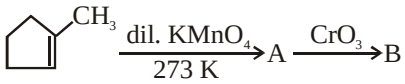
CARBONYL COMPOUNDS

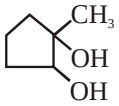
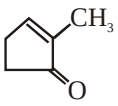
1. Which of the following reagent is used for the following reaction ?

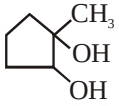
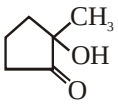
$$CH_3CH_2CH_3 \xrightarrow{?} CH_3CH_2CHO$$

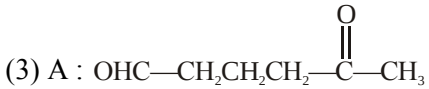
(1) Manganese acetate
(2) Copper at high temperature and pressure
(3) Molybdenum oxide
(4) Potassium permanganate

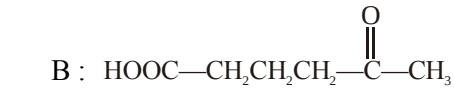
2. Identify products A and B :

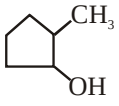
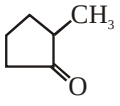


(1) A :  B : 

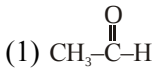
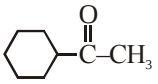
(2) A :  B : 

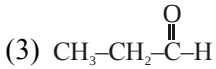
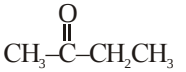
(3) A : 

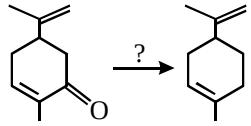
B : 

(4) A :  B: 

3. Which one of the following carbonyl compounds cannot be prepared by addition of water on an alkyne in the presence of $HgSO_4$ and H_2SO_4 ?

(1)  (2) 

(3)  (4) 

4. 

Which of the following reagent is suitable for the preparation of the product in the above reaction ?

(1) $NaBH_4$

(2) $NH_2–NH_2/C_2H_5\overset{\ominus}{O}\overset{\oplus}{Na}$

(3) Ni/H_2

(4) Red P + Cl_2

5. Which one of the following reactions will not form acetaldehyde?

(1) $CH_3CH_2OH \xrightarrow[573K]{Cu}$

(2) $CH_3CN \xrightarrow[(ii)H_2O]{(i)DIBAL-H}$

(3) $CH_2=CH_2 + O_2 \xrightarrow[H_2O]{Pd(II)/Cu(II)}$

(4) $CH_3CH_2OH \xrightarrow{CrO_3-H_2SO_4}$

6. The major product of the following chemical reaction is :

$$CH_3CH_2CN \xrightarrow[(3)\ Pd/BaSO_4,H_2]{\substack{(1)\ H_3O^+,\ \Delta \\ (2)\ SOCl_2}} ?$$

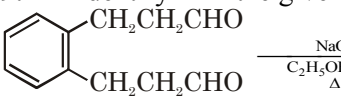
(1) $CH_3CH_2CH_3$ (2) $CH_3CH_2CH_2OH$
(3) $(CH_3CH_2CO)_2O$ (4) CH_3CH_2CHO

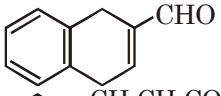
7. $\underset{(C_4H_8Cl_2)}{A} \xrightarrow[373K]{Hydrolysis} \underset{(C_4H_8O)}{B}$

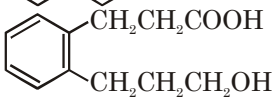
B reacts with Hydroxyl amine but does not give Tollen's test. Identify A and B
(1) 1,1-Dichlorobutane and 2-Butanone
(2) 2,2-Dichlorobutane and Butanal
(3) 1,1-Dichlorobutane and Butanal
(4) 2,2-Dichlorobutane and Butan-2-one

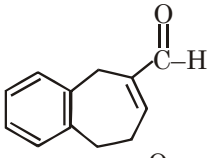
8. 2,4-DNP test can be used to identify :
(1) Amine (2) Aldehyde
(3) Ether (4) Halogens

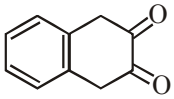
9. Identify A in the given chemical reaction,



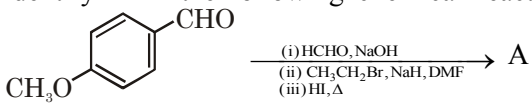
(1) 

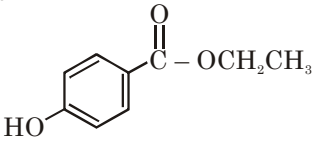
(2) 

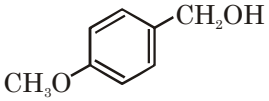
(3) 

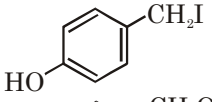
(4) 

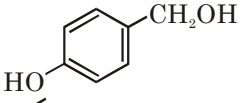
10. Identify A in the following chemical reaction

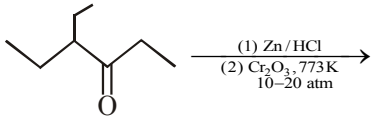


(1) 

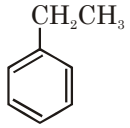
(2) 

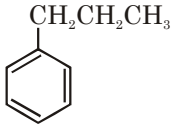
(3) 

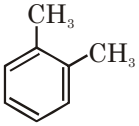
(4) 

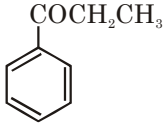
11. 

