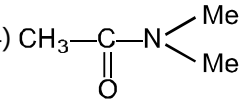
Exercise-1

ONLY ONE OPTION CORRECT TYPE

Section (A) : Solvent, Electrophile, Nucleophile and Leaving group ability

1. Which of the following is aprotic solvent ?
(1) DMSO (2) NH_3 (3) H_2O (4) CH_3COOH

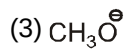
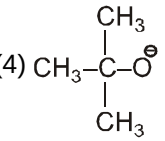
2. Which of the following is polar protic solvent ?
(1) CH_3COCH_3 (2) CH_3COOH (3) CH_3SOCH_3 (4) 

3. Electrophiles are
(1) Electron deficent species (2) having vacant p or d-orbital
(3) Electron rich species (4) (1) & (2) both

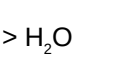
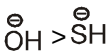
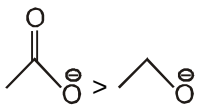
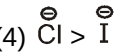
4. Which of the following is an electrophilic reagent ?
(1) H_2O (2) OH^- (3) NO_2^+ (4) None

5. Which of the following is not electrophile ?
(1) CN^- (2) H^+ (3) Br^+ (4) $AlCl_3$

6. Which of the following statement is correct for nucleophile ?
(1) Electron rich species are called nucleophile.
(2) Nucleophiles are Lewis bases.
(3) Nucleophile donates long pair of electron to vacant orbital of carbon atom.
(4) All are correct.

7. Which one of the following has maximum nucleophilicity :
(1) (2)  (3)  (4) 

8. Which among the following species is an ambident nucleophile ?
(1) Ethene (2) Benzene (3) Cyanide ion (4) Acetone

9. The correct leaving group ability order is :
(1)  (2)  (3)  (4) 

10. According to Lewis concept of acids and bases, ethers are :
(1) Acidic (2) Basic (3) Neutral (4) Amphoteric

Section (B) : Unimolecular nucleophilic substitution reaction of Alkyl Halide (S_N1)

1. Substitution reactions involve :
(1) Cleavage of a σ–bond and formation of a new σ–bond
(2) Cleavage of two σ–bond and formation of a new π –bond
(3) Cleavage of a π–bond and formation of two new σ –bond
(4) None of these

2. Which of the following reaction is a substitution reaction ?

(1) $CH_2 = CH_2 \xrightarrow{Ni/H_2} CH_3–CH_3$ (2) $CH_2(Br)–CH_2(Br) \xrightarrow{Zn} CH_2 = CH_2 + ZnBr_2$

(3) $CH_3 – I + \overset{\Theta}{OH} \longrightarrow CH_3OH + \overset{\Theta}{I}$ (4) $CH_3 – CHO \xrightarrow[H^{\oplus}]{KCN} CH_3 – C(H)(CN) – OH$

3. S_N1 reactions occur through the intermediate formation of-

(1) Carbocations (2) Carbanions (3) Free radicals (4) None of these

4. S_N1 reactions are favoured by -

(1) Non-polar solvents.
(2) Bulky groups on the carbon atom attached to the halogen atom.
(3) Small groups on carbon atom attached to the halogen atom.
(4) None of these.

5. Which of the following undergoes nucleophilic substitution by S_N1 mechanism :

(1) Ethyl chloride (2) Vinyl chloride (3) Benzyl chloride (4) Chloro benzene

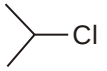
6. In an S_N1 reaction, the configuration of the product undergoes :

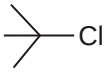
(1) inversion (2) racemization (3) retention (4) difficult to predict

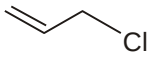
7. Which of the following alkyl halide is most readily hydrolysed?

(1) C_6H_5Cl (2) $(C_6H_5)_2CHCl$ (3) $C_6H_5CH_2Cl$ (4) $(C_6H_5)_3CCl$

8. Correct order of rate of solvolysis of the following alkyl chlorides in 50% aqueous ethanol at 44.6°C is :


I


II

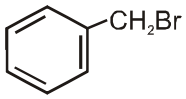
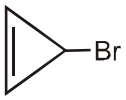
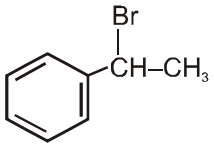
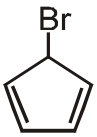

III

(1) III > II > I (2) III > I > II (3) I > III > II (4) I > II > III

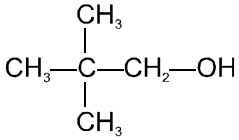
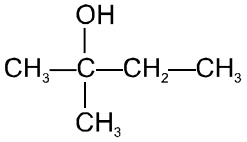
9. Following reaction $(CH_3)_3CBr + C_2H_5OH \longrightarrow (CH_3)_3COC_2H_5 + HBr$ is an example of :

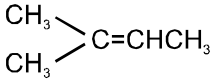
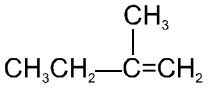
(1) Elimination reaction (2) Free radical substitution
(3) Nucleophilic substitution (4) Electrophilic substitution

10. Which of the following will not give precipitate with aq. $AgNO_3$?

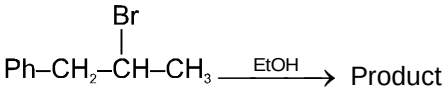
(1)  (2)  (3)  (4) 

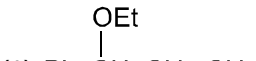
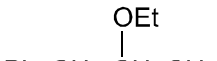
11. Neopentyl bromide is allowed to react with aquous acetone. The major product formed in the reaction is:

(1)  (2) 

(3)  (4) 

12. What will be the major product of the following reaction ?



(1)  (2)  (3) Ph–CH=CH–CH_3 (4) Ph–CH_2–CH=CH_2

13. The rate of reaction of alkyl halides depends upon.
(1) Nature of alkyl group
(2) Nature of halogen atom
(3) Nature of both alkyl group and halogen atoms
(4) None of the above.

14. Which of the following undergoes nucleophilic substitution by S_N1 mechanism :
(1) Ethyl chloride (2) Vinyl chloride (3) Benzyl chloride (4) Chloro benzene

15. Aryl halides are less reactive towards nucleophilic substitution reactions as compared to alkyl halides due to
(1) The formation of less stable carbanion (2) Longer carbon halogen bond
(2) The inductive effect (4) sp^2–hybridized carbon attached to the halogen.

Section (C) : Bimolecular nucleophilic substitution reaction of Alkyl Halide (S_N2)

1. Which one of the following statement is wrong about S_N2 reaction ?
(1) The rate of reaction is independent of the concentration of nucleophile.
(2) Nucleophile attacks the carbon from the side opposite to where the leaving group is attached.
(3) Only in one step the bond formation and bond breaking takes place.
(4) The rate of reaction $\propto$ [substrate] [nucleophile]

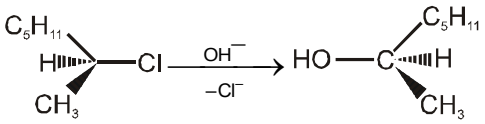
2. When the concentration of alkyl halide is tripled and the concentration of $\overset{\ominus}{OH}$ ion is reduced to half, the rate of S_N2 reaction increases by:
(1) 3 times (2) 2 times (3) 1.5 times (4) 6 times

3. Reaction of alkyl halides with ethanolic KCN predominantly gives :
(1) Alkyl carbylamines (2) Alkyl cyanides (3) Nitroalkanes (4) Alkyl nitrites

4. Reaction of methyl bromide with an alcoholic solution of silver cyanide predominantly gives :
(1) Acetonitrile (2) Methyl isocyanide (3) Methyl isocyanate (4) Methyl isothiocyanate

