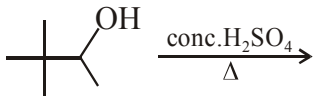
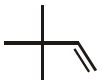
ALCOHOL AND ETHER

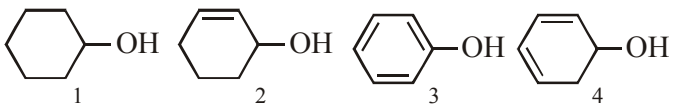
EXERCISE # O-1

1.  Major product :

(A)  (B)  (C)  (D) None of these

AE0001

2. Correct order of dehydration of following alcohols will be :

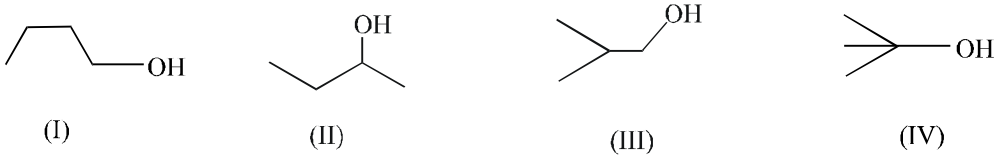


(A) 1 < 2 < 3 < 4 (B) 4 > 3 > 1 > 2

(C) 4 > 2 > 1 > 3 (D) 1 > 3 > 4 > 2

AE0002

3. Dehydration of the isomeric alcohols

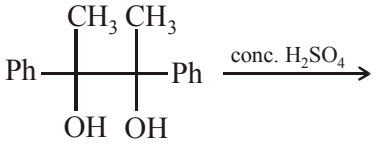


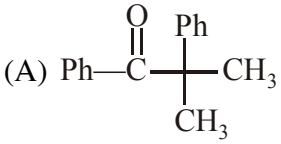
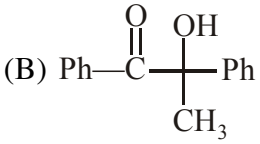
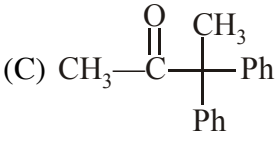
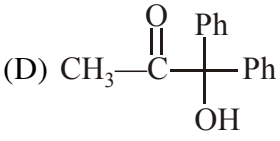
What will be the order of rate of reaction ?

(A) IV > III > II > I (B) I > II > III > IV (C) IV > II > III > I (D) II > IV > I > III

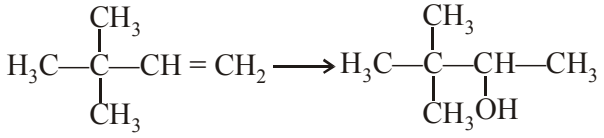
AE0003

4. Find out major product of following reaction.



(A)  (B)  (C)  (D) 

AE0004

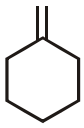
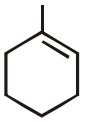
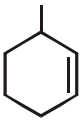
5.  , This interconversion can be achieved by :

(A) Acid catalysed hydration (B) Oxymercuration-demercuration

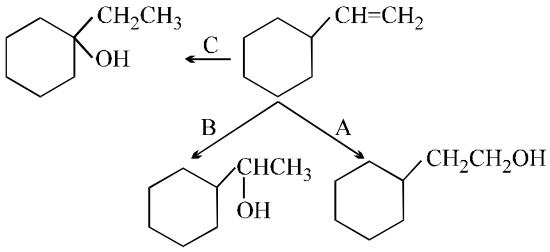
(C) Hydroboration - oxidation (D) Any method mentioned above

AE0005

6. A $\xrightarrow[\text{(ii) } NaBH_4\text{, } \bar{O}H]{\text{(i) } Hg(OAc)_2\text{, HOH}}$ 1–Methylcyclohexanol. Here A is :

(A)  (B)  (C)  (D) (A) or (B)

AE0006

7. 

Select schemes A, B, C out of

(I) Acid catalysed hydration

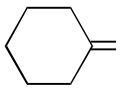
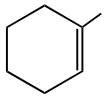
(II) HBO

(III) Oxymercuration-demercuration

(A) I in all cases (B) I, II, III (C) II, III, I (D) III, I, II

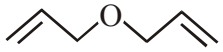
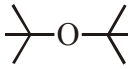
AE0007

8. HBO, oxymercuration-demercuration and acid catalysed hydration will give same product in

(A)  (B)  (C)  (D) 

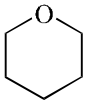
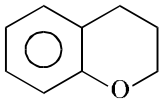
AE0008

9. Which of the following ethers is least reactive to cleavage with conc. HBr ?

(A) Ph—CH_2—O—CH_3 (B) Ph—O—Ph (C)  (D) 

AE0009

10. Consider the reaction of HI with the following:

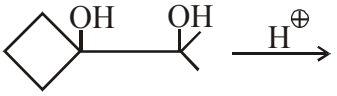
I.  II. 

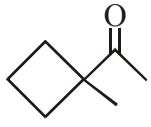
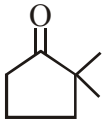
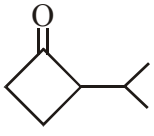
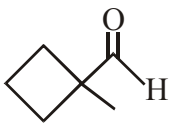
Which forms di-iodide on reaction with HI (excess)?

(A) I and II both (B) II only (C) I only (D) none

AE0010

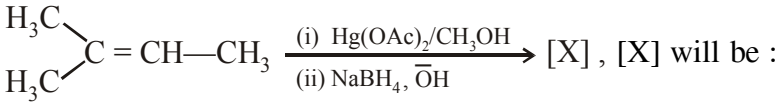
11. Find out major product of following reaction.



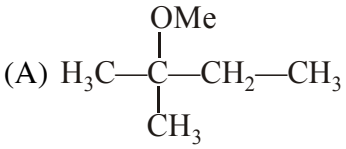
(A)  (B)  (C)  (D) 

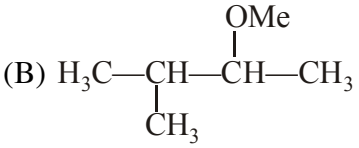
AE0011

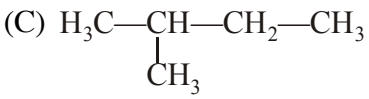
12. In the given reaction

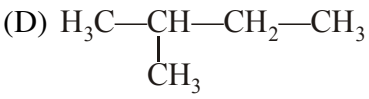


[X] , [X] will be :

(A) 

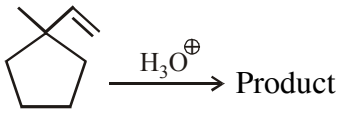
(B) 

(C) 

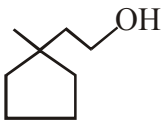
(D) 

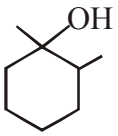
AE0012

13. In the following reaction

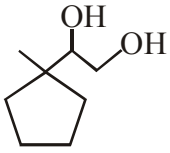


The major product is :

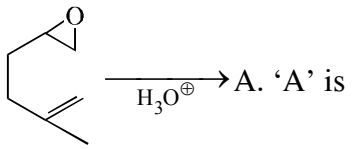
(A) 

(B) 

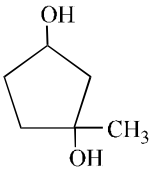
(C) 

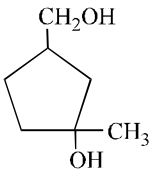
(D) 

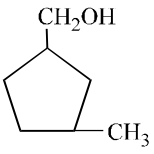
AE0013

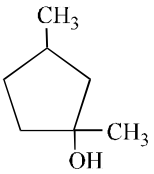
14. 

A. 'A' is

(A) 

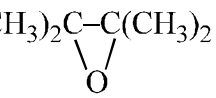
(B) 

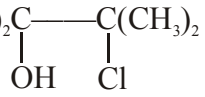
(C) 

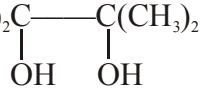
(D) 

AE0014

15. $(CH_3)_2C = C(CH_3)_2 \xrightarrow[H_2O]{X_2} A \xrightarrow[\text{limited amount}]{OH^-} B$, Product 'B' is :

(A) 

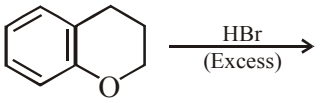
(B) 

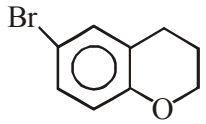
(C) 

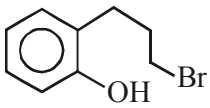
(D) None

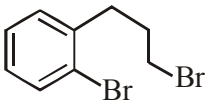
AE0015

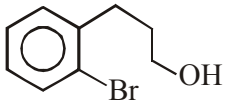
16. Find out correct product of reaction :



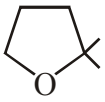
(A) 

(B) 

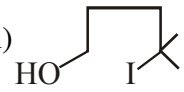
(C) 

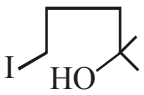
(D) 

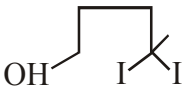
AE0016

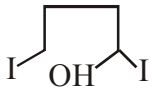
17. 