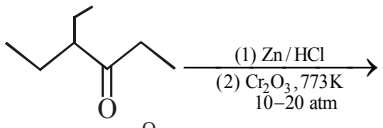
considering the above reaction, the major product among the following is :

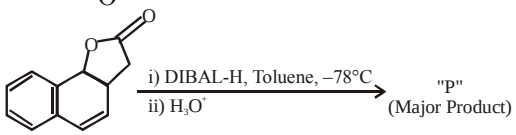
(1) 

(2) 

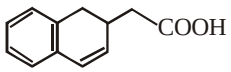
(3) 

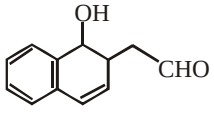
(4) 

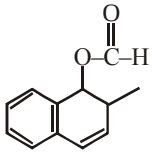


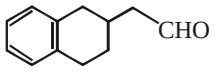
12. 

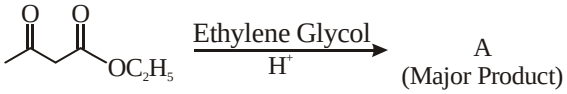
The product "P" in the above reaction is :

(1) 

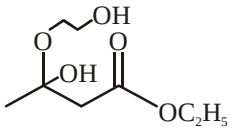
(2) 

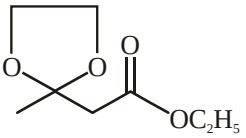
(3) 

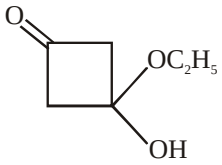
(4) 

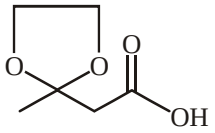
13. 

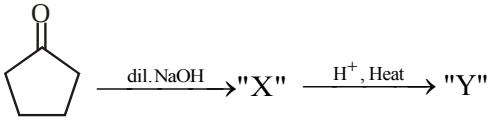
The product "A" in the above reaction is:

(1) 

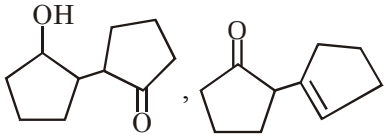
(2) 

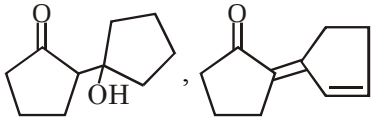
(3) 

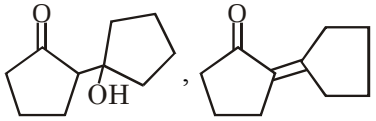
(4) 

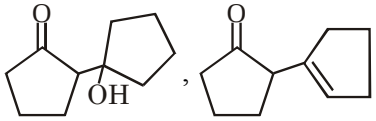
14. 

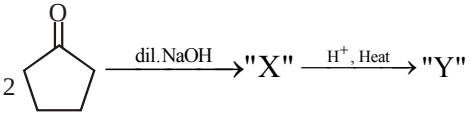
Consider the above reaction, the product 'X' and 'Y' respectively are :

(1) 

(2) 

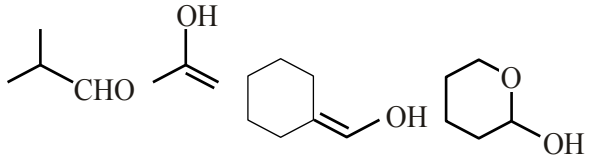
(3) 

(4) 



15. In Tollen's test for aldehyde, the overall number of electron(s) transferred to the Tollen's reagent formula $[Ag(NH_3)_2]^+$ per aldehyde group to form silver mirror is_____.(Round off to the Nearest integer)

16.

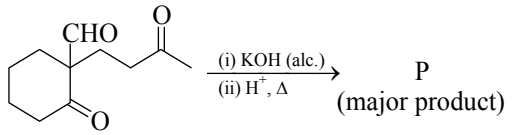


(I) (II) (III) (IV)

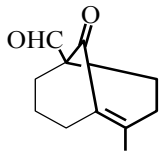
Which among the above compound/s does/do not form Silver mirror when treated with Tollen's reagent?

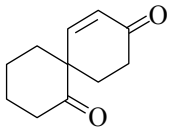
(1) (I), (III) and (IV) only
(2) Only (IV)
(3) Only (II)
(4) (III) and (IV) only

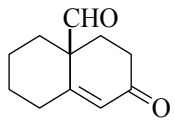
17. The major product (P) in the following reaction is :

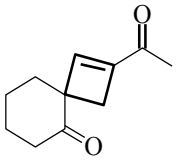


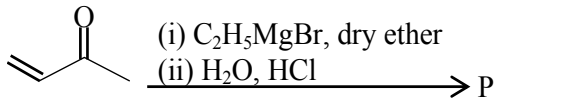
(major product)

(1) 

(2) 

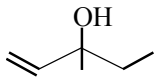
(3) 

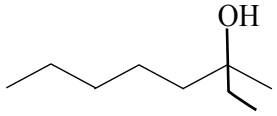
(4) 

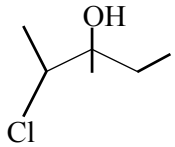
18. 