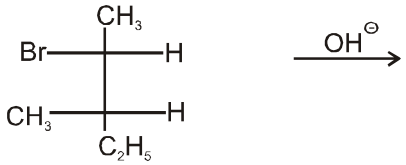
5. The least reactive alkyl chloride towards substitution reaction is :
(1) Methyl chloride (2) Allyl chloride (3) Ethyl chloride (4) Vinyl chloride

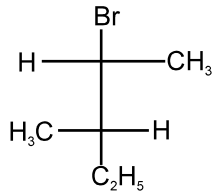
6. The reaction given is an example of :

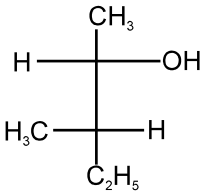


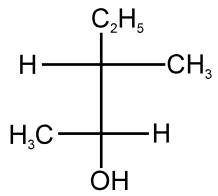
(1) S_N1 (2) S_N2 (3) E1 (4) E2

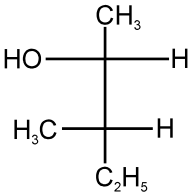
7. In the following reaction the most probable product will be :



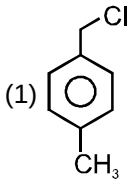
(1) 

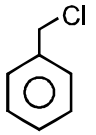
(2) 

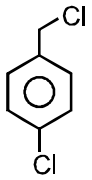
(3) 

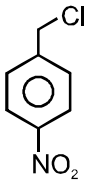
(4) 

8. Which of the following is most reactive towards S_N2 reaction ?

(1) 

(2) 

(3) 

(4) 

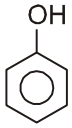
9. What is the final product of the given reaction :

$CH_3 - C \equiv CH \xrightarrow{Na} \xrightarrow{CH_3-CH_2-I}$ Product

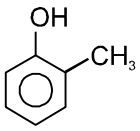
(1) $CH_2=CH-CH_2-CH_3$ (2) $CH_3-CH_2-C\equiv C-CH_2-CH_3$

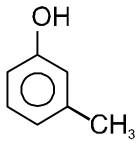
(3) $CH \equiv C - CH_2 - CH_2 - CH_3$ (4) $CH_3 - C \equiv C - CH_2 - CH_3$

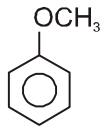
10. What is the final product of the given reaction ?

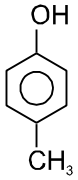


+ $CH_3I \xrightarrow[1\text{ eq.}]{KOH}$ Product

(1) 

(2) 

(3) 

(4) 

11. In S_N2 substitution reaction :

$R-Br + NaI \xrightarrow{Acetone} R-I + NaBr$

Which one of the following has the highest relative rate ?

(1) $(CH_3)_3C-CH_2Br$ (2) CH_3CH_2Br (3) $CH_3CH_2CH_2Br$ (4) $(CH_3)_2CH-CH_2Br$

12. S_N2 mechanism proceeds through intervention of

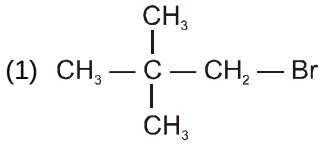
(1) Carbonium ion (2) Transition state (3) Free radical (4) Carbanion

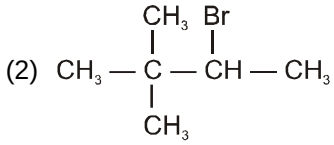
13. Isopropyl cyanide can be obtained by the reaction between :

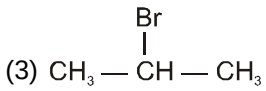
(1) $CH_3CH_2CH_2I$ and AgCN (2) $CH_3CHBrCH_3$ and KCN

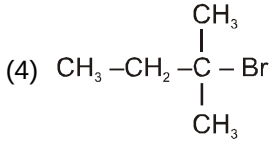
(3) $(CH_3)_2CHI$ and AgCN (4) $(CH_3)_2CHCl$ and HCN

14. Which of the following alkyl halide will readily gives S_N2 reaction ?

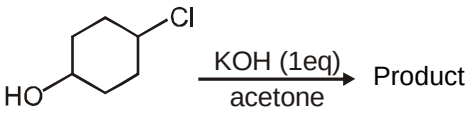
(1) 

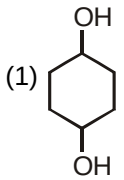
(2) 

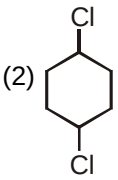
(3) 

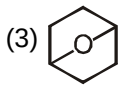
(4) 

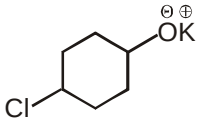
15. In Williamson's synthesis, ethoxyethane is prepared by :
(1) Passing ethanol over heated alumina
(2) Heating sodium ethoxide with ethyl bromide
(3) Treating ethyl alcohol with excess of H_2SO_4 at 430 – 440 K
(4) Heating ethanol with dry Ag_2O

16. 
The product is :

(1) 

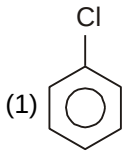
(2) 

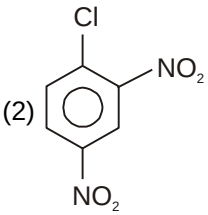
(3) 

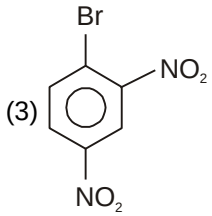
(4) 

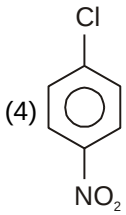
Section (D) : Aryl Halide (S_N2Ar)

1. In which case S_N2 Ar reaction is fastest ?

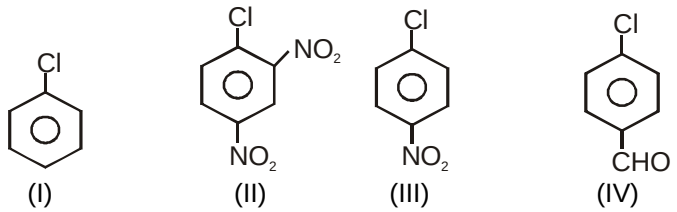
(1) 

(2) 

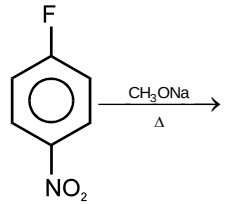
(3) 

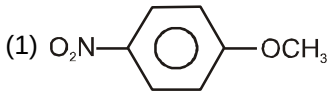
(4) 

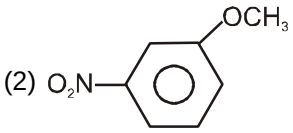
2. The correct order of increasing reactivity of C–Cl bond towards nucleophile substitution reaction in the following compounds is

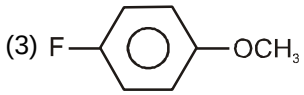

(I) (II) (III) (IV)

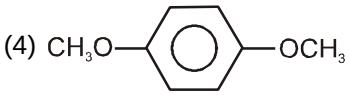
(1) III < II < I < IV (2) I < IV < III < II (3) II < III < I < IV (4) IV < III < I < II

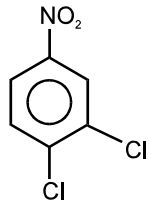
3. 

(1) 

(2) 

(3) 

(4) 

4. 

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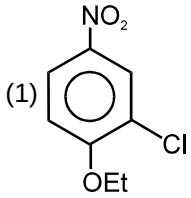
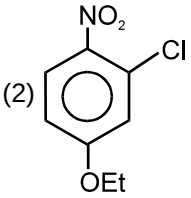
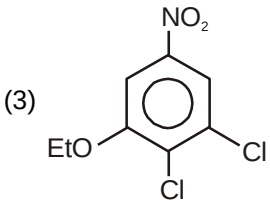
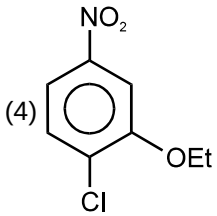
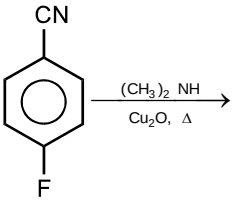
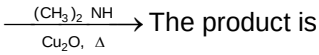
(1) 

(2) 

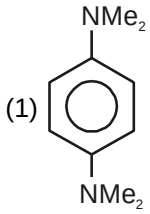
(3) 

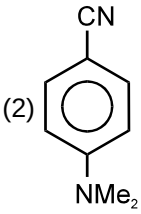
(4) 

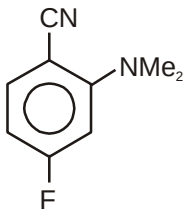
5. 