$+ \underset{(1\ eq.)}{HI} \longrightarrow$ Product, Product is :

(A) 

(B) 

(C) 

(D) 

AE0017

18. $Z \xrightarrow{PCl_5} X \xrightarrow[\Delta]{Alc.KOH} Y \xrightarrow{dil.\ H_2SO_4} Z$; Z is :

(A) $CH_3–CH_2–CH_2–OH$ (B) $H_3C-\underset{\underset{OH}{|}}{CH}-CH_3$ (C) $\begin{matrix} CH_3 \\ \diagdown \\ CH-CH_2-OH \\ \diagup \\ CH_3 \end{matrix}$ (D) $CH_3-CH=CH_2$

AE0018

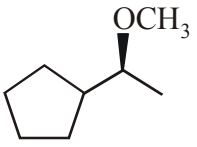
19. When 2-chloroethanol is warmed slightly with dilute NaOH, the major product formed is :

(A) $CH_3–CH_2–CH_2–O–CH_2–CH_2–Cl$ (B) $HO–CH_2–CH_2–CH_2–CH_2–OH$

(C) $HO–CH_2–CH_2–OH$ (D) 

AE0019

20. How many total alcohols are form by acidic hydrolysis of following ether.



(A) 5 (B) 6 (C) 7 (D) 8

AE0020

21. Which of the following test can be used to differentiate methyl alcohol and iso-propyl alcohol.

(A) Litmus paper test (B) Bromine water test

(C) Lucas test (D) All of these

AE0021

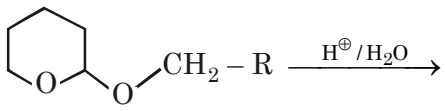
22. On reaction of ether with BF_3, ether acts as :

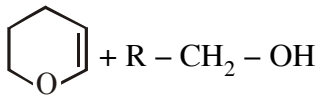
(A) Electrophile (B) Nucleeophile

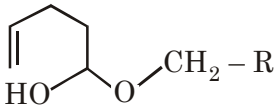
(C) Ambiphile (D) None

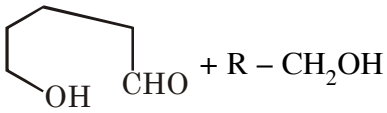
AE0022

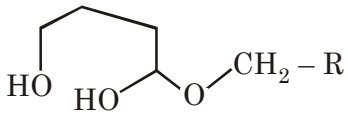
23. Give suitable major product for following reaction



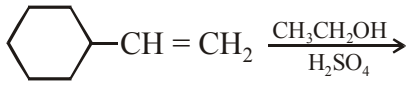
(A) 

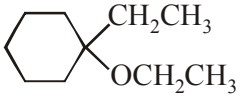
(B) 

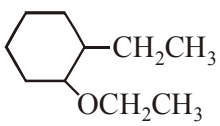
(C) 

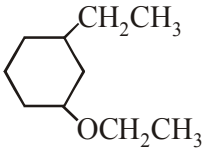
(D) 

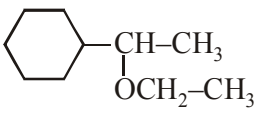
AE0023

24. 

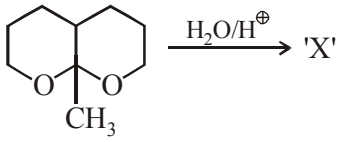
(A) 

(B) 

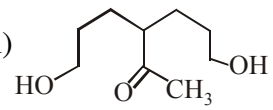
(C) 

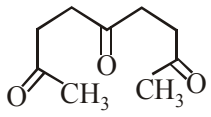
(D) 

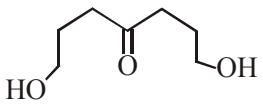
AE0024

25. 

Product 'X' will be :

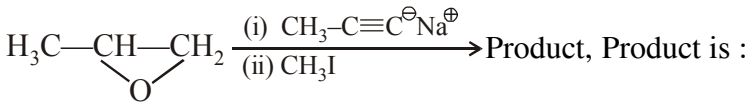
(A) 

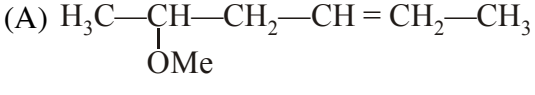
(B) 

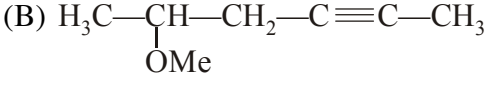
(C) 

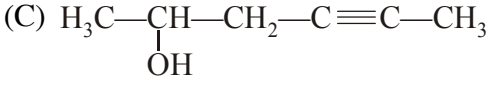
(D) All of these

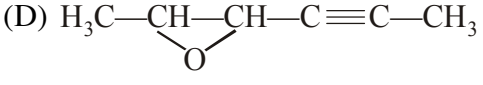
AE0025

26. 

(A) 

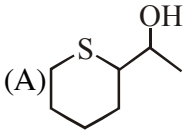
(B) 

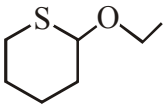
(C) 

(D) 

AE0026

27. The product of the reaction is :

(A) 

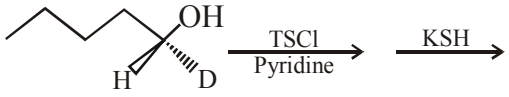
(B) 

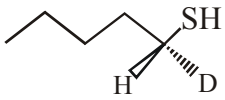
(C) HS–$(CH_2)_5$)–O–Et

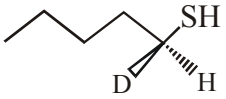
(D) HS–$(CH_2)_4$–CH(OH)–CH(OH)

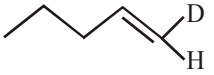
AE0027

28. Identify the major product of reaction :



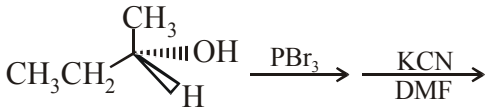
(A) 

(B) 

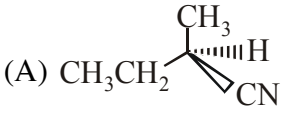
(C) 

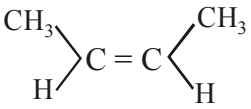
(D) No reaction

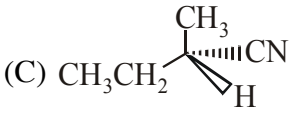
AE0028

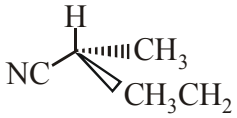
29. 

Final product is ?

(A) 

(B) 

(C) 

(D) 

AE0029

30. Diethyl ether on prolong exposure to air gives :

(A) Ethanol

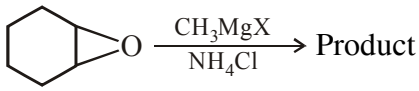
(B) Diethyl peroxide

(C) Diethyl hydroxy peroxide

(D) Ethanoic acid

AE0030

EXERCISE # O-2

1. 

What is the product ?

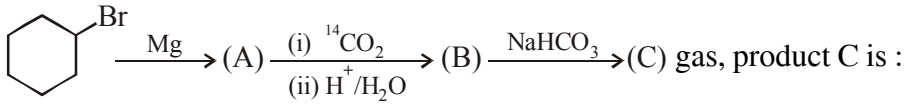
(A) Enantiomer (B) Diastereisomer (C) Meso (D) Achiral

AE0031

2. $RMgX \xrightarrow[(ii)\ HOH / H^+]{(i)\ CH_3CN} (A) \xrightarrow[NH_4Cl]{RMgX} (B)$, (B) will be :

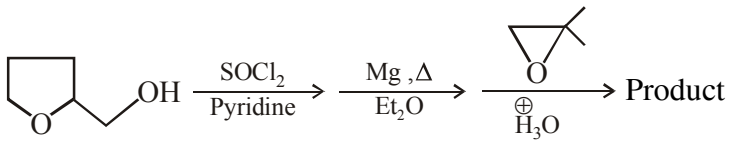
(A) 1° ROH (B) 2° ROH (C) 3° ROH (D) Alkene

AE0032

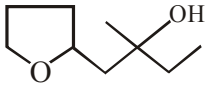
3. 