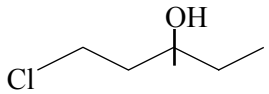
(Major product)

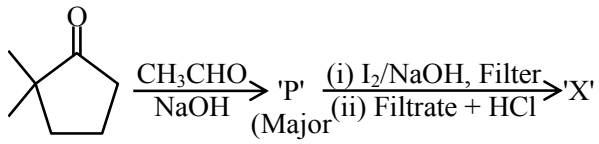
Consider the above reaction, the major product 'P' is:

(1) 

(2) 

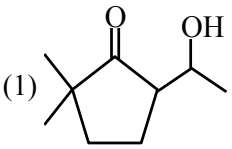
(3) 

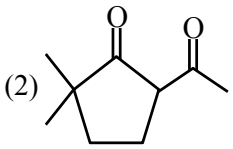
(4) 

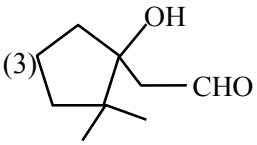
19. 

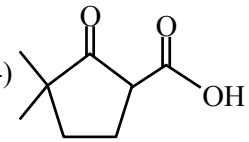
(Major product)

Consider the given reaction, the product 'X' is:

(1) 

(2) 

(3) 

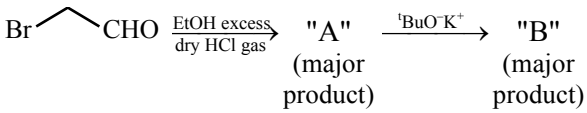
(4) 

20. An organic compound 'A' C_4H_8 on treatment with $KMnO_4/H^+$ yields compound 'B' C_3H_6O. Compound 'A' also yields compound 'B' an ozonolysis. Compound 'A' is :

(1) 2–Methylpropene
(2) 1–Methylcyclopropane
(3) But–2–ene
(4) Cyclobutane

21. A reaction of benzonitrile with one equivalent CH_3MgBr followed by hydrolysis produces a yellow liquid "P". The compound "P" will give positive_____.

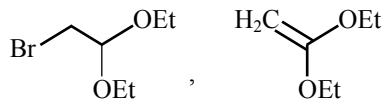
(1) Iodoform test (2) Schiff's test

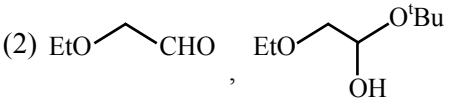
22. 

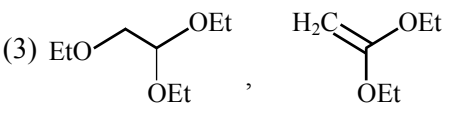
(major product) (major product)

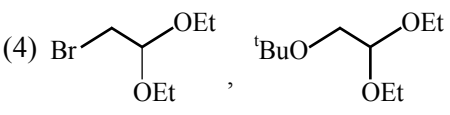
[where Et ⇒ $-C_2H_5$ ^tBu ⇒ $(CH_3)_3C-$]

Consider the above reaction sequence, Product "A" and Product "B" formed respectively are :

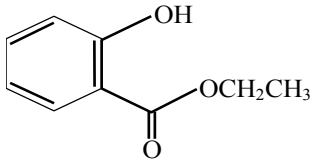
(1) 

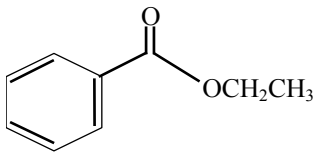
(2) 

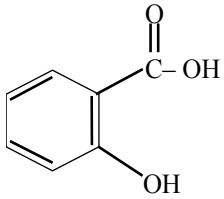
(3) 

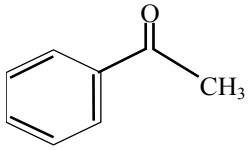
(4) 

23. Which one of the following compounds will give orange precipitate when treated with 2,4-dinitrophenyl hydrazine ?

(1) 

(2) 

(3) 

(4) 

24. $R-CN \xrightarrow[(ii)\ H_2O]{(i)\ DIBAL-H} R-Y$

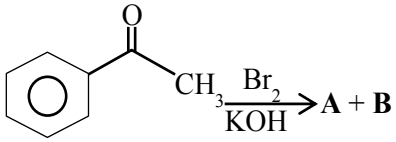
Consider the above reaction and identify "Y"

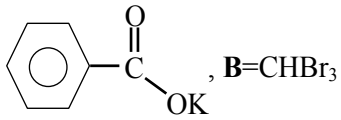
(1) $-CH_2NH_2$ (2) $-CONH_2$

(3) –CHO (4) –COOH

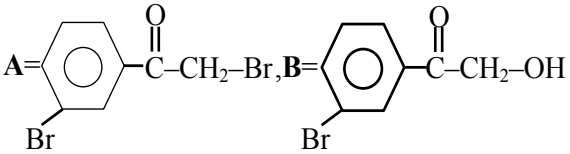
$R-CN \xrightarrow[(ii)\ H_2O]{(i)\ DIBAL-H} R-Y$

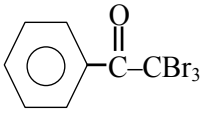
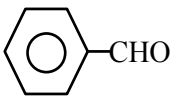
25. The major products formed in the following reaction sequence **A** and **B** are :

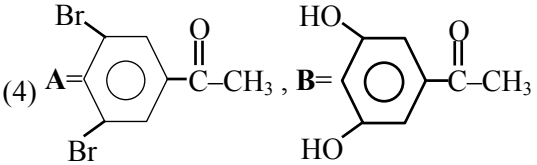


(1) **A** =  , **B**=$CHBr_3$

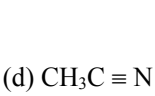
(2)



(3) **A**=  , **B**= 

(4) 

