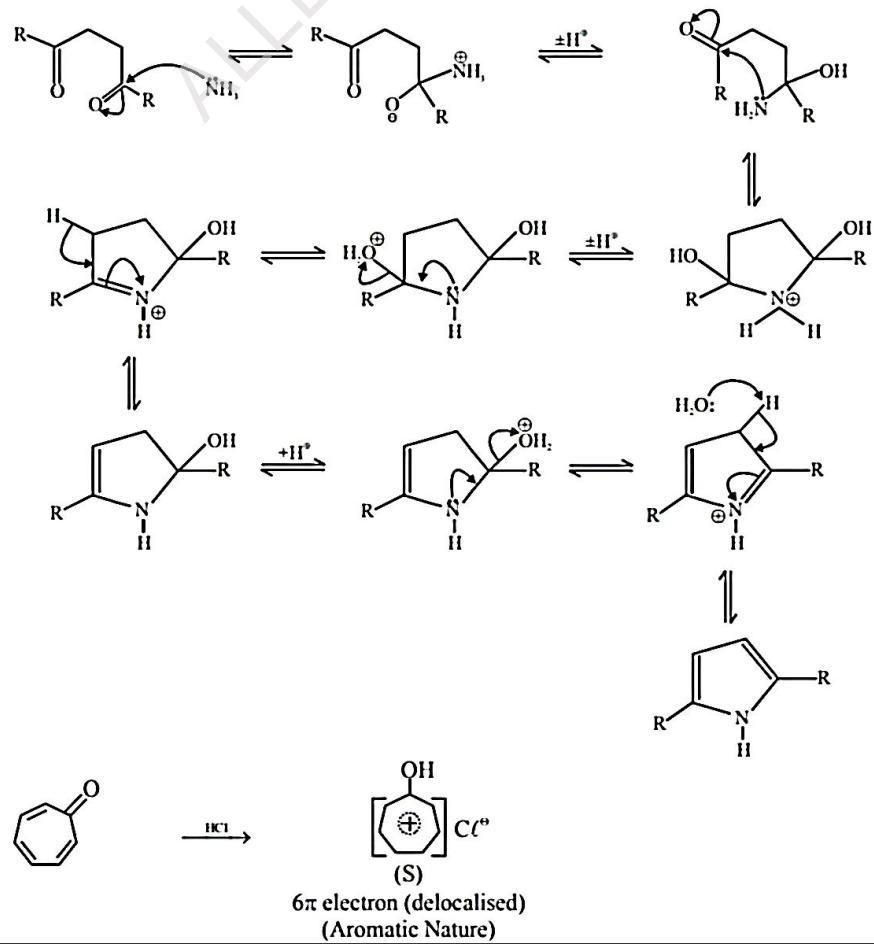
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E

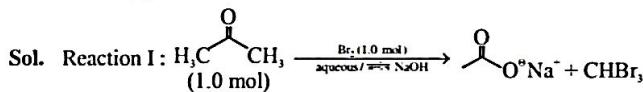
30 JEE-Chemistry

ALLEN

Mechanism :