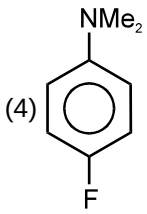


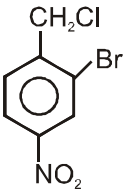
The product is

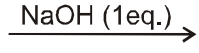
(1) 

(2) 

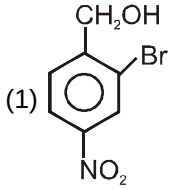
(3) 

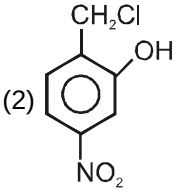
(4) 

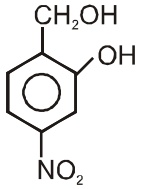
6. 

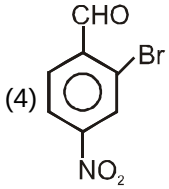


Product is :

(1) 

(2) 

(3) 

(4) 

7. Aryl halides are less reactive towards nucleophilic substitution reaction as compared to alkyl halide due to :
(1) The formation of less stable carbonium ion
(2) C–X bond has partial double character in aryl halides
(3) Longer carbon-halogen bond
(4) The inductive effect

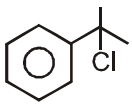
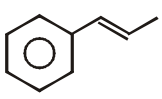
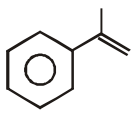
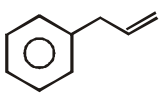
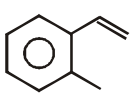
Section (E) : Unimolecular Elimination Reaction of Alkyl Halide (E1)

1. Elimination reaction generally occurs with the formation of :
(1) One sigma bond (2) one pi bond
(3) one sigma and one pi bond (4) None of the above

2. Which of the following reaction is an elimination reaction ?
(1) $CH_3–CH_2–CH_2–OH \xrightarrow{PCl_5} CH_3–CH_2–CH_2–Cl$
(2) $CH_3–CH=CH_2 \xrightarrow{HCl} CH_3–\underset{\displaystyle Cl}{\underset{|}{CH}}–CH_3$
(3) $CH_3–\underset{\displaystyle Cl}{\underset{|}{CH}}–CH_3 \xrightarrow{\text{Alc. KOH}} CH_3–CH=CH_2$
(4) $CH_3–\underset{\displaystyle O}{\underset{\|}{C}}–OH \xrightarrow{CH_3OH} CH_3–\underset{\displaystyle O}{\underset{\|}{C}}–OCH_3$

3. Which one of the following compound is most reactive for E1 reaction ?
(1) $CH_3–CH_2–\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle Br}{\overset{|}{C}}}}–CH_3$
(2) $CH_3–CH_2–\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle Br}{\overset{|}{C}}}}–C_6H_5$
(3) $CH_3–CH_2–\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle Br}{\overset{|}{C}}}}–C_2H_5$
(4) $CH_3–CH_2–\overset{\displaystyle Br}{\overset{|}{CH}}–CH_3$

4. $CH_3–CH_2–\underset{\displaystyle Br}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}–CH_2–CH_3 \xrightarrow[\Delta]{CH_3OH}$ P (Major elimination product)
The major elimination (E-1) product P is :
(1) $CH_3–CH = C\begin{matrix}\diagup CH_2–CH_3\\ \diagdown CH_2–CH_3\end{matrix}$
(2) $CH_2 = CH\begin{matrix}\diagup CH_2–CH_3\\ \diagdown CH_2–CH_3\end{matrix}$
(3) $CH_2 = CH_2$
(4) $CH_3—CH = \underset{\displaystyle CH_3}{\underset{|}{C}}—CH_2—CH_3$

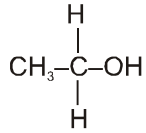
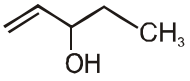
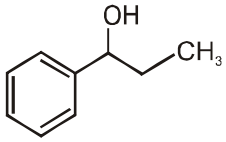
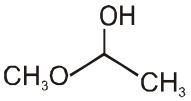
5.  $\xrightarrow{EtOH/\Delta}$ P (Major elimination product)
P is
(1) 
(2) 
(3) 
(4) 

6. Select the correct reactivity order of dehydrohelogenation reaction for the following halides with alcoholic KOH.

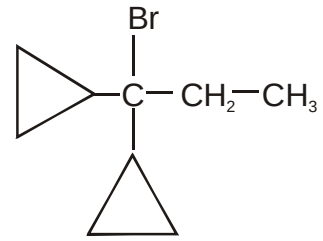
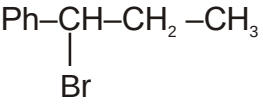
(i) $CH_3CH_2CH_2CH_2–Br$ (ii) $CH_3–CH(Br)–CH(CH_3)_2$ (iii) $CH_3–CH(Br)–CH_2Ph$

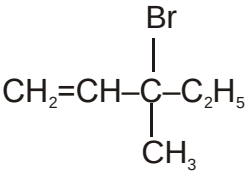
(1) i > ii > iii (2) i > iii > ii (3) iii > ii > i (4) ii > iii > i

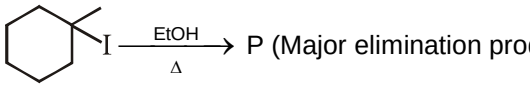
7. Substrate that readily do not show E1 reaction

(1)  (2)  (3)  (4) 

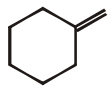
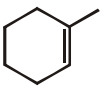
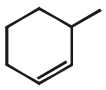
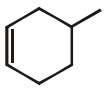
8. Which one the following will be the most reactive for E1 reaction

(1)  (2) 

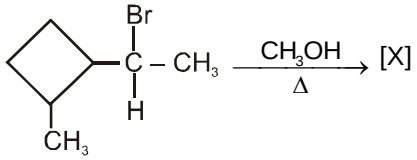
(3) $Br–CH=CH–CH_2–CH_3$ (4) 

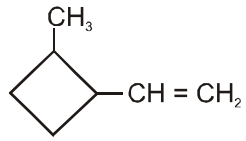
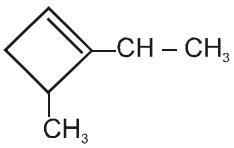
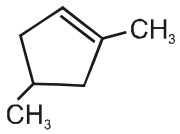
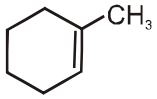
9. 