26. Match **List-I** with **List-II** :

List-I (Chemical Reaction)	**List-II (Reagent used)**
(a) $CH_3COOCH_2CH_3 \rightarrow CH_3CH_2OH$	(i) CH_3MgBr / H_3O^+ (1.equivalent)
(b) $CH_3COOCH_3 \rightarrow CH_3CHO$	(ii) H_2SO_4 / H_2O
(c) $CH_3C \equiv N \rightarrow CH_3CHO$	(iii) DIBAL-H/H_2O
(d) $CH_3C \equiv N \rightarrow$ 	(iv) $SnCl_2$, HCl/H_2O

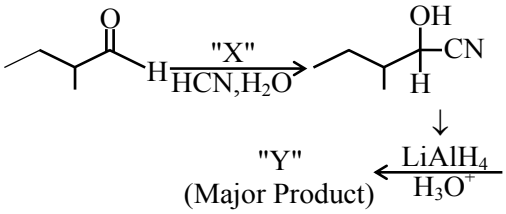
Choose the most appropriate match :

(1) a-ii, b-iv, c-iii, d-i

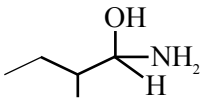
(2) a-iv, b-ii, c-iii, d-i

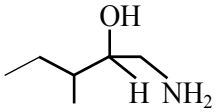
(3) a-ii, b-iii, c-iv, d-i

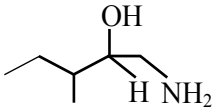
(4) a-iii, b-ii, c-i, d-iv

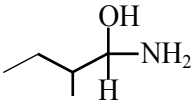
27. 

Consider the given reaction, Identify **'X'** and **'Y'** :

(1) X – NaOH Y – 

(2) X – HNO_3 Y – 

(3) X – NaOH Y – 

(4) X – HNO_3 Y – 

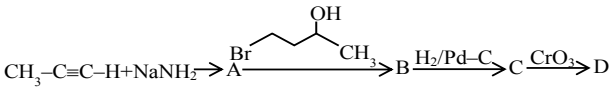
28. A chloro compound "A".

(i) forms aldehydes on ozonolysis followed by the hydrolysis.

(ii) when vaporized completely 1.53 g of A, gives 448 mL of vapour at STP.

The number of carbon atoms in a molecule of compound **A** is _____.

29. In the following sequence of reactions, the final product D is :



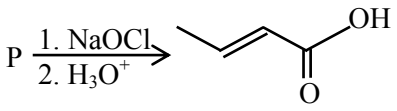
(1) $H_3C–CH_2–CH_2–CH_2–CH_2–\overset{\overset{O}{\|}}{C}–H$

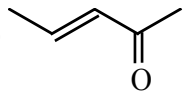
(2) $CH_3–CH=CH–CH_2–CH_2–CH_2–COOH$

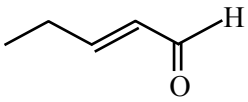
(3) $H_3C–CH=CH–CH(OH)–CH_2–CH_2–CH_3$

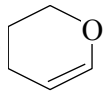
(4) $CH_3–CH_2–CH_2–CH_2–CH_2–\overset{\overset{O}{\|}}{C}–CH_3$

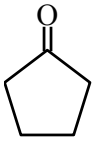
30. The structure of the starting compound **P** used in the reaction given below is :



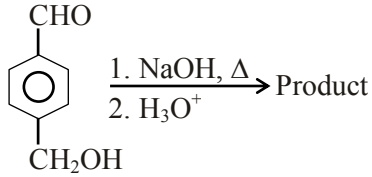
(1) 

(2) 

(3) 

(4) 

31. For the reaction given below :



The compound which is **not** formed as a product in the reaction is a :

(1) compound with both alcohol and acid functional groups

(2) monocarboxylic acid

(3) dicarboxylic acid

(4) diol

32. In the following sequence of reactions,

$C_3H_6 \xrightarrow{H^+/H_2O} \mathbf{A} \xrightarrow[\text{dil KOH}]{\text{KIO}} \mathbf{B} + \mathbf{C}$

The compounds **B** and **C** respectively are :

(1) CI_3COOK, HCOOH (2) CI_3COOK, CH_3I

(3) CH_3I, HCOOK (4) CHI_3, CH_3COOK

33. Given below are **two** statements :

Statement I : The nucleophilic addition of sodium hydrogen sulphite to an aldehyde or a ketone involves proton transfer to form a stable ion.

Statement II : The nucleophilic addition of hydrogen cyanide to an aldehyde or a ketone yields amine as final product.

In the light of the above statements, choose the **most appropriate** answer from the options given below :

(1) Both **Statement I** and **Statement II** are true.

(2) **Statement I** is true but **Statement II** is false.

(3) **Statement I** is false but **Statement II** is true.

(4) Both **Statement I** and **Statement II** are false.

SOLUTION

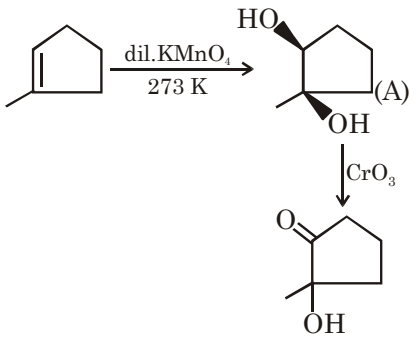
1. Official Ans. by NTA (3)

Sol. $CH_3–CH_2–CH_3 \xrightarrow{MO_2O_3} CH_3–CH_2–CH=O$

The reagent used will be MO_2O_3

2. Official Ans. by NTA (2)

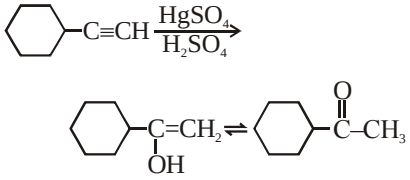
Sol.