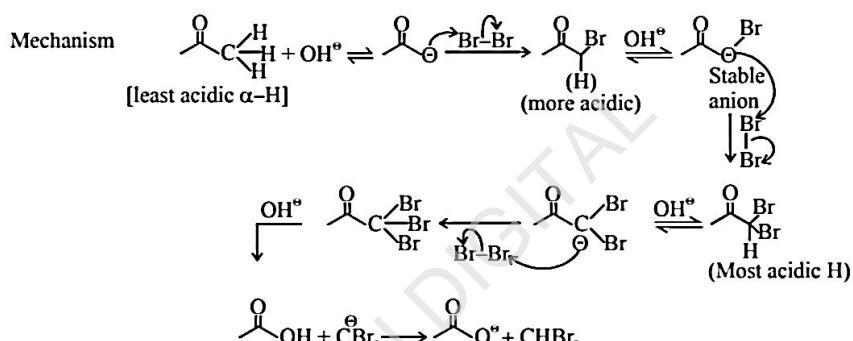


23. Ans. (C)

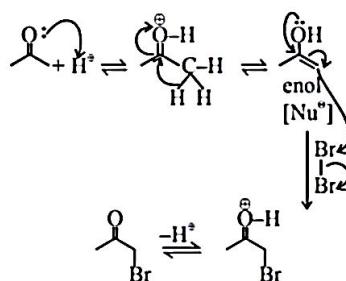
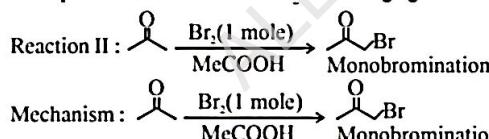


ALLEN

Carbonyl Compound 31

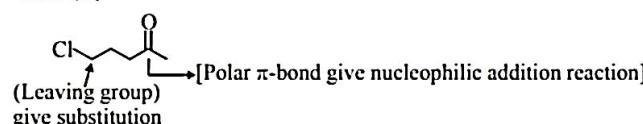


In basic medium halogenation does not stop with replacement of just one hydrogen and poly halogenation takes place because  $\alpha$ -haloketones are more reactive towards base and haloform reaction takes place. In above reaction  $\text{Br}_2$  is limiting agent.

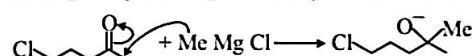


Further bromination is less favourable because of less amount of  $\text{Br}_2$ .

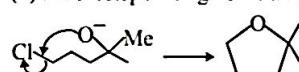
24. Ans. (D)



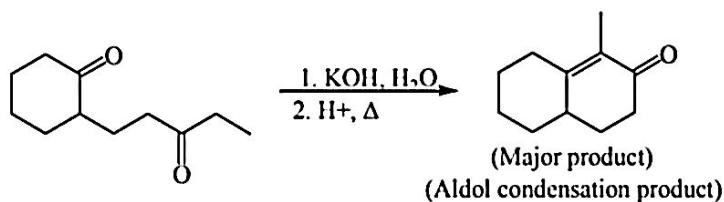
(i) Grignard prefer to give nucleophilic addition on polar  $\pi$ -bond and form anion intermediate.



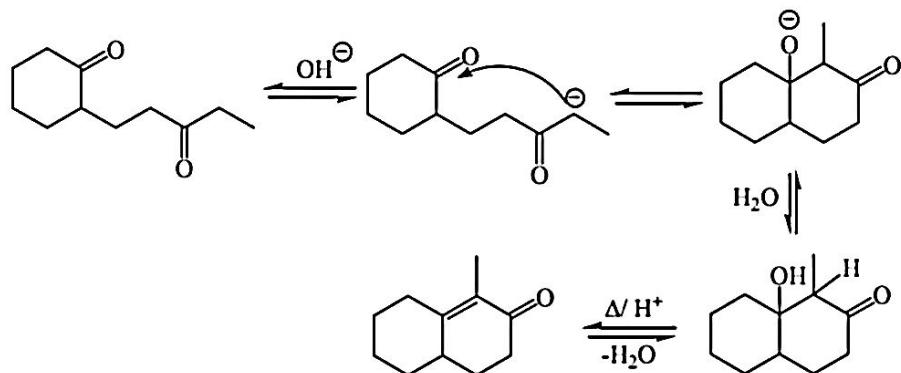
(ii) In next step anion give intramolecular nucleophilic substitution reaction & form 5 membered ring.



25. Ans. (A)

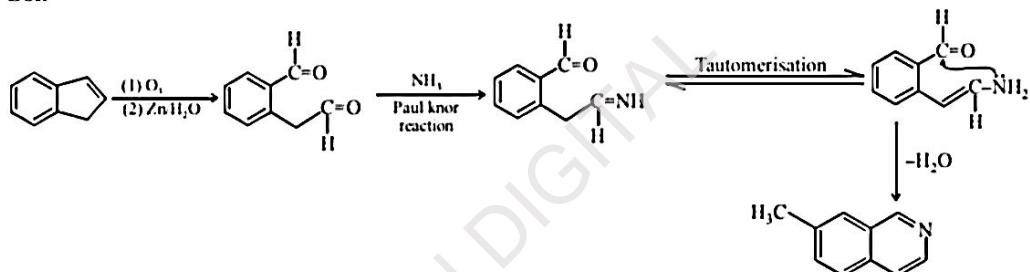


Mechanism :