P is -

(1)  (2)  (3)  (4) 

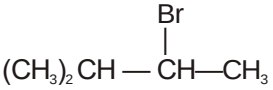
10. [X] as the major product among the elimination products is :

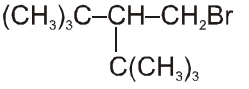


(1)  (2)  (3)  (4) 

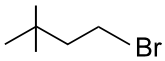
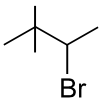
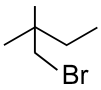
Section (F) : Bimolecular Elimination Reaction of Alkyl Halide (E2)

1. Most reactive alkyl halide towards E2 mechanism is :

(1) $(CH_3)_3C–CH_2Br$ (2) 

(3) $(CH_3)_3C–CH_2CH_2Br$ (4) 

2. Which of the following cannot undergo E2 reaction ?

(1)  (2)  (3)  (4) none of these

3. 1–Chlorobutane on reaction with alcoholic potash gives :

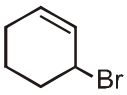
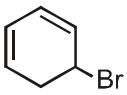
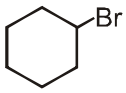
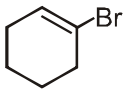
(1) 1–Butanol (2) 2–Butene (3) 1–Butene (4) 2–Butanol

4. A mixture of 1-chlorobutane and 2-chlorobutane when treated with alcoholic KOH gives -

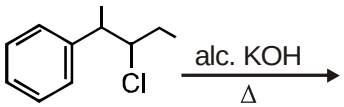
(1) 1-Butene (2) 2-Butene

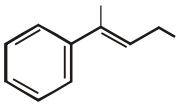
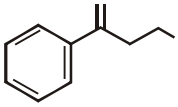
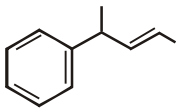
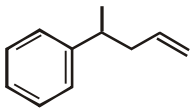
(3) Isobutylene (4) Mixture of 1-butene + 2-butene

5. Which of the following give fastest reaction with alcoholic KOH?

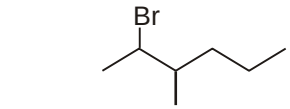
(1)  (2)  (3)  (4) 

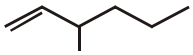
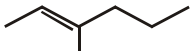
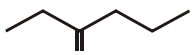
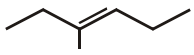
6. Major product of the reaction given below is :



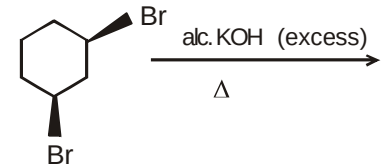
(1)  (2)  (3)  (4) 

7. Major product of the given reaction is :

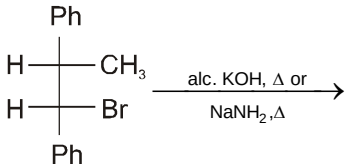


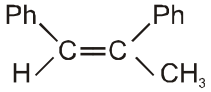
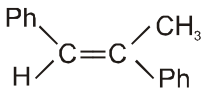
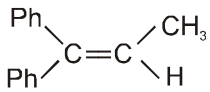
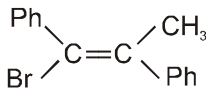
(1)  (2)  (3)  (4) 

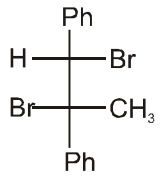
8. The most probable product is the following reaction :

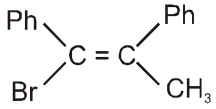
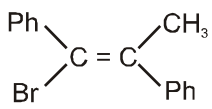
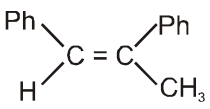


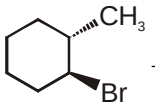
(1)  (2)  (3)  (4) 

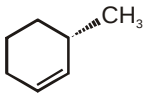
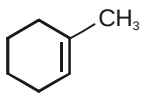
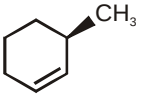
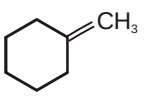
9.  major product is :

(1)  (2)  (3)  (4) 

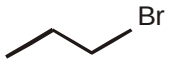
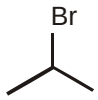
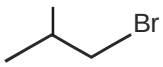
10.  $\xrightarrow{Zn,\Delta}$ Product is :

(1)  (2)  (3)  (4) Ph–C≡C–CH_2–Ph

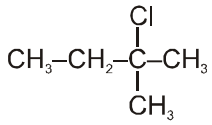
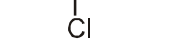
11.  $\xrightarrow{t\text{–}BuO^{-}K^{+}/\Delta}$ porduct X

(1)  (2)  (3)  (4) 

12. Most reactive alkyl halide torwards E2 reaction is –

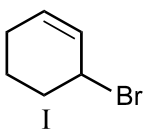
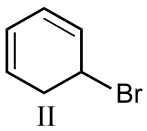
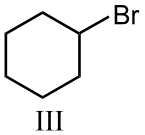
(1)  (2)  (3)  (4) 

13. Which one of the following compound is least reactive towards EtO^{-}/EtOH ?

(1)  (2)  (3)  (4) 

14. Correct statement for E2 Reaction is :
(1) It is a two step process.
(2) It is an unimolecular reaction
(3) Strong base favours
(4) Carbanion is formed during the reaction

15. Arrange the following in decreasing order of stability of their transition state during elimination by strong base

 I  II  III

(1) II > I > III (2) II > III > I (3) I > III > II (4) I > II > III

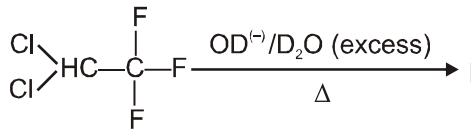
16. For the reaction $CH_3CH(X)CH_2CH_3 \xrightarrow[\Delta]{\text{alc. KOH}} CH_3–CH=CH–CH_3 + CH_2=CH–CH_2–CH_3$

(1) CH_3–CH=CH–CH_3 predominates. (2) CH_2=CH–CH_2–CH_3 predominates.
(3) Both are formed in equal amounts. (4) The product ratio depends upon the type of X.

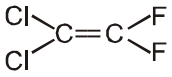
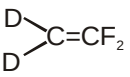
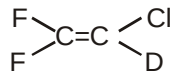
Section (G) : Unimolecular Elimination Reaction with respect of conjugate Base (E1cB)

1. D-exchange is observed in :
(1) E1 (2) E2 (3) E1cB (4) none of these

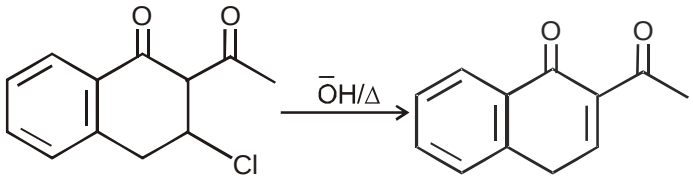
2. Reaction intermediate of E1cB reaction is :
(1) Carbocation (2) Carbanion (3) Benzyne (4) Free radical

3. 

possible product is/ are :

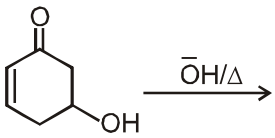
(I)  (II) $Cl_2CD–CF_3$ (III)  (IV) 

(1) I & II (2) I & III (3) I only (4) I & IV

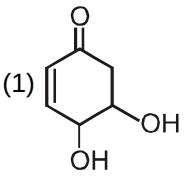
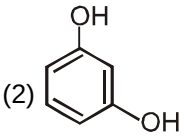
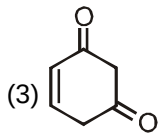
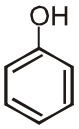
4. 

The above reaction is example of :

(1) E 2 (2) E 1 (3) S_N2 (4) E1cB

5. 