3. Official Ans. by NTA (3)

Sol. Reaction of $HgSO_4$/dil.H_2SO_4 with alkyne gives addition of water as per markonikoff's rule.

(1) $HC\equiv CH \xrightarrow[H_2SO_4]{HgSO_4} CH_2=\underset{OH}{CH} \rightleftharpoons CH_3-\overset{O}{\overset{\|}{C}}-H$

(2) 

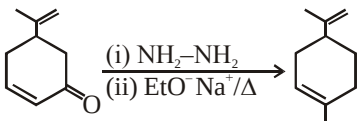
(3) $CH_3–C\equiv CH \xrightarrow[H_2SO_4]{HgSO_4} CH_3-\underset{OH}{C}=CH_2 \rightleftharpoons CH_3-\overset{O}{\overset{\|}{C}}-CH_3$

Hence $CH_3–CH_2–CHO$ cannot be form.

(4) $CH_3–C\equiv C–CH_3 \xrightarrow[H_2SO_4]{HgSO_4} CH_3-\underset{OH}{C}=CH-CH_3 \rightleftharpoons CH_3-\underset{O}{\overset{\|}{C}}-CH_2-CH_3$

4. Official Ans. by NTA (2)

Sol.



To reduce the carbonyl groups into alkane wolf – kischner reduction is used, without affecting the double bond.

5. Official Ans. by NTA (4)

Sol. $CH_3–CH_2–OH \xrightarrow[\text{Strong oxidising agent}]{CrO_3\cdot H_2SO_4} CH_3-\overset{O}{\overset{\|}{C}}-OH$ (Carboxylic acid is formed by complete oxidation)

6. Official Ans. by NTA (4)

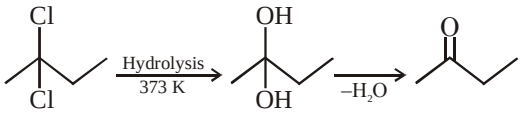
Sol. $Et\text{-}C\equiv N \xrightarrow{(i)\ H_3O^+/\Delta} Et-\overset{O}{\overset{\|}{C}}-OH \xrightarrow{(2)\ SOCl_2} Et-\overset{O}{\overset{\|}{C}}-Cl$

$Et-\overset{O}{\overset{\|}{C}}-H \xleftarrow[\text{Resonmund's reduction}]{(3)\ Pd/BaSO_4,\ H_2} Et-\overset{O}{\overset{\|}{C}}-Cl$

Final product of reaction is propanaldehyde.

7. Official Ans. by NTA (4)

Sol.



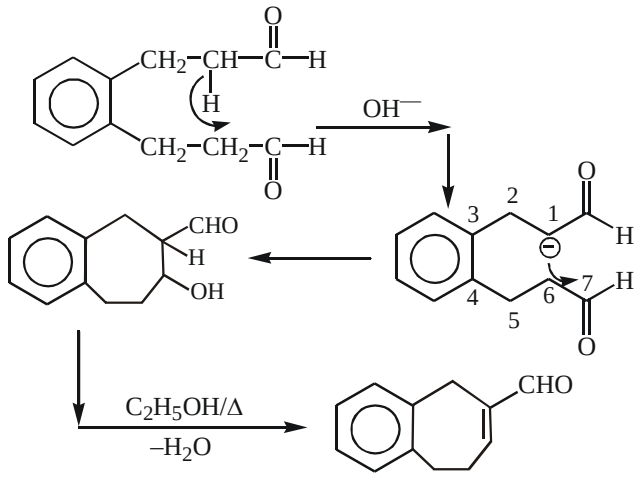
$(C_4H_8Cl_2)$ (A) (C_4H_8O) (B)

8. Official Ans. by NTA (2)

Sol. 2,4-DNP test is useful for the identification of carbonyl compounds.

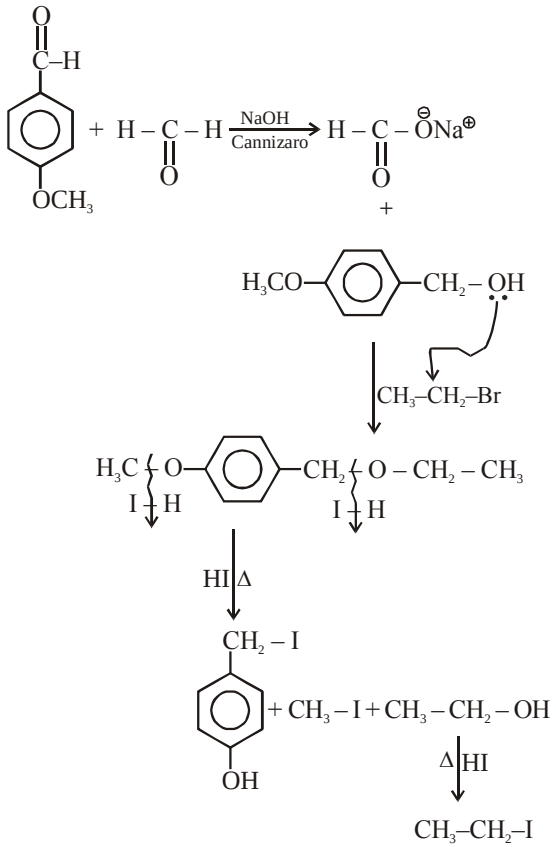
9. Official Ans. by NTA (3)

Sol.