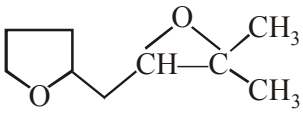
(A) CO (B) $^{14}CO_2$ (C) CO_2 (D) A mixture $^{14}CO_2$ and CO_2

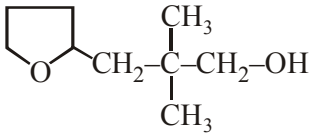
AE0033

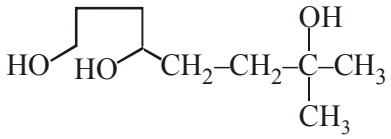
4. 

Product of reaction is :

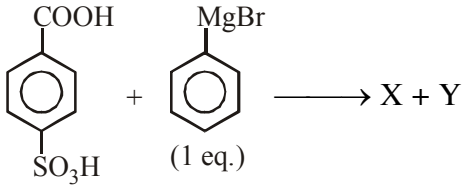
(A) 

(B) 

(C) 

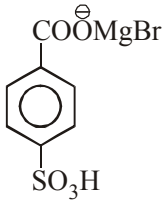
(D) 

AE0034

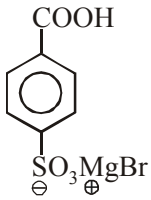
5. 

X and Y are respectively :

(A)  only

(B) 

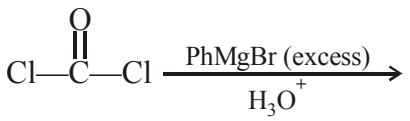
and 

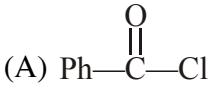
(C) 

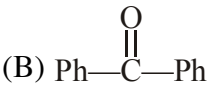
and 

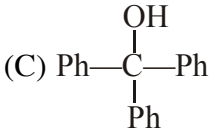
(D) None of these

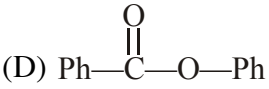
AE0035

6.  (X) ; Product (X) is :

(A) 

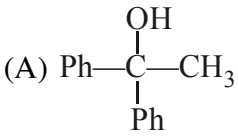
(B) 

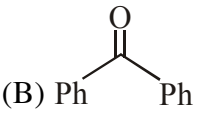
(C) 

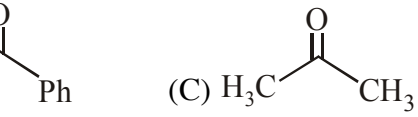
(D) 

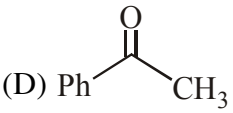
AE0036

7. $PhMgBr + H_3C—C\equiv N \xrightarrow{H_3O^+}$ Product :

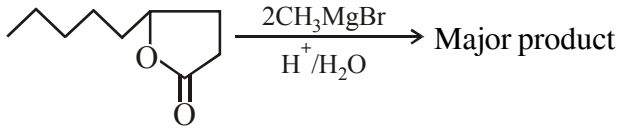
(A) 

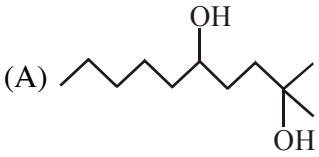
(B) 

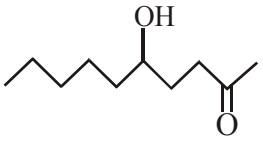
(C) 

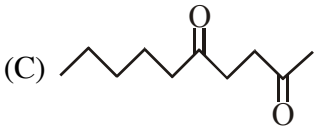
(D) 

AE0037

8.  Major product

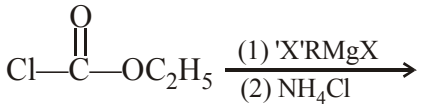
(A) 

(B) 

(C) 

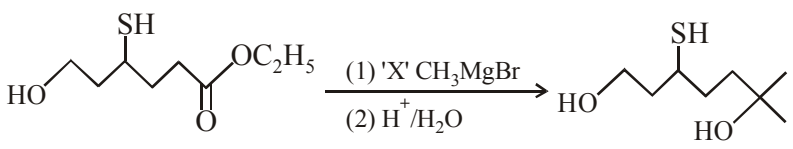
(D) No reaction

AE0038

9.  3° Alcohol. Find out value of 'X'.

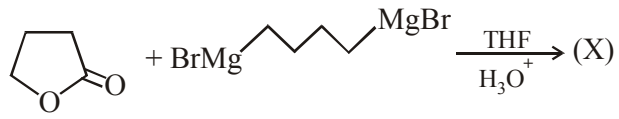
(A) 2 (B) 3 (C) 4 (D) 1

AE0039

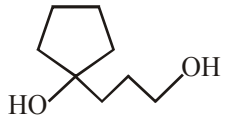
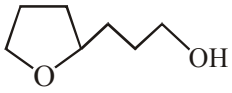
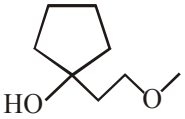
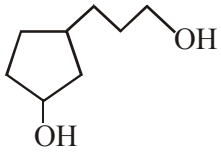
10. 

(A) 2 (B) 3 (C) 4 (D) 5

AE0040

11. 

Identify (X) :

(A)  (B)  (C)  (D) 

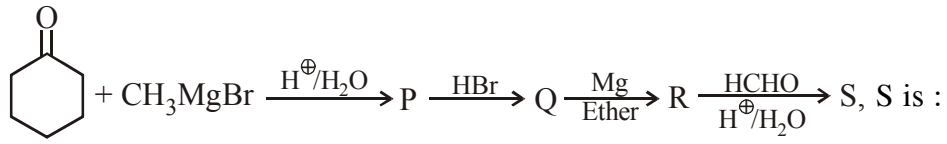
AE0041

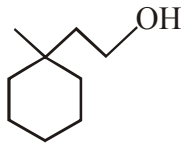
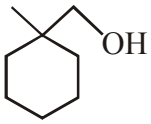
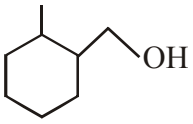
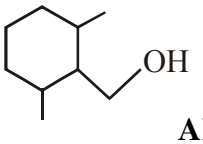
12. If phenyl magnesium bromide and acetaldehyde are the reactants, the product formed after hydrolysis would be :

(A) Benzyl alcohol (B) 1-Phenylethanol

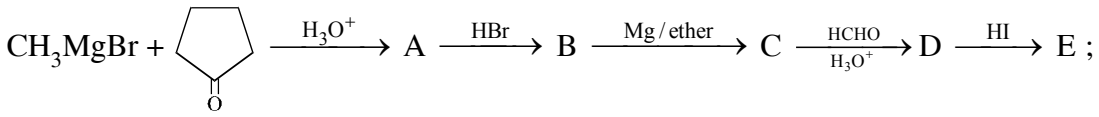
(C) 2-Phenylethanol (D) Acetone

AE0042

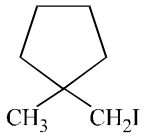
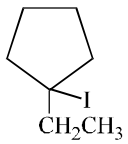
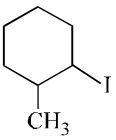
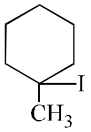
13. 

(A)  (B)  (C)  (D) 

AE0043

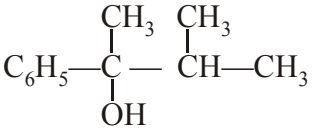
14. 

Product E is

(A)  (B)  (C)  (D) 

AE0044

15. Which of the following reagents (A to D) would you not select to convert $C_6H_5COCH_3$ (acetophenone) to the following alcohol ?

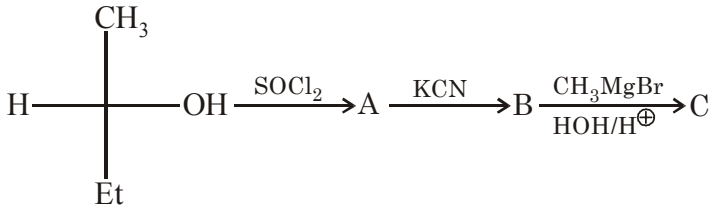


(A) $CH_3CH_2CH_2MgBr$ and hydrolysis (B) CH_3MgBr and acid hydrolysis

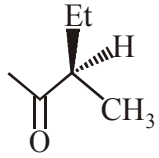
(C) $(CH_3)_2CHMgBr$ and acid hydrolysis (D) PhMgBr and acid hydrolysis

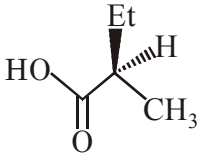
AE0045

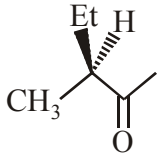
16.