Product is :

(1)  (2)  (3)  (4) 

Section (H) : Nucleophilic Substitution Reaction of Alcohol

1. Primary, secondary and tertiary alcohols are distinguished by

(1) Oxidation method (2) Lucas test (3) Victor mayer's test (4) All of the above

2. Power alcohol is the mixture of :

(1) Absolute alcohol + Methyl alcohol (2) Absolute alcohol + Petrol

(3) Rectified alcohol + Petrol (4) Denatured alcohol + Petrol

3. For the reaction, $C_2H_5OH + HX \xrightarrow{ZnX_2} C_2H_5X$, the order of reactivity is :

(1) HI > HCl > HBr (2) HI > HBr > HCl (3) HCl > HBr > HI (4) HBr > HI > HCl

4. The reaction, Alcohol + HCl $\rightleftharpoons$ Alkyl halide + H_2O is reversible. For the completion of the reaction..... is used

(1) Anhydrous $ZnCl_2$ (2) Concentrated H_2SO_4 (3) Excess of water (4) Calcium chloride

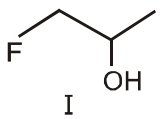
5. Which of the following major product will be obtained when neopentyl alcohol is treated with conc. HCl in presence of $ZnCl_2$

(1) t-butyl chloride (2) isobutylene (3) t-pentyl chloride (4) Neo pentyl chloride

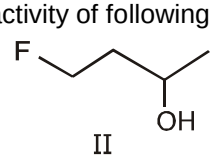
6. In Lucas test of alcohols, the appearance of cloudiness is due to the formation of-

(1) Aldehydes (2) Ketones (3) Acid chlorides (4) Alkyl chlorides

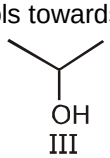
7. The correct order of reactivity of following alcohols towards conc.HCl/$ZnCl_2$ is :



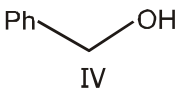
I



II



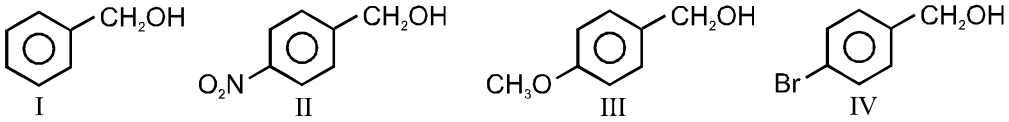
III



IV

(1) I > II > III > IV (2) I > III > II > IV (3) IV > III > II > I (4) IV > III > I > II

8. Consider the following alcohols :



I II III IV

The order of decreasing reactivities of these alochols towards nucleophilic substitution with HBr is

(1) III > I > IV > II (2) III > I > II > IV (3) I > III > IV > II (4) I > III > II > IV

9. Thionyl chloride method is preferred over phosphorus pentachloride method for the preparation of alkyl chloride because-

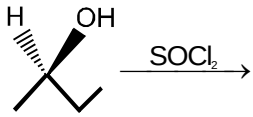
(1) The reaction goes to completion.

(2) The by-products being gases escape into the atmosphere leaving behind almost pure alkyl chloride.

(3) Thionyl chloride is cheap while phosphorus pentachloride is costly.

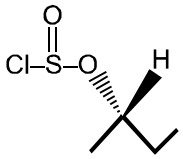
(4) None of the above.

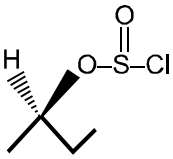
10. The product formed in the reaction ?



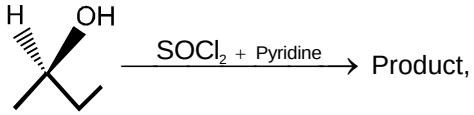
(1) 

(2) 

(3) 

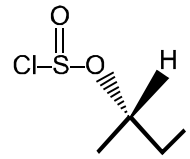
(4) 

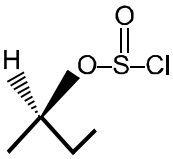
11. The product formed in the reaction ?



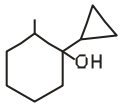
(1) 

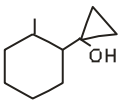
(2) 

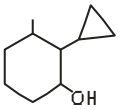
(3) 

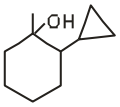
(4) 

12. Which of the following give fastest reaction with Lucas reagent ?

(1) 

(2) 

(3) 

(4) 

13. What is the correct order of reactivity of alcohols in the following reaction?

$R–OH + HCl + ZnCl_2 \rightarrow R–Cl + H_2O$

(1) Ethanol > Propan–1–ol > Butan–1–ol

(2) Butan–1–ol > Propan–1–ol > Butan–2–ol

(3) Neopentyl alcohol > t-Butyl alcohol > Methanol

(4) t-Butyl alcohol > Butan–2–ol > Propan–1–ol

Section (I) : Elimination Reaction of Alcohol

1. Dehydration of alcohol is an example of :

(1) addition reaction (2) substitution reaction (3) elimination reaction (4) rearrangement

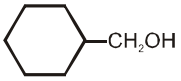
2. Which of the following can work as dehydrating agent for alcohols ?

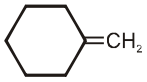
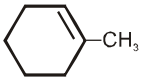
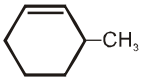
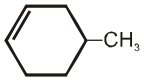
(1) H_2SO_4 (2) Al_2O_3 (3) H_3PO_4 (4) All of these

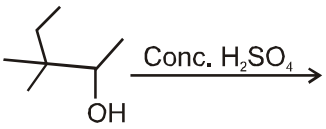
3. Which of the following step is involved in the acid catalysed dehydration of alcohols ?

(1) Expulsion of a OH^- ion (2) A free radical intermediate formation

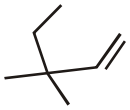
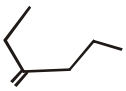
(3) A carbocation intermediate formation (4) A carbanion intermediate formation

4.  on dehydration with conc. H_2SO_4 predominantly forms

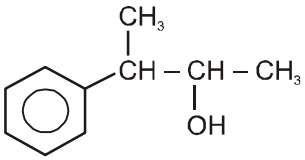
(1)  (2)  (3)  (4) 

5. 

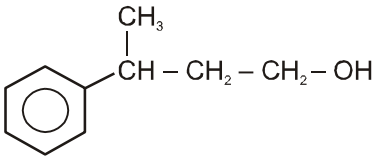
Major product is :

(1)  (2)  (3)  (4) 

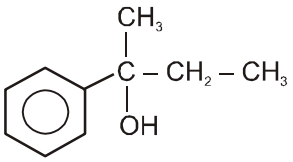
6. The relative rate of acid catalysed dehydration of following alcohols would be :



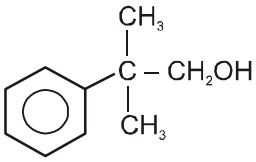
I



II



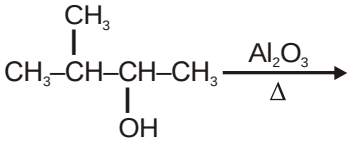
III

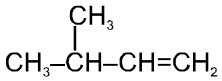
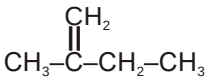
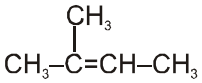


IV

(1) III > I > IV > II (2) III >IV > I > II (3) I > III > IV > II (4) III > IV > I > II

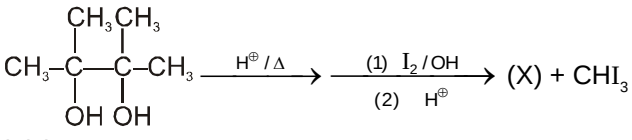
7. Major product of the given reaction is :



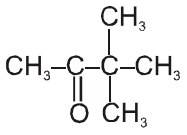
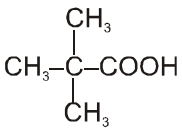
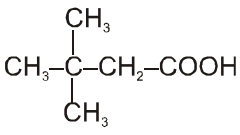
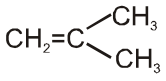
(1)  (2)  (3)  (4) $CH_3–CH_2–CH_2–CH=CH_2$

8. Pinacol –Pinacolone reaction is an example of -

(1) Elimination (2) Substitution (3) Addition (4) isomerisation

9. 