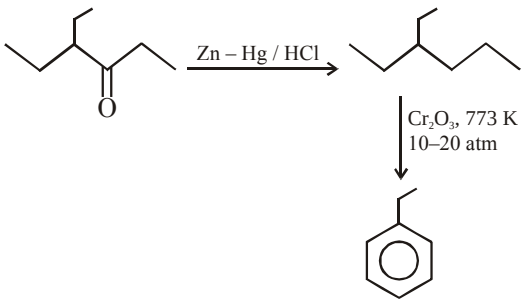
10. Official Ans. by NTA (3)

Sol.



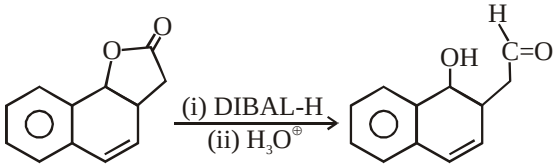
11. Official Ans. by NTA (1)

Sol.



12. Official Ans. by NTA (2)

Sol.

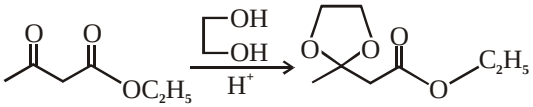


DIBAL can not reduce double bond

It can reduce cyclic ester.

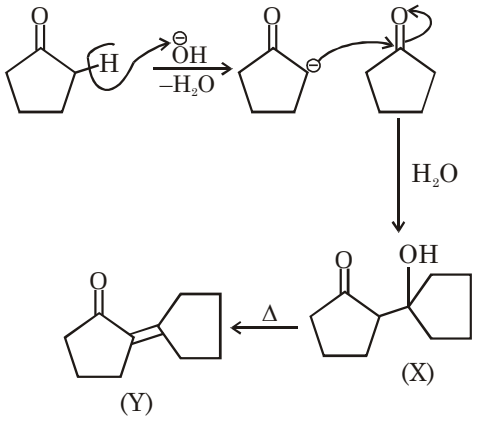
13. Official Ans. by NTA (2)

Sol.



14. Official Ans. by NTA (3)

Sol.

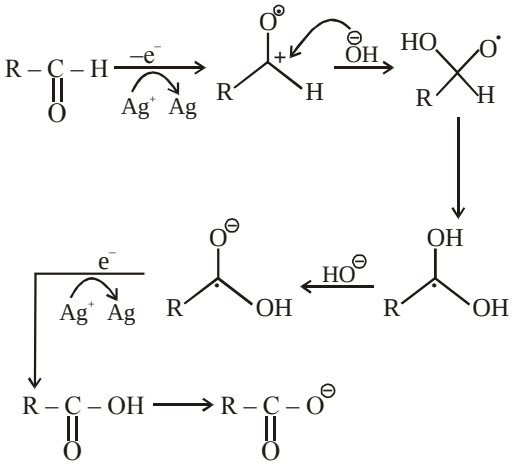


15. Official Ans. by NTA (2)

Sol. $AgNO_3 + NaOH \rightarrow AgOH + NaNO_3$

$2AgOH \rightarrow Ag_2O + H_2O$

$Ag_2O + 4NH_3 + H_2O \rightarrow 2Ag(NH_3)_2^{+} + 2\overset{\ominus}{O}H$

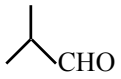


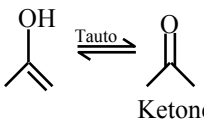
Total $2e^-$ transfer to Tollen's reagent

16. Official Ans. by NTA (3)

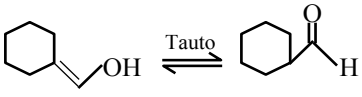
Sol. Aldehydes give ⊕ve Tollen's Test (Silver mirror test)

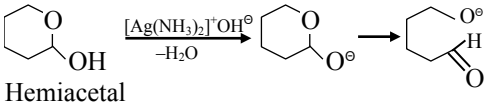
Tollen's test

(I)  Positive

(II)  Negative

Ketone

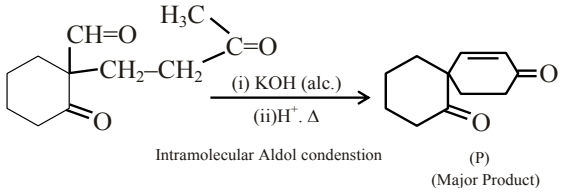
(III)  Positive

(IV)  Positive

Hemiacetal

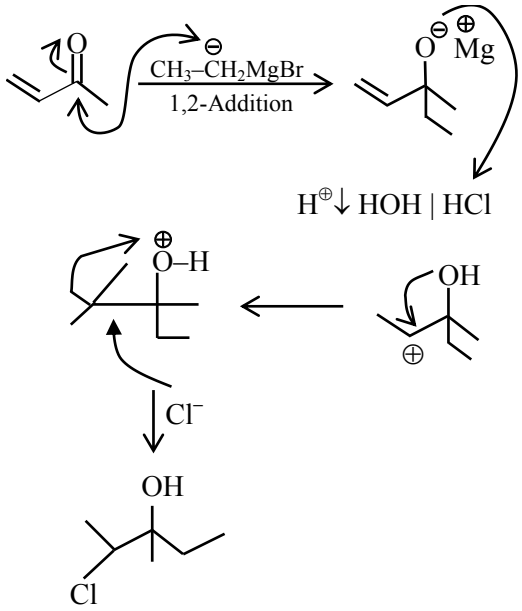
17. Official Ans. by NTA (2)

Sol.