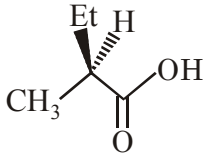


the final product C is :

(A) 

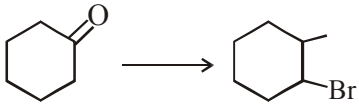
(B) 

(C) 

(D) 

AE0046

17. Which combination of reagents will not bring about the following conversion ?



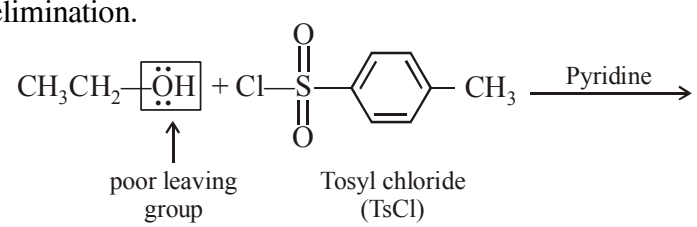
(A) MeMgBr/$H^{\oplus}$, H_2SO_4/Δ, HBr/H_2O_2, hν (B) MeMgBr/$H^{\oplus}$, H_2SO_4/Δ, HBr

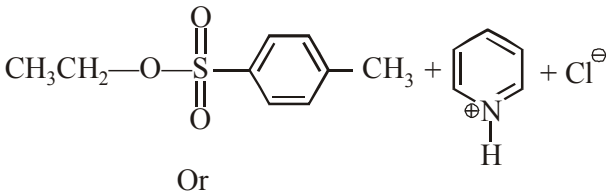
(C) MeMgBr/$H^{\oplus}$, HBr/CCl_4 (D) MeMgBr, NH_4Cl

AE0047

Paragraph for Q.No. 18 & 19

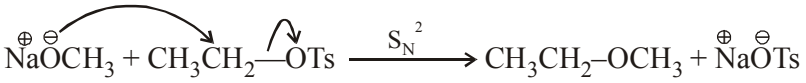
Alcohols are converted to tosylates by treatment with p-toluene sulfonyl chloride (TsCl) in presence of pyridine. This overall process converts a poor leaving group ($\overset{\ominus}{O}H$) into better one ($\overset{\ominus}{O}Ts$). A tosylate is a better leaving group because its conjugated acid p-toluene sulfonic acid is strong acid.
Because alkyl tosylates have better leaving tendency they undergo both nucleophilic substitution and β-elimination.

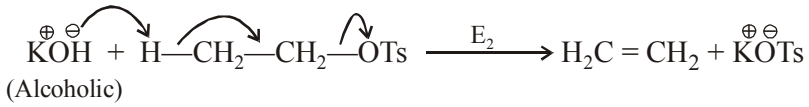




Or

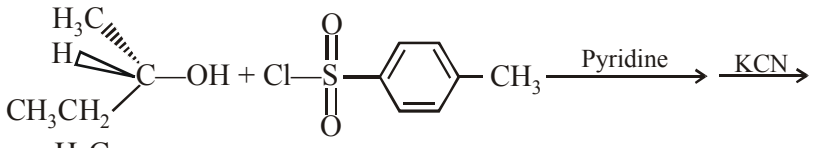
CH_3CH_2—OTs ↑ Better leaving group

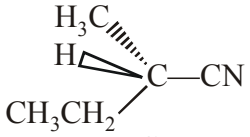


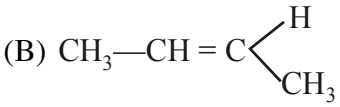


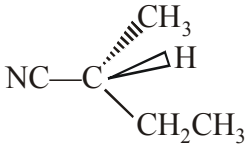
(Alcoholic)

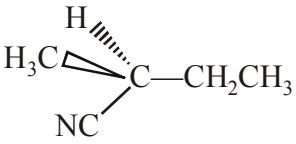
18. Find the major product of following reaction :



(A) 

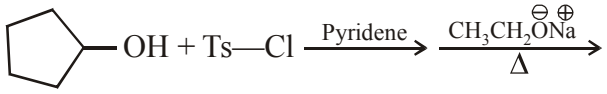
(B) 

(C) 

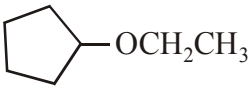
(D) 

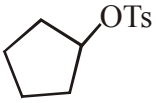
AE0048

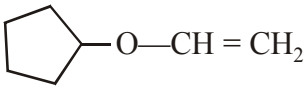
19. What would be the major product of following reactions ?



(A) 

(B) 

(C) 

(D) 

AE0049

20. Which of the following order is incorrect ?

(A) $CH_3–CH_2–OH > CH_3–CH_2–CH_2–OH > CH_3–CH_2–CH_2–CH_2–OH$ (Solubility in H_2O)

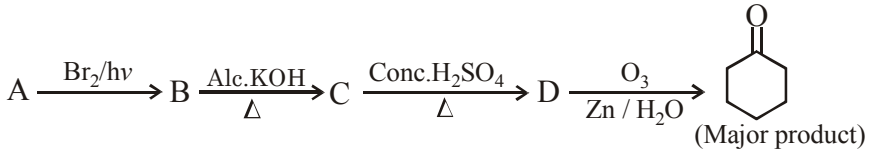
(B) $CH_3–CH_2–OH > CH_3–O–CH_3 > CH_3–CH_2–CH_3$ (Boiling point)

(C) Pentan-1-ol > Pentanal > Ethoxy ethane (Boiling point)

(D) $CH_3–OH > CH_3–CH_2–OH > CH_3–CH_2–CH_2–OH$ (Boiling point)

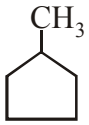
AE0050

EXERCISE # S-1

1. 

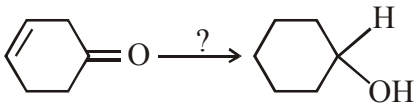
(Major product)

Find out the structure of 'A' :

(A)  (B)  (C)  (D) 

AE0051

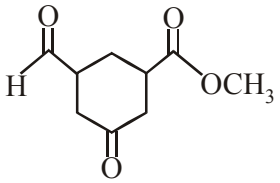
2. Predict the reducing agents in following reaction.

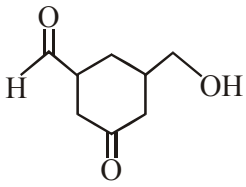


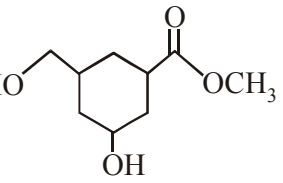
(A) $LiAlH_4$ (B) $NaBH_4$ (C) H_2 / Pt, Δ (D) Both (A) and (B)

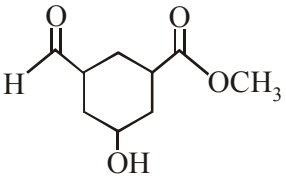
AE0052

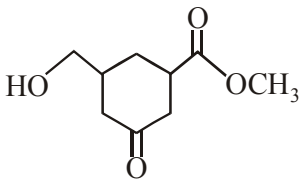
3. Find out the product when the following compound react with $NaBH_4$:



(A) 

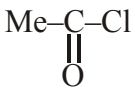
(B) 

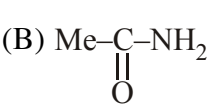
(C) 

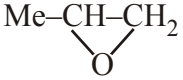
(D) 

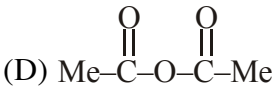
AE0053

4. Compound which does not give alcohol on reduction by $LiAlH_4$ is/are ?

(A) 

(B) 

(C) 

(D) 

AE0054

5. Choose the incorrect option ?

(A) Boiling point increases with increase in carbon due to increase in vander wall forces

(B) Branching in carbon decreases the boiling point

(C) High boiling point of alcohols are mainly due to pressure of intermolecular H-bonding

(D) Methoxymethane has higher boiling point than ethanol & propane

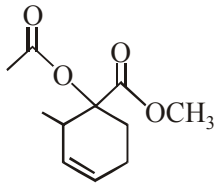
AE0055

6. Ethoxyethane & butan-1-ol are miscible to almost same extent (7.5 & 9 gm per 100 ml water respectively because of :

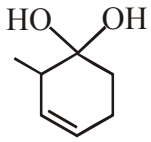
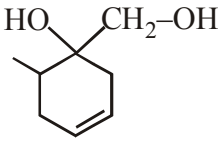
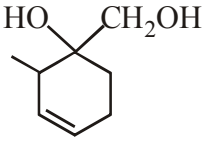
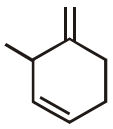
(A) Same molecular mass (B) They are isomers