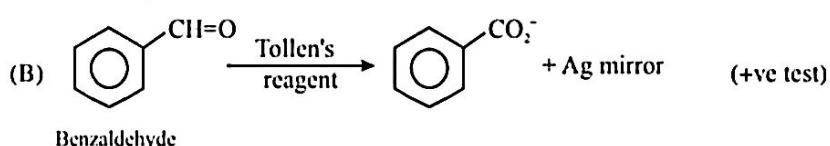
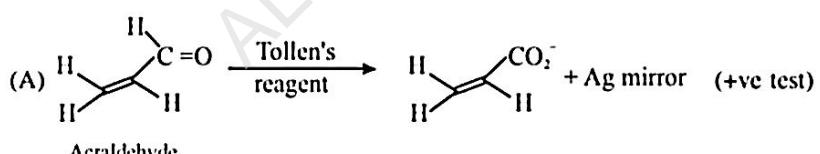
26. Ans.(A)

Sol.



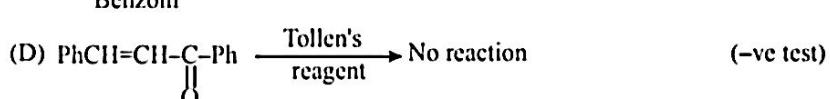
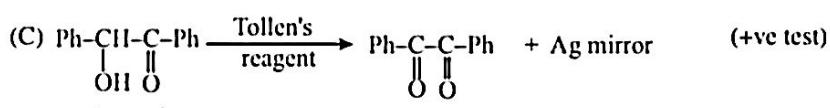
27. Ans. (A,B,C)

Sol. Tollens's test is given by compounds having aldehyde group. Also  $\alpha$ -hydroxy carbonyl gives positive tollen's test.

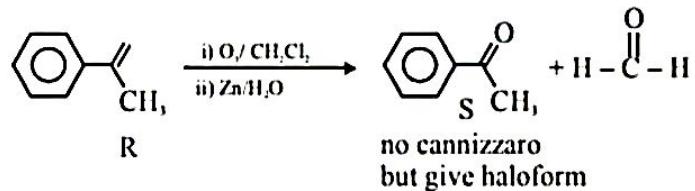
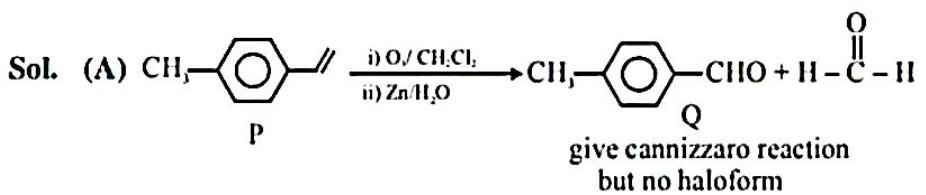


**ALLEN**

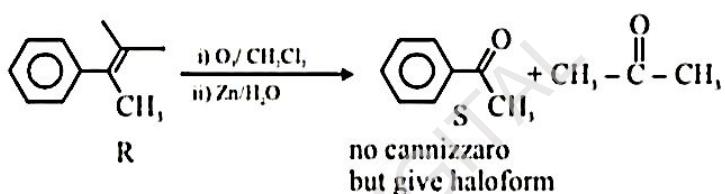
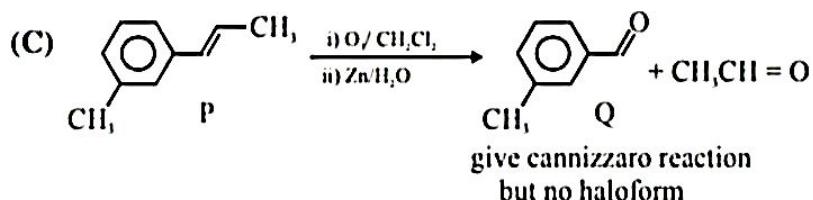
**Carbonyl Compound** 3



29. Ans. (A,C)



(B) Product of ozonolysis of R is having 9 carbon.