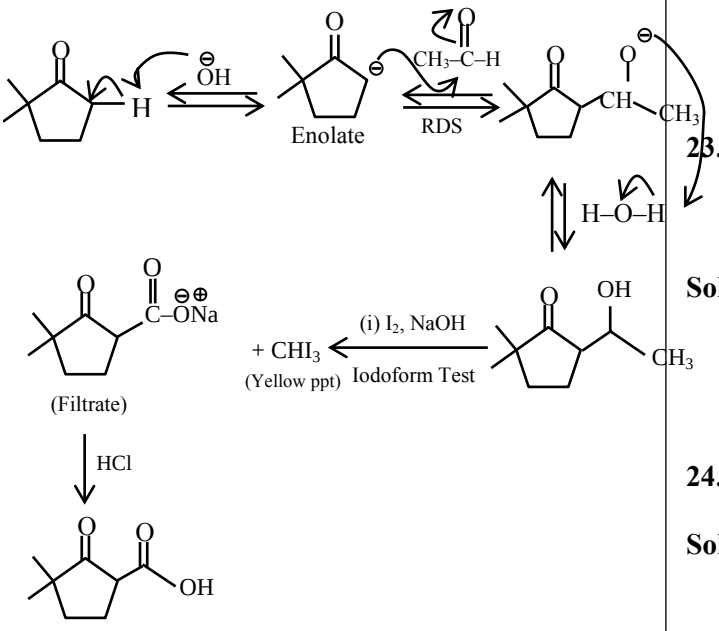
18 Official Ans. by NTA (3)

Sol.



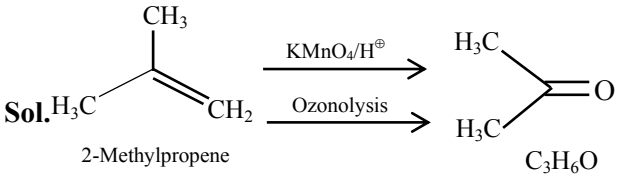
19. Official Ans. by NTA (4)

Sol.



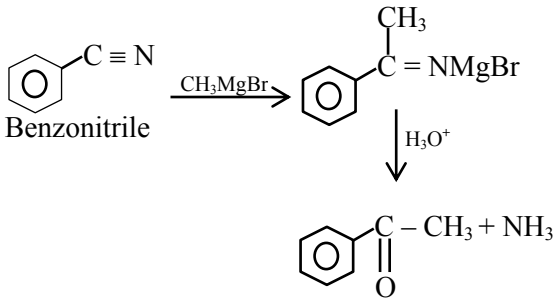
20. Official Ans. by NTA (1)

Sol.



21. Official Ans. by NTA (1)

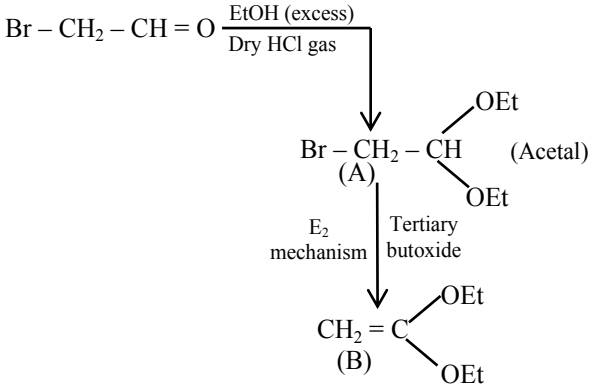
Sol.



It gives positive Iodoform test

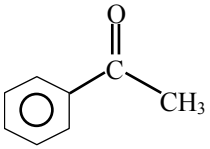
22. Official Ans. by NTA (1)

Sol.



23. Official Ans. by NTA (4)

Sol.



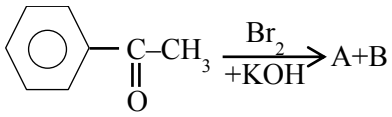
Explanation ⇒ 2-4-D.N.P test is used for carbonyl compound (aldehyde & ketone)

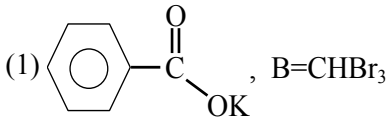
24. Official Ans. by NTA (3)

Sol. $R-C\equiv N \xrightarrow[(2)\ H_2O]{(1)\ DiBAL-H} R-\underset{\underset{O}{\|}}{C}-H$

Here Y is $-\underset{\underset{O}{\|}}{C}-H$ Aldehyde

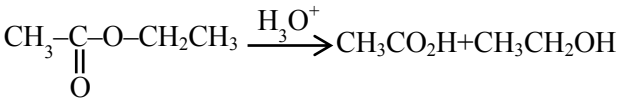
25. Official Ans. by NTA (1)

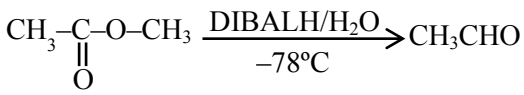
Sol. 

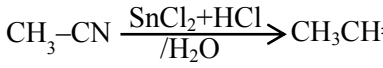


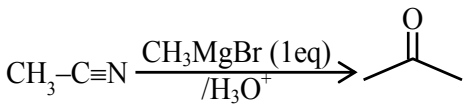
26. Official Ans. by NTA (3)

Sol.