(C) Both can form hydrogen bond with water (D) Water is universal solvent

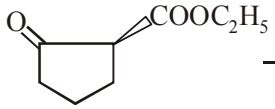
AE0056

7.  $\xrightarrow[H_2O]{LiAlH_4}$ (A)

Find out 'A' of the reaction

(A)  (B)  (C)  (D) 

AE0057

8.  $\xrightarrow{LiAlH_4}$; Products of the reaction are :

(A) Racemic (B) Diastereomers

(C) Meso (D) Optically pure

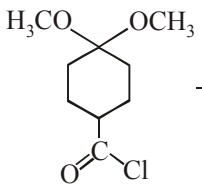
AE0058

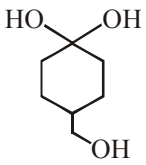
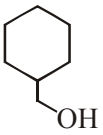
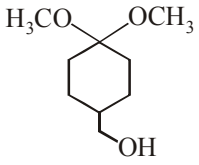
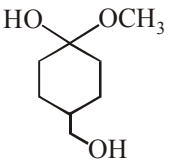
9. Reduction of $R—CH_2OH \longrightarrow RCH_3$ can be carried out by :

(A) $LiAlH_4$ (B) H_2 / Ni

(C) Red P + HI (D) $NaBH_4$ / $AlCl_3$

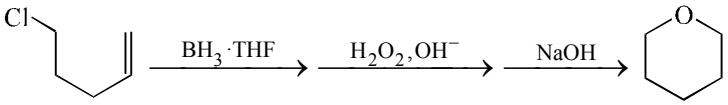
AE0059

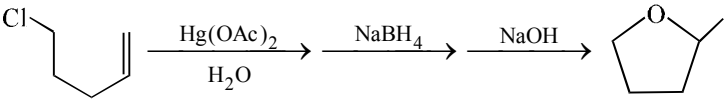
10.  $\xrightarrow{NaBH_4}$ (X), Product (X) is :

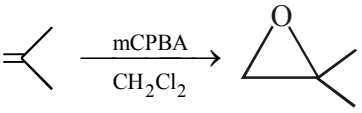
(A)  (B)  (C)  (D) 

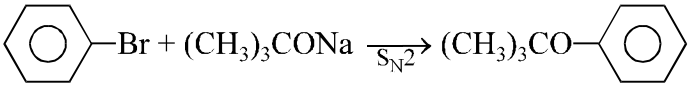
AE0060

11. Select the correct synthesis

(A) 

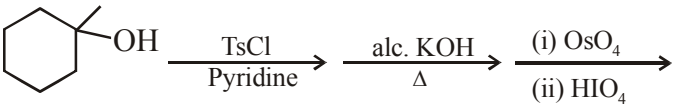
(B) 

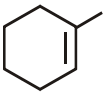
(C) 

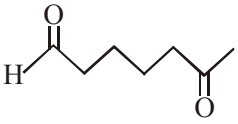
(D) 

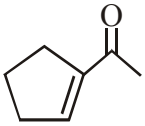
AE0061

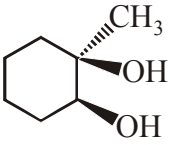
12. Identify the final product of following sequence of reactions :



(A) 

(B) 

(C) 

(D) 

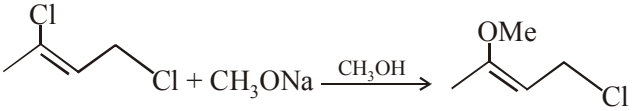
and its enantiomer

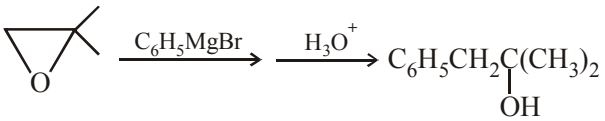
AE0062

13. Which of the following reaction is not possible ?

(A) $C_6H_5OH + HBr \longrightarrow C_6H_5Br + H_2O$

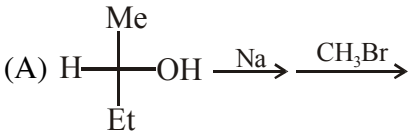
(B) $(CH_3)_3CCl + NaOCH_3 \longrightarrow (CH_3)_3COCH_3 + NaCl$

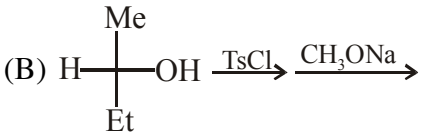
(C) 

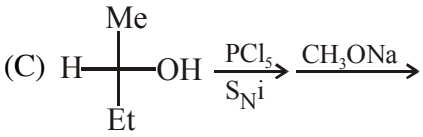
(D) 

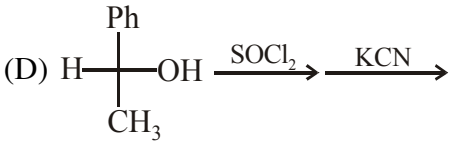
AE0063

14. Which of the following reactions proceeds with inversion of configuration ?

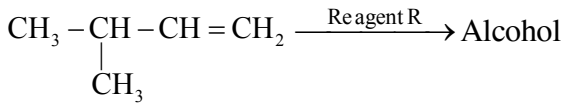
(A) 

(B) 

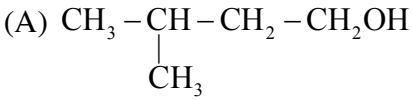
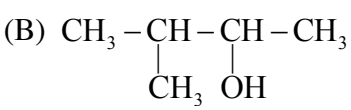
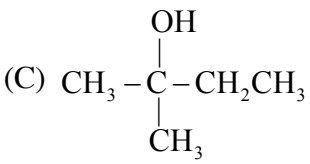
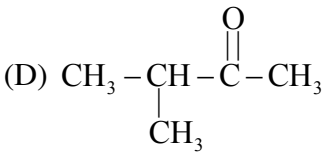
(C) 

(D) 

AE0064

15. 

which is true about alcohol and Reagent ?

List-I **(Alcohol)**	**List-II** **(Reagent)**
(A) 	(P) B_2H_6 , H_2O_2 / NaOH
(B) 	(Q) $Hg(OAc)_2$, H_2O / $NaBH_4$ followed by P.C.C.
(C) 	(R) $Hg(OAc)_2$, H_2O / $NaBH_4$
(D) 	(S) dil. H_2SO_4

AE0065

EXERCISE # J-MAIN

1. In the following sequence of reactions $CH_3CH_2OH \xrightarrow{P + I_2} A \xrightarrow[Ether]{Mg} B \xrightarrow{HCHO} C \xrightarrow{H_2O} D$, then compound 'D' is - **[AIEEE-2007]**

(1) Butanal (2) n–Butyl alcohol (3) n–Propyl alcohol (4) Propanal

AE0066

2. A liquid was mixed with ethanol and a drop of concentrated H_2SO_4 was added. A compound with a fruity smell was formed. The liquid was :- **[AIEEE-2009]**

(1) CH_3COCH_3 (2) CH_3COOH (3) CH_3OH (4) HCHO

AE0067

3. From amongst the following alcohols the one that would react fastest with conc. HCl and anhydrous $ZnCl_2$, is :- **[AIEEE-2010]**

(1) 1–Butanol (2) 2–Butanol

(3) 2–Methylpropan–2–ol (4) 2–Methylpropanol

AE0068

4. Consider the following reaction : **[AIEEE-2011]**

$C_2H_5OH + H_2SO_4 \rightarrow$ Produce

Among the following, which one cannot be formed as a product under any conditions ?