(X) is

(1)  (2)  (3)  (4) 

10. The correct order of migratary aptitude in pinacole-pinacolone rearrangement is :

(1) MeO > Me > O_2N

(2) MeO < Me < O_2N

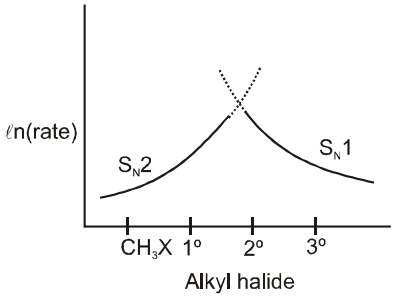
(3) Me > MeO > O_2N

(4) O_2N > MeO > Me

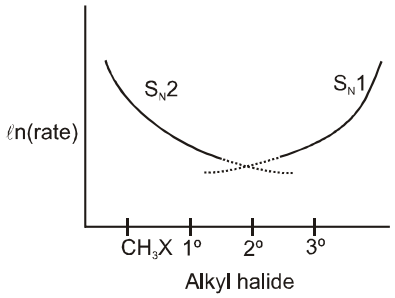
Section (J) : Comparision of Mechanism

1. Which of the following curves correctly represents S_N1 vs S_N2 ?

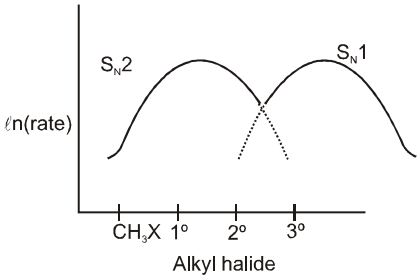
(1)



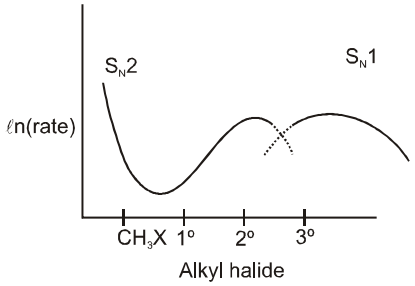
(2)



(3)

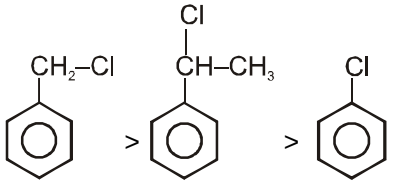


(4)



2. Which one is correct order of both S_N1 and S_N2 reaction of alkyl halide ?

(1) CH_2= CH–CH_2–Cl > CH_3–CH_2–CH_2–Cl > CH_3–CH=CH–Cl

(2) 

(3) R –O–CH_2– Br > R–CH_2–CH_2–Br > R–CH(–CH_3)–CH_2–Br

(4) CH_3–CH_2–CH_2–CH_2–Br > CH_3–CH_2–CH(CH_3)–Br > CH_3–CH(CH_3)–CH_2–Br

3. The correct order of S_N2 / E2 ratio for the % yield of product of the following halide is :

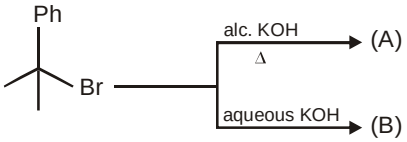
(P) $CH_3 - CH_2 - C(Ph)(I) - CH_3$

(Q) $CH_3 - CH(Ph) - CH(I) - CH_3$

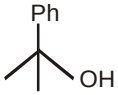
(R) $CH_3 - CH_2 - I$

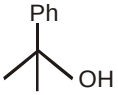
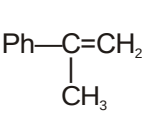
(S) $CH_3 - CH - CH(I) - CH_3$

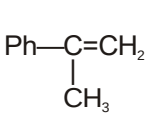
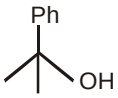
(1) R > S > Q > P (2) R > Q > S > P (3) P > R > S > Q (4) Q > P > R > S

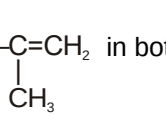
4. 

'A' & 'B' are respectively :

(1)  in both case

(2)  and 

(3)  and 

(4)  in both case

Section (K) : Method of Preparation of Ethers & S_N reaction of ether

1. When ethyl iodide is heated with dry silver oxide, if forms-
(1) Ethyl alcohol (2) Diethyl ether (3) Silver ethoxide (4) Ethyl methyl ether

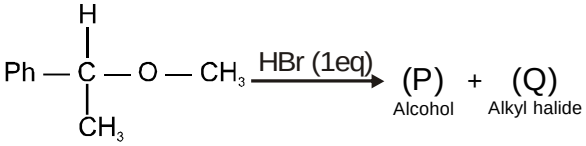
2. Diethyl ether absorbs oxygen to form :
(1) acetic acid (2) acetaldehyde (3) ether peroxide (4) none of these

3. When excess of ethyl alcohol heated at 140°C with concentrate sulphuric acid the compound that distill is:
(1) $C_2H_5—O—C_2H_5$ (2) Ethyl hydrogen sulphate
(3) $CH_2 = CH_2$ (4) di ethyl sulphate

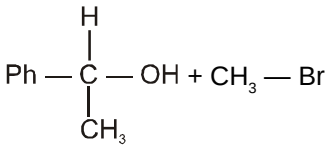
4. In the given reaction [X] and [Y] will be :

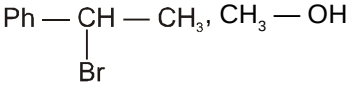
$CH_3 – CH_2 – CH_2 – O – CH_3 \xrightarrow{HCl\ (1eq)} [X] + [Y]$

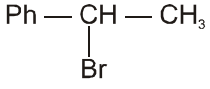
(1) $CH_3–CH_2 –CH_2OH$ & $CH_3–Cl$ (2) $CH_3–CH_2–CH_2–Cl$ & $CH_3–OH$
(3) $CH_3–CH_2–CH_2–Cl$ & CH_2Cl_2 (4) $CH_3–CH_2 –CH_2OH$ & $CH_3–OH$

5. 

(P), (Q) respectively.

(1) 

(2) 

(3) $CH_3 — OH$, 

(4) $CH_3 — OH + PH — CH_2 — CH_2 — Br$

6. $Ph–O–CH_2–Ph \xrightarrow[excess]{HI}$ Products

(1)Ph–OH & $Ph–CH_2–I$ (2) Ph–OH & $Ph–CH_2–OH$
(3)Ph–I & $Ph–CH_2–OH$ (4) Ph–I & $Ph–CH_2–I$

Section (L) : Polyhalogen compounds

1. Which of the following is a geminal dihalides ?
(1) Ethylene bromide (2) Propylidene chloride (3) Propylene bromide (4) Isopropyl bromide

2. If chloroform is left open in air in presence of sun-rays :

(1) Phosgene gas is formed (2) Explosion takes place
(3) Polymerisation take place (4) No reaction take place

3. The purity of $CHCl_3$ can be checked by treating with :
(1) NaOH (2) HCl (3) $AgNO_3$ (4) C_2H_5–OH

4. Pure $CHCl_3$ and pure CHI_3 can be distinguished by :
(1) treating with litmus paper (2) treating with aq. KOH
(3) treating with HCl (4) treating with $AgNO_3$

5. Freon used as refrigerant is :
(1) $CF_2 == CF_2$ (2) CH_2F_2 (3) CCl_2F_2 (4) CF_4

6. CCl_4 is a well known fire extinguisher. However after using it to extinguish fire, the room should be well ventilated. This is because.
(1) It is inflammable at higher temperature.
(2) It is toxic.
(3) It produces phosgene by reaction with water vapours at high temperatures.
(4) It is corrosive.

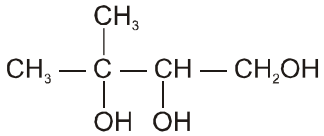
7. Chloropicrin is :
(1) Picric acid derivative (2) Nitrochloroform (3) Nitromethane (4) Nitroethylchloride

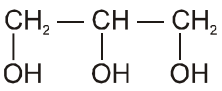
8. $AgNO_3$ does not give precipitate with $CHCl_3$ because :
(1) $AgNO_3$ is chemically inert (2) $CHCl_3$ is chemically inert.
(3) $CHCl_3$ does not ionise in water. (4) None of the above.