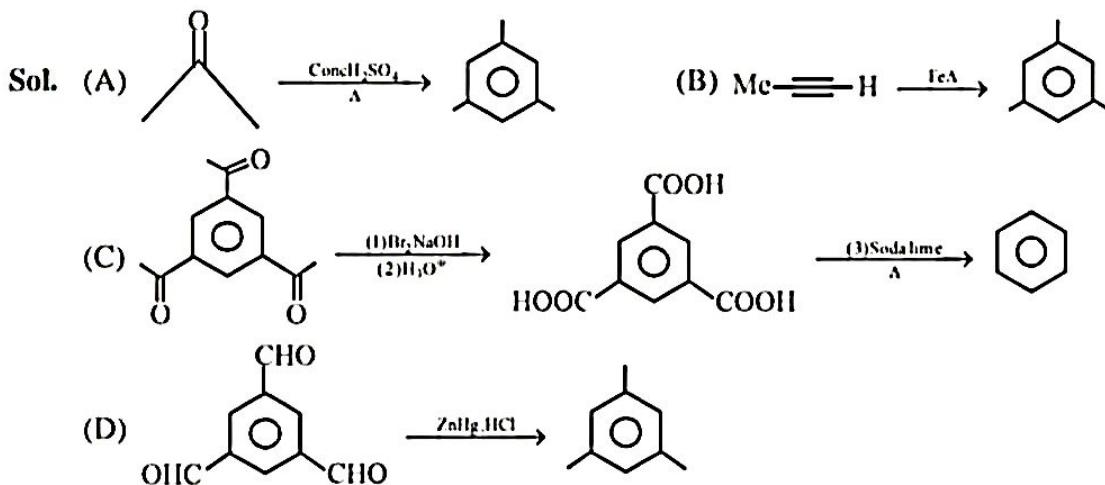


(D) Product of ozonolysis of R is having 9 carbon.

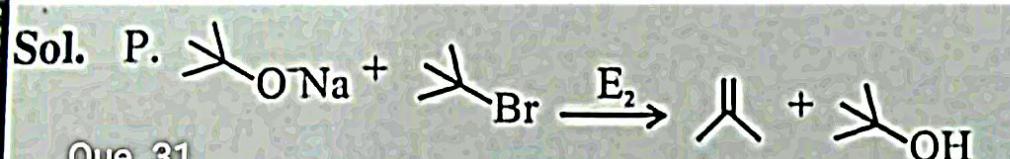
E

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30. Ans. (A,B,D)



Sol. P.

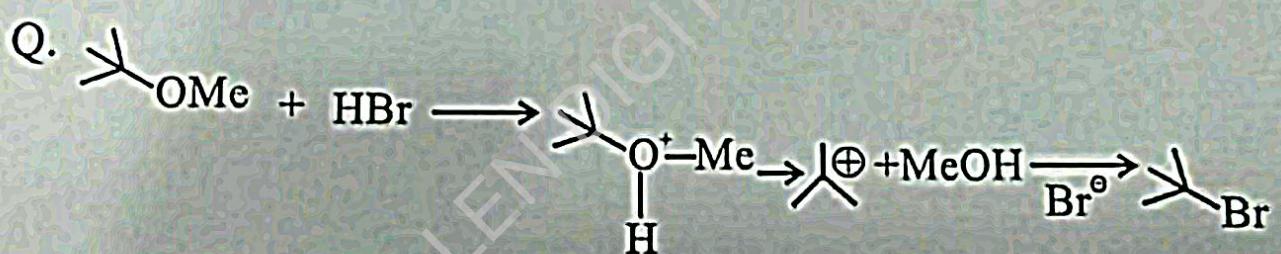


Que. 31

Ans. D

(Elimination product)

Q.



R.



S.