(1) Ethyl-hydrogen sulphate (2) Ethylene (3) Acetylene (4) Diethyl ether

AE0069

5. An unknown alcohol is treated with the "Lucas reagent' to determine whether the alcohol is primary, secondary or tertiary. Which alcohol reacts fastest and by what mechanism :- **[AIEEE-2013]**

(1) secondary alcohol by SN^1 (2) tertiary alcohol by SN^1

(3) secondary alcohol by SN^2 (4) tertiary alcohol by SN^2

AE0070

6. Allyl phenyl ether can be prepared by heating: **(JEE-MAIN-2014)**

(1) CH_2=CH–CH_2–Br + C_6H_5ONa (2) C_6H_5–CH=CH–Br + CH_3–ONa

(3) C_6H_5Br + CH_2=CH–CH_2–ONa (4) CH_2=CH–Br + C_6H_5–CH_2–ONa

AE0071

7. In the Victor-Meyer's test, the colour given by 1°, 2° and 3° alcohols are respectively :-

(1) Red, blue, colourless (2) Colourless, red, blue **(JEE-MAIN-2014)**

(3) Red, blue, violet (4) Red, colourless, blue

AE0072

8. Williamson synthesis of ether is an example of **(JEE-MAIN-2014)**

(1) Nucleophilic addition (2) Electrophilic substitution

(3) Nucleophilic substitution (4) Electrophilic addition

AE0073

9. The gas evolved on heating CH_3MgBr in methanol is : **[JEE-MAIN-On-line-2016]**

(1) Ethane (2) Propane (3) Methane (4) HBr

AE0074

10. Bouveault–Blanc reduction reaction involves: **[JEE-MAIN-On-line-2016]**

(1) Reduction of an ester with Na/C_2H_5OH

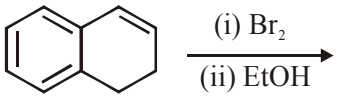
(2) Reduction of an ester with H_2/Pd

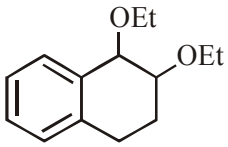
(3) Reduction of a carbonyl compound with Na/Hg and HCl

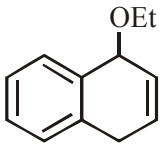
(4) Reduction of an anhydride with $LiAlH_4$

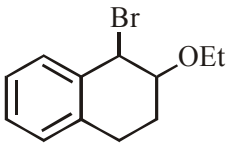
AE0075

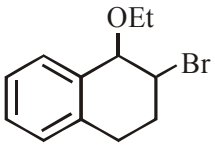
11. The major product the following reaction is : **[JEE-MAIN-On-line-(Jan)-2019]**



(1) 

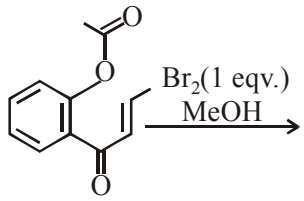
(2) 

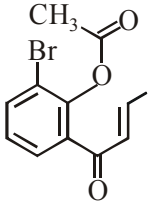
(3) 

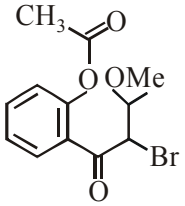
(4) 

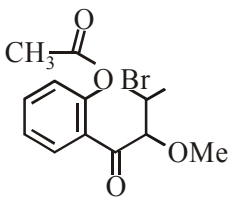
AE0076

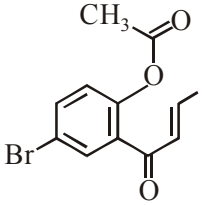
12. The major product obtained in the following conversion is :- **[JEE-MAIN-On-line-(Jan)-2019]**



(1) 

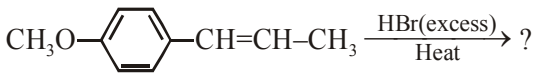
(2) 

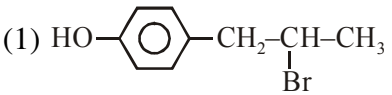
(3) 

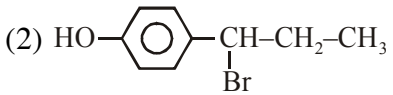
(4) 

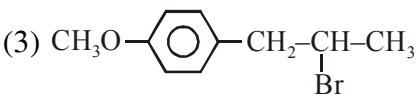
AE0077

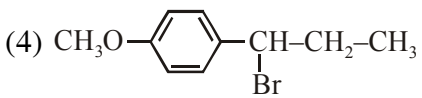
13. The major product in the following conversion is : **[JEE-MAIN-On-line-(Jan)-2019]**



(1) 

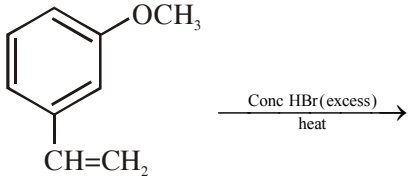
(2) 

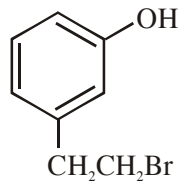
(3) 

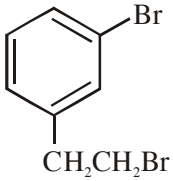
(4) 

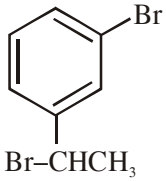
AE0078

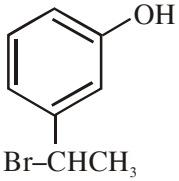
14. The major product of the following reactions: **[JEE-MAIN-On-line-(April)-2019]**



(1) 

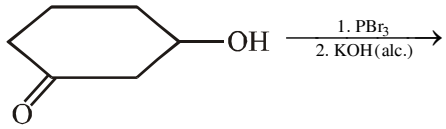
(2) 

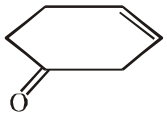
(3) 

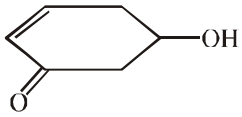
(4) 

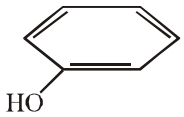
AE0079

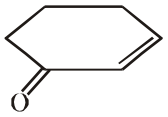
15. The mojor product of the following reaction is : **[JEE-MAIN-On-line-(April)-2019]**



(1) 

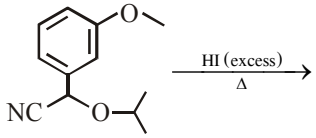
(2) 

(3) 

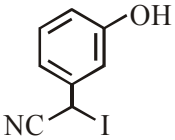
(4) 

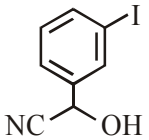
AE0080

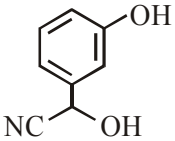
16. The major product of the following reaction is :

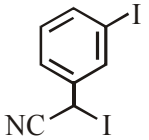


[JEE-MAIN-On-line-(April)-2019]

(1) 

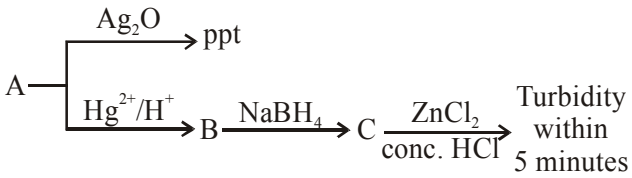
(2) 

(3) 

(4) 

AE0081

17. Consider the following reactions : **[JEE-MAIN-On-line-(April)-2019]**



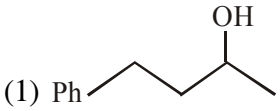
'A' is :

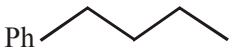
(1) CH≡CH (2) CH_3–C≡CH (3) CH_2=CH_2 (4) CH_3–C≡C–CH_3

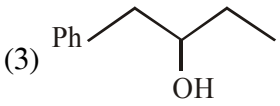
AE0082

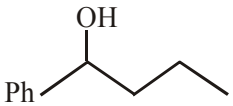
18. Heating of 2-chloro-1-phenylbutane with EtOK/EtOH gives X as the major product. Reaction of X with $Hg(OAc)_2/H_2O$ followed by $NaBH_4$ gives Y as the major product. Y is :

[JEE-MAIN-On-line-(April)-2019]

(1) 

(2) 

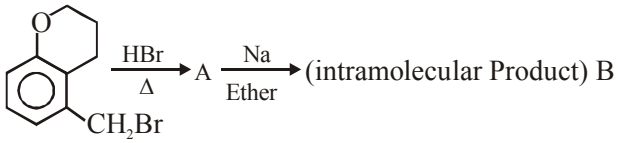
(3) 

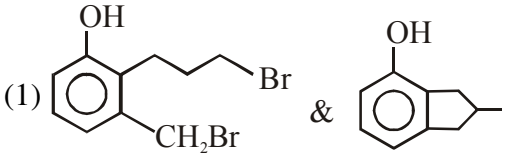
(4) 

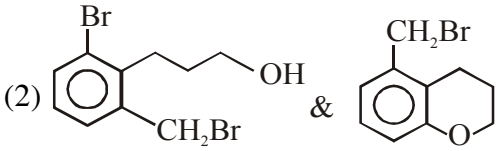
AE0083

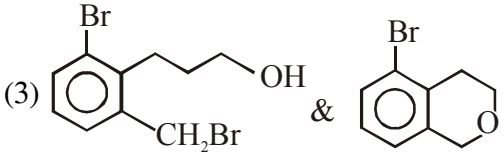
19. In the following reaction squence, structures of A and B, respectively will be :