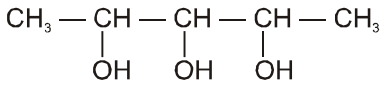
9. Glycol on treatment with PI_3 gives mainly :
(1) ethylene (2) ethylene iodide (3) ethyl iodide (4) ethane

10. The boiling points of alcohols are much higher than those of hydrocarbons of comparable molecular masses. This is due to :
(1) Dipole-dipole interactions (2) Intermolecular hydrogen bonding
(3) Van der Waal's forces of attraction (4) Intramolecular hydrogen bonding

11. Which one of the following is a trihydric alcohol containing only secondary hydroxyl group?

(1) 

(2) 

(3) 

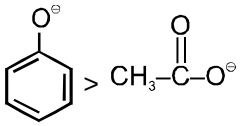
(4) None of these

12. Which of the following is poisonous?
(1) Methanol (2) Ethanol (3) Glycerol (4) Castor oil

Exercise-2

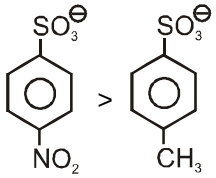
ONLY ONE OPTION CORRECT TYPE

1. Which of the following is **incorrect** order for leaving group ability in S_N reaction ?

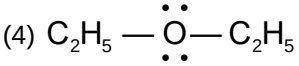
(1)  >

(2) $CF_3SO_3^{\ominus} > CH_3SO_3^{\ominus}$

(3) $Cl^{\ominus} > F^{\ominus}$

(4) 

2. Which of the following is not a lewis base?

(1) $AlCl_3$ (2) $(CH_3)_2NH$ (3) C_2H_5OH (4) 

3. Which of the following is not a nucleophile ?

(1) CH_3ONa (2) PhLi (3) PH_3 (4) $\overset{\oplus}{N}H_4$

4. Which of the following statement is not true ?

(1) Nucleophiles possess unshared pairs of electron which are utillized in forming bonds with electrophilic substrate.

(2) The cyanide ion is an ambident nucleophile and causes nucleophilic substitution of alkyl halide by either of its carbon atom or nitrogen atom.

(3) The nitrite ion is an ambident nucleophile and causes nucleophilic substitution of alkyl halide by either of its oxygen atom or nitrogen atom.

(4) Strength of nucleophile generally decreases on going down a group in the periodic table.

5. Which one of the following has maximum nucleophilicity :

(1) $CH_3S^{\ominus}$ (2) $C_6H_5-\overset{\ominus}{O}$ (3) Et_3N (4) $F^{\ominus}$

6. The best leaving group (nucelofuge) is :

(1) $(CH_3)_2S$ (2) $(CH_3)_2NH$ (3) $(CH_3)_2O$ (4) CH_3OH

7. For the following the increasing order of nucleophilicity would be :

(i) I^- (ii) Cl^- (iii) Br^-

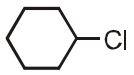
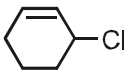
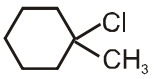
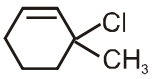
(1) $I^- < Cl^- < Br^-$ (2) $Br^- < Cl^- < I^-$ (3) $I^- < Br^- < Cl^-$ (4) $Cl^- < Br^- < I^-$

8. The correct order of decreasing nucleophilicity for the following is :

(I) CH_3O^-, (II) H_2O (III) OH^- (IV) CH_3COO^-

(1) I > II > III > IV (2) III > II > IV > I (3) I > III > IV > II (4) II > III > I > IV

9. Which among the following compounds will be most reactive for S_N1 reaction ?

(1)  (2)  (3)  (4) 

10. Among the following, the one which reacts most readily with ethanol is

(1) p-nitro benzyl bromide (2) p-chloro benzyl bromide

(3) p-methoxy benzyl bromide (4) p-methyl benzyl bromide

11. Select the **incorrect** statement among the following :

(1) S_N1 reaction involve two steps (2) S_N2 reactions involve single step

(3) S_N2 reaction involves transition state (4) S_N2 reaction involve carbonium ion intermediate

12. Which of the following statement is correct for S_N1 reaction :

(1) Intermediate of S_N1 reaction is carbocation.

(2) It is two step process.

(3) Its rate depends only on concentration of reactant.

(4) All of these

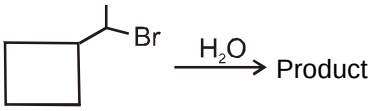
13. When the concentration of alkyl halide is doubled and the amount of H_2O taken as solvent is reduced to half, the rate of S_N1 reaction increases by:

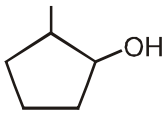
(1) 3 times (2) 2 times (3) 1.5 times (4) 6 times

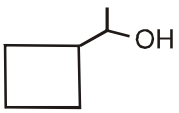
14. Which of the following alkyl halide is most reactive towards S_N1 reaction :

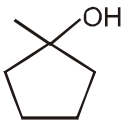
(1) $CH_3 - CH_2 - Cl$ (2) $CH_3-\underset{\displaystyle Cl}{\underset{|}{CH}}-CH_3$ (3) $CH_3 - CH_2 - CH_2 - Cl$ (4) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}-Cl$

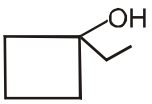
15. What will be the major product of the following reaction ?



(1) 

(2) 

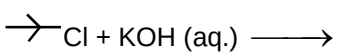
(3) 

(4) 

16. Which one of the following compounds will give (d) and (ℓ) form in S_N1 reaction (as major product) ?

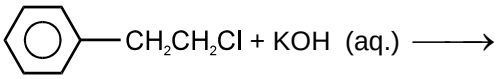
(1) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}-Br$ (2) $CH_3-\underset{\displaystyle C_2H_5}{\underset{|}{\overset{\displaystyle C_2H_5}{\overset{|}{C}}}}-Br$ (3) $CH_3-\underset{\displaystyle C_2H_5}{\underset{|}{\overset{\displaystyle H}{\overset{|}{C}}}}-Br$ (4) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle H}{\overset{|}{C}}}}-Br$

17. S_N1 reaction is most feasible in :

(1) 

(2) 

(3) 

(4) 

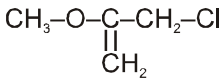
18. (R)-2-Bromobutane is allowed to react with aqueous KOH. Identify the product formed in the reaction ?

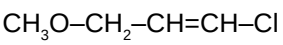
(1) $H-\underset{\displaystyle C_2H_5}{\overset{\displaystyle CH_3}{C}}-OH$ (2) $HO-\underset{\displaystyle C_2H_5}{\overset{\displaystyle CH_3}{C}}-H$

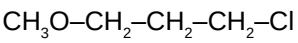
(3) Equimolar amount of (1) & (2) (4) None of these

19. Which of them is correct order for solvolysis rate in aqueous acetone ?

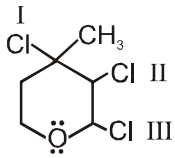
$CH_3O-CH=CH-CH_2-Cl$ P


Q


R

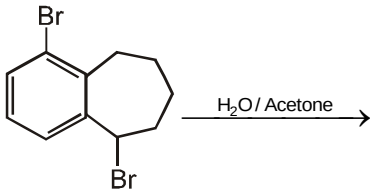

S

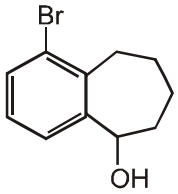
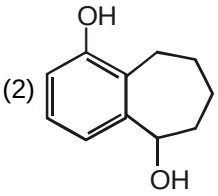
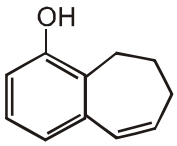
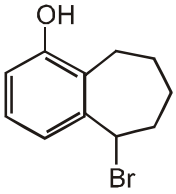
(1) R > P > Q > S (2) P > Q > R > S (3) Q > P > S > R (4) P > Q > S > R

20. 