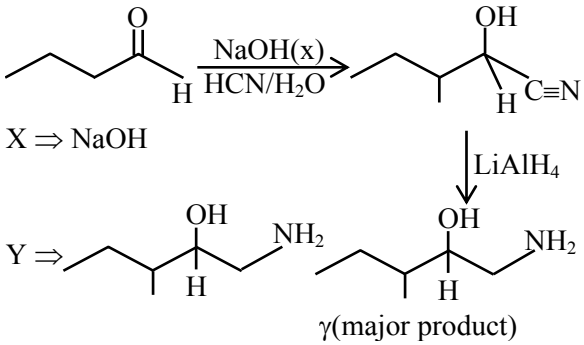






27. Official Ans. by NTA (3)

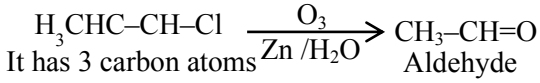
Sol.



28. Official Ans. by NTA (3)

Sol. 448 ml of A $\Rightarrow$ 1.53 gm A

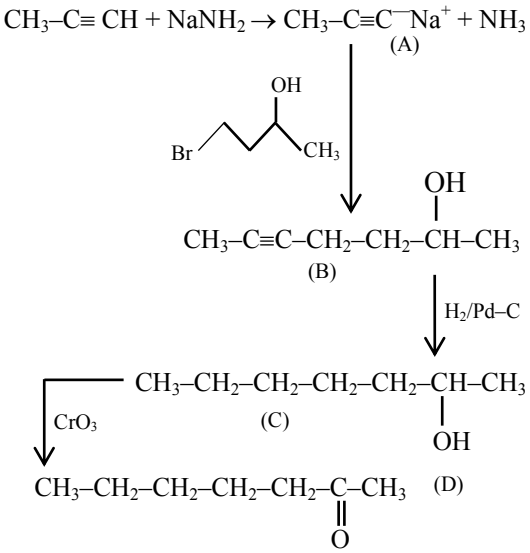
22400 ml of A $\Rightarrow \frac{1.53}{445} \times 22400$ gm A = 7650



It has 3 carbon atoms

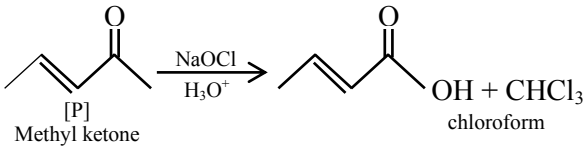
& mm is 36 + 5 + 35.5 = 76.5

29. Official Ans. by NTA (4)

Sol. 

30. Official Ans. by NTA (1)

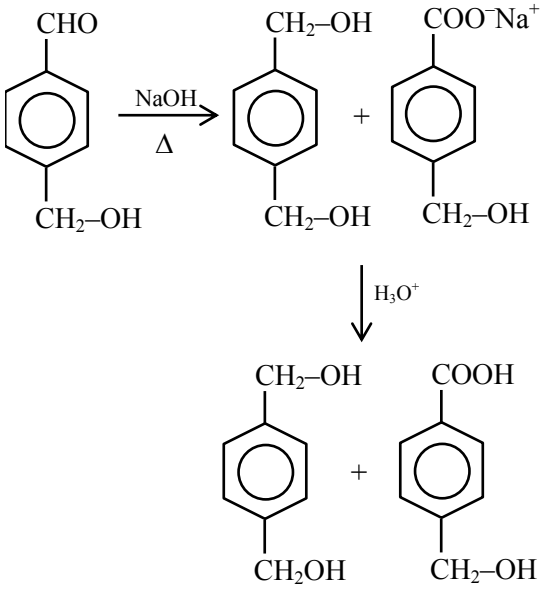
Sol.



NaOCl is used in haloform reaction as reagent.

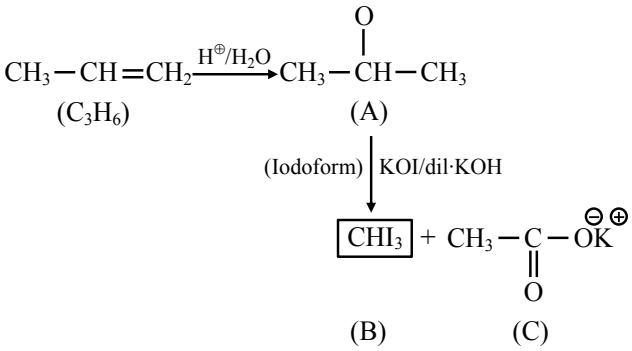
31. Official Ans. by NTA (3)

Sol.



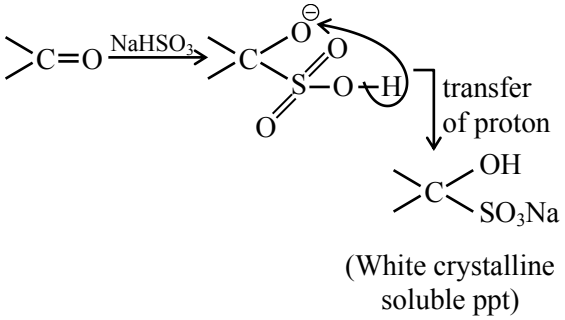
32. Official Ans. by NTA (4)

Sol.



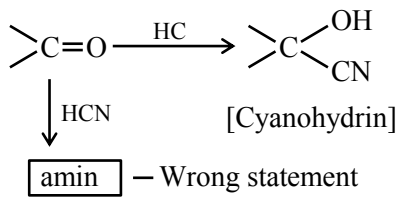
33. Official Ans. by NTA (2)

Sol. **Statement I :** Correct



(White crystalline soluble ppt)

Statement II :



amin – Wrong statement

(Amine not formed)