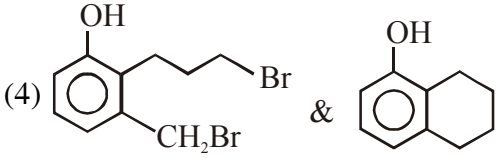
[JEE-MAIN-(Jan)-2020]



(1) 

(2) 

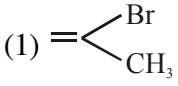
(3) 

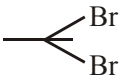
(4) 

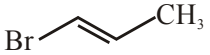
AE0084

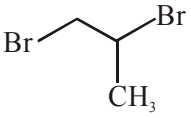
20. 1-methyl ethylene oxide when treated with an excess of HBr produces :

[JEE-MAIN-(Jan)-2020]

(1) 

(2) 

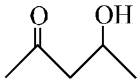
(3) 

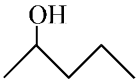
(4) 

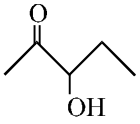
AE0085

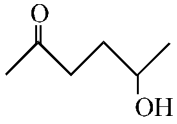
EXERCISE # J-ADVANCE

1. Which one of the following will most readily be dehydrated in acidic condition: **[JEE 2000]**

(A) 

(B) 

(C) 

(D) 

AE0086

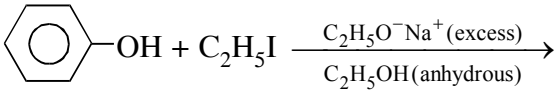
2. Identify the correct order of boiling point of the following compounds: **[JEE 2002]**

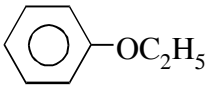
$CH_3CH_2CH_2CH_2OH$ $CH_3CH_2CH_2CHO$ $CH_3CH_2CH_2COOH$

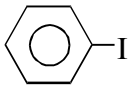
1 2 3

(A) 1 > 2 > 3 (B) 3 > 1 > 2 (C) 1 > 3 > 2 (D) 3 > 2 >1

AE0087

3.  **[JEE 2003]**

(A) 

(B) 

(C) $C_6H_5OC_6H_5$ (D) $C_2H_5OC_2H_5$

AE0088

4. Reaction of entainomerically pure acid with 1 chiral carbon and racemic alcohol with 1 chiral carbon gives an ester which is: **[JEE 2003]**

(A) Meso (B) Optically active mixture

(C) Racemic mixture (D) Enantionmerically pure

AE0089

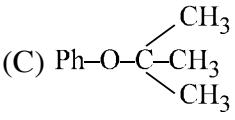
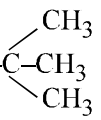
5. On acid catalysed hydration, 2-phenyl propene gives: **[JEE 2004]**

(A) 3-phenyl-2-propanol (B) 2-phenyl-1-propanol

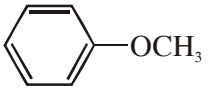
(C) 1-phenyl-3-propanol (D) 2-phenyl-2-propanol

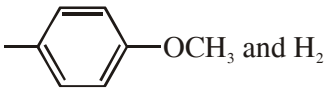
AE0090

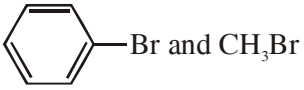
6. Phenyl magnesium bromide reacting with t-Butyl alcohol gives **[JEE 2005]**

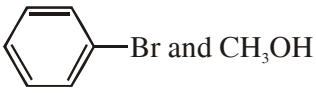
(A) Ph – OH (B) Ph – H (C)  (D) 

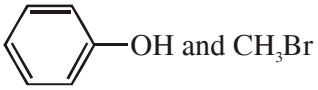
AE0091

7. In the reaction  the products are **[JEE 2010]**

(A) 

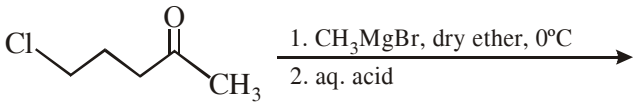
(B) 

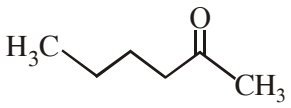
(C) 

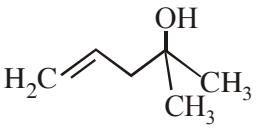
(D) 

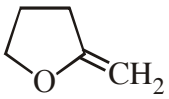
AE0092

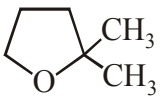
8. The major product in the following reaction is



A) 

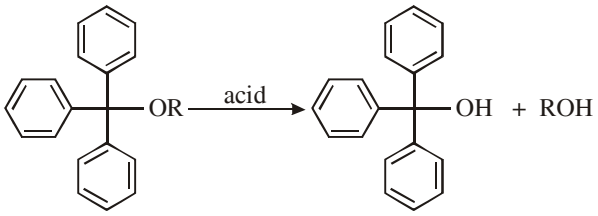
(B) 

(C) 

(D) 

AE0093

9. The acidic hydrolysis of ether (X) shown below is fastest when **[JEE 2014]**



[X]

(A) one phenyl group is replaced by a methyl group
(B) one phenyl group is replaced by a para-methoxyphenyl group
(C) two phenyl groups are replaced by two para-methoxyphenyl group
(D) no structural change is made to X

AE0094

10. The correct combination of names for isomeric alcohols with molecular formula $C_4H_{10}O$ is/are- **[JEE 2014]**

(A) *tert*-butanol and 2-methylpropan-2-ol
(B) *tert*-butanol and 1, 1-dimethylethan-1-ol
(C) *n*-butanol and butan-1-ol
(D) isobutyl alcohol and 2-methylpropan-1-ol

AE0095

ANSWER-KEY

EXERCISE # O-1

1.	**Ans. (B)**	**2.**	**Ans. (C)**	**3.**	**Ans. (C)**	**4.**	**Ans. (C)**
5.	**Ans. (B)**	**6.**	**Ans. (D)**	**7.**	**Ans. (C)**	**8.**	**Ans. (C)**
9.	**Ans. (B)**	**10.**	**Ans. (C)**	**11.**	**Ans. (B)**	**12.**	**Ans. (A)**
13.	**Ans. (B)**	**14.**	**Ans. (B)**	**15.**	**Ans. (A)**	**16.**	**Ans. (B)**
17.	**Ans. (A)**	**18.**	**Ans. (B)**	**19.**	**Ans. (D)**	**20.**	**Ans. (D)**
21.	**Ans. (C)**	**22.**	**Ans. (B)**	**23.**	**Ans. (C)**	**24.**	**Ans. (A)**
25.	**Ans. (A)**	**26.**	**Ans. (B)**	**27.**	**Ans. (A)**	**28.**	**Ans. (B)**
29.	**Ans. (C)**	**30.**	**Ans. (C)**				

EXERCISE # O-2

1.	**Ans. (A)**	**2.**	**Ans. (C)**	**3.**	**Ans. (C)**	**4.**	**Ans. (D)**
5.	**Ans. (C)**	**6.**	**Ans. (C)**	**7.**	**Ans. (D)**	**8.**	**Ans. (A)**
9.	**Ans. (B)**	**10.**	**Ans. (C)**	**11.**	**Ans. (A)**	**12.**	**Ans. (B)**
13.	**Ans. (B)**	**14.**	**Ans. (D)**	**15.**	**Ans. (A,B,D)**	**16.**	**Ans. (A)**
17.	**Ans. (B,C,D)**	**18.**	**Ans. (C)**	**19.**	**Ans. (A)**	**20.**	**Ans. (D)**

EXERCISE # S-1

1.	**Ans. (B)**	**2.**	**Ans. (C)**	**3.**	**Ans. (B)**	**4.**	**Ans. (B)**
5.	**Ans. (D)**	**6.**	**Ans (C)**	**7.**	**Ans. (C)**	**8.**	**Ans. (B)**
9.	**Ans. (C)**	**10.**	**Ans. (C)**	**11.**	**Ans. (A,B,C)**	**12.**	**Ans. (B)**
13.	**Ans. (A,B,C)**	**14.**	**Ans. (B,C,D)**	**15.**	**Ans. (A)→P; (B)→R; (C)→S; (D)→Q**		

EXERCISE # J-MAIN

1.	**Ans. (3)**	**2.**	**Ans. (2)**	**3.**	**Ans. (3)**	**4.**	**Ans. (3)**

5. **Ans. (2)**

6. **Ans. (1)**

Sol. $C_6H_5\overset{\ominus\,\oplus}{O}Na + CH_2=CH-CH_2-Br \longrightarrow$

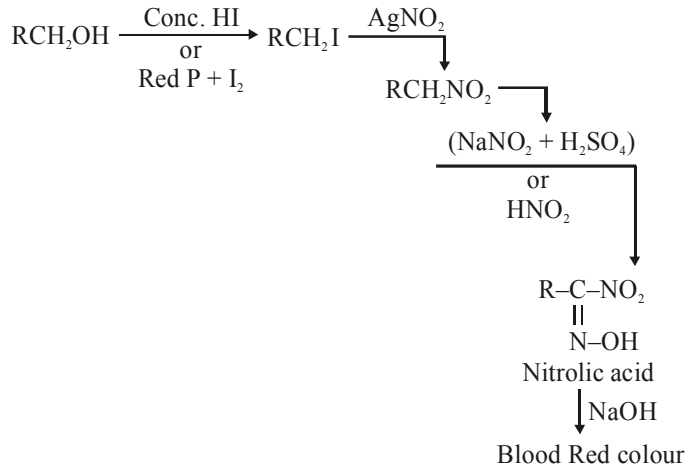
$C_6H_5O-CH_2-CH=CH_2$

Allyl phenyl ether

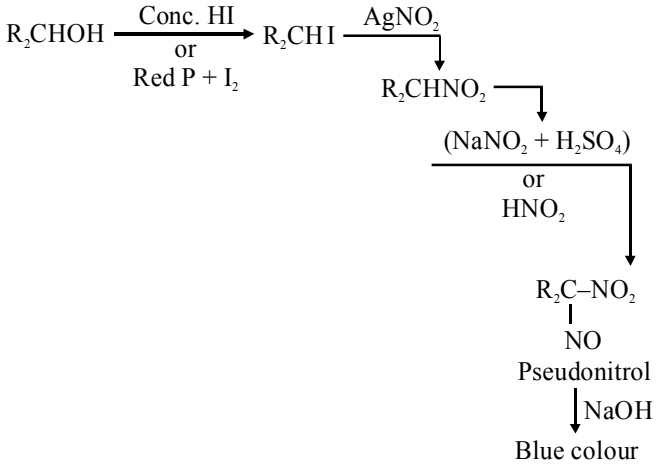
7. Ans. (1)

Sol. Victor Meyer's Test :

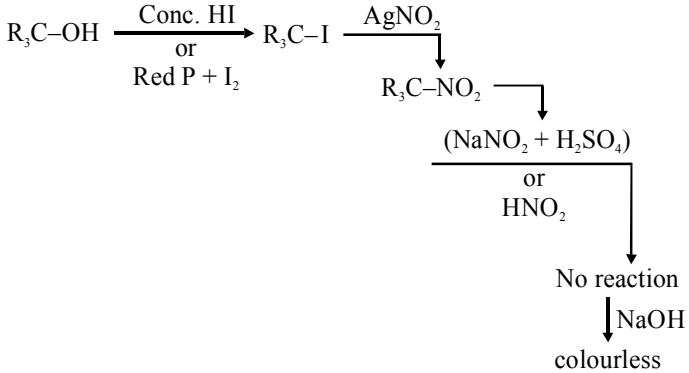
1°Alcohol



2°Alcohol

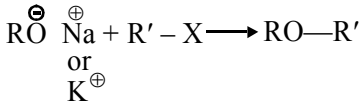


3°Alcohol



8. Ans.(3)

Sol. Nucleophilic substitution

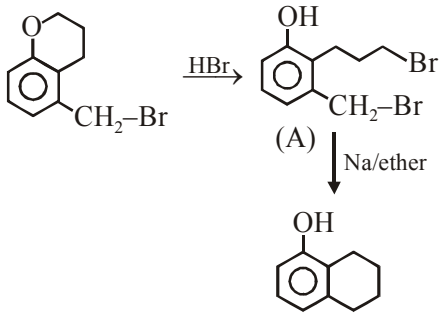


9. **Ans. (3)** **10.** **Ans. (1)** **11.** **Ans.(4)** **12.** **Ans. (2)** **13.** **Ans. (2)**

14. **Ans. (4)** **15.** **Ans.(4)** **16.** **Ans. (1)** **17.** **Ans. (2)** **18.** **Ans. (4)**

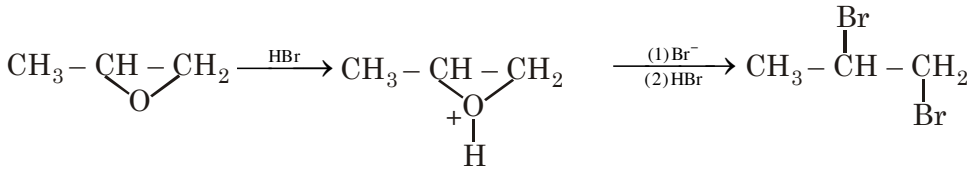
19. **Ans. (4)**

Sol.



20. **Ans.(4)**

Sol.



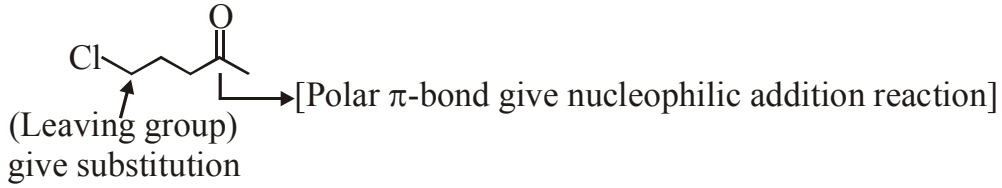
EXERCISE # J-ADVANCE

1. **Ans. (A)** **2.** **Ans.(B)** **3.** **Ans.(D)** **4.** **Ans. (B)**

5. **Ans. (D)** **6.** **Ans. (B)** **7.** **Ans. (D)**

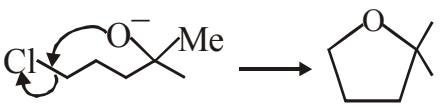
8. **Ans. (D)**

Sol.



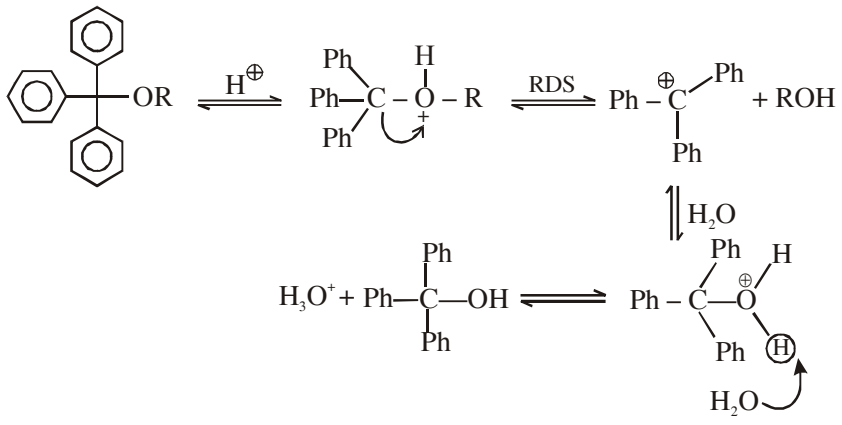
(i) Grignard prefer to give nucleophilic addition on polar π-bond and form anion intermediate.

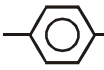
(ii) In next step anion give intramolecular nucleophilic substitution reaction & form 5 membered ring.



9. Ans. (C)

Sol.



If 2 Ph groups are substituted by 2 MeO  groups then carbocation formed in above sequence is more stable and rate of above hydrolysis increases

10. Ans. (A,C,D)

The combination of names for isomeric alcohols with molecular formula $C_4H_{10}O$ is/are

Formula	Names
$CH_3CH_2CH_2CH_2OH$	n-butyl alcohol / n-butanol / butan-1-ol
$CH_3–\underset{\displaystyle CH_3}{\underset{\vert}{CH}}–CH_2–OH$	isobutyl alcohol / 2-methyl propan-1-ol
$CH_3–CH_2–\underset{\displaystyle CH_3}{\underset{\vert}{CH}}–OH$	Secondary butyl alcohol / butan-2-ol
$CH_3–\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{\vert}{\underset{\vert}{C}}}}–OH$	Tertiary butyl alcohol / tert butanol / 2-methyl propan-2-ol / 1,1-dimethyl ethan-1-ol

Reference : National Institute of standards and technology (NIST)