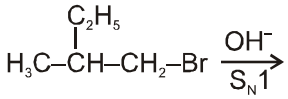
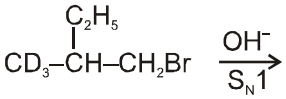
The rate of reaction with $AgNO_3$ will be :

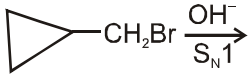
(1) I > II > III (2) III > I > II (3) III > II > I (4) I > III > II

21. 
(A) ; Product (A) is :

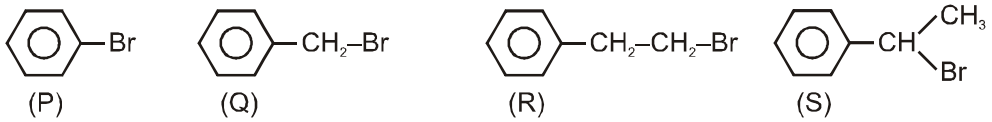
(1)  (2)  (3)  (4) 

22. In which case racemisation take's place ?

(1)  (2) 

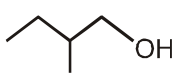
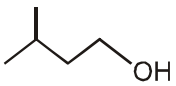
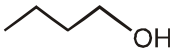
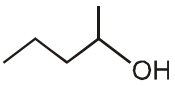
(3)  (4) All of these

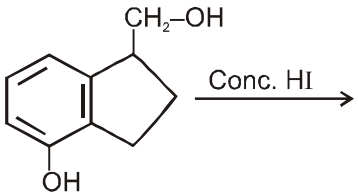
23. The correct order of rate of S_N1 reaction is :

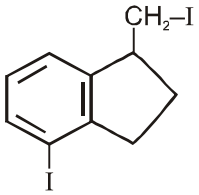
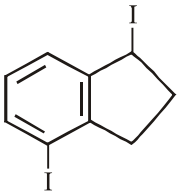
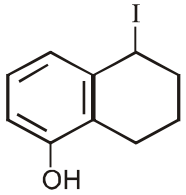
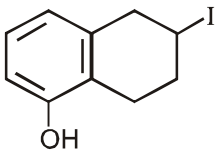

(P) (Q) (R) (S)

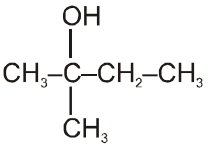
(1) S > Q > R > P (2) S > R > P > Q (3) P > Q > R > S (4) S > R > Q > P

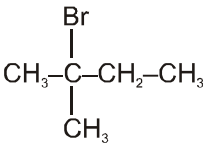
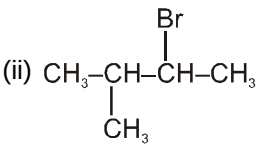
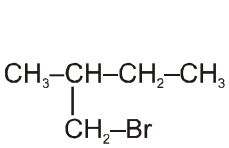
24. Which of the following is most reactive towards S_N1 reaction :

(1)  (2)  (3)  (4) 

25.  major Product is :

(1) 
(2) 
(3) 
(4) 

26. Which of the following can give  (2-methylbutan-2-ol) as major product :

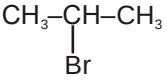
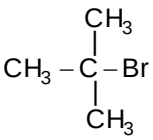
(i) 
(ii) 
(iii) 

(1) i, ii & iii (2) II & iii only (3) i & iii only (4) i & ii only

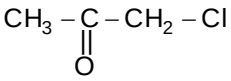
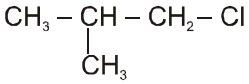
27. In S_N2 reaction if we doubled the concentration of reactant and nucleophile the rate of S_N2 reaction increases by :

(1) 2 times (2) 4 times (3) 8 times (4) No change

28. Compound having maximum reactivity towards S_N2 reaction is :

(1) $CH_3 - CH_2 - Br$ (2) $CH_3 - CH_2 - CH_2 - Br$ (3)  (4) 

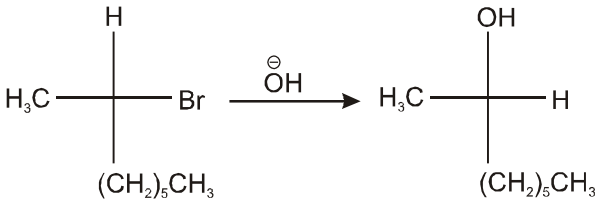
29. The decreasing order of rate of S_N2 reaction is :

$CH_3–Cl$   $CH_3–CH_2–Cl$

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

(1) IV > III > II > I (2) II > III > I > IV (3) II > I > IV > III (4) none

30. Following reaction is :



(1) E1 (2) S_N1 (3) E2 (4) S_N2

31. $C_4H_8Cl_2 \xrightarrow{\text{aq. NaOH}}$ Compound (Y)
(X)
If compound (Y) can give yellow precipitate with both 2, 4-DNP and I_2 / NaOH then (X) can be :

(1) $CH_3-\underset{\underset{Cl}{|}}{CH}-\underset{\underset{Cl}{|}}{CH}-CH_3$ (2) $CH_3-\underset{\underset{Cl}{|}}{\overset{\overset{Cl}{|}}{C}}-CH_2-CH_3$

(3) $CH_3–CH_2–CH_2–CHCl_2$ (4) $Cl–CH_2–CH_2–CH_2–CH_2–Cl$

32. An S_N2 reaction at an asymmetric carbon of a compound always gives :
(1) an enantiomer of the substrate (2) a product with opposite optical rotation
(3) a mixture of diastereomers (4) a single stereoisomer

33. Which of the following alkyl chlorides will undergo S_N2 reaction most readily ?
(1) 1-chloro-4-methylpentane (2) 2-chloro-4-methylpentane
(3) 2-chloro-2-methylpentane (4) 3-chloro-2-methylpentane

34. The correct sequence of reagents for following reaction is :
$CH_3 – CH_3 \longrightarrow CH_3 – CH_2 –CN$
(1) (i) HCl (ii) KCN (2) KCN
(3) (i) $Cl_2/h\nu$ (monochlorination) (ii) KCN (4) (i) NaCl (ii) KCN

35. In which of the following reaction the product obtained is t-butylmethyl ether ?

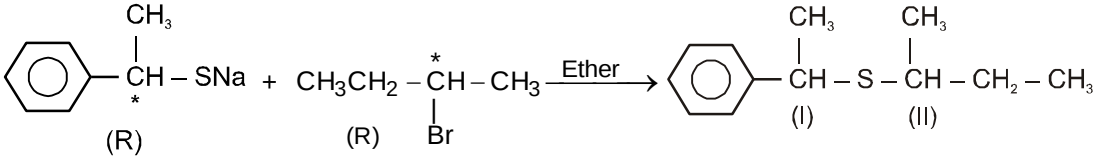
(1) $CH_3OH + HO—CH_2—CH_3 \xrightarrow{\text{conc.}H_2SO_4}$

(2) $CH_3—\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}—Br + CH_3OH \xrightarrow{NaOH}$

(3) $CH_3Br + Na^+O^-—\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}—CH_3 \longrightarrow$

(4) $CH_3O^-Na^+ + CH_3—\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}—Br \longrightarrow$

36. Which configuration will be adopted by the product at cabon atoms marked (I) and (II) respectively in the given reaction.



(1) R, R (2) R, S (3) S, S (4) S, R

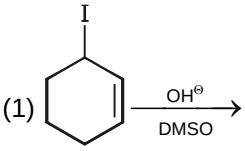
37. What is the final product of the following reaction ?

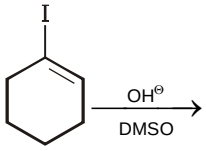
$CH_2–CH_2–CH_2–CH_2 \xrightarrow[1\text{ eq.}]{KOH}$ Product
| |
Br OH

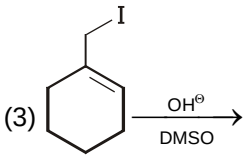
(1) $CH_2–CH_2–CH_2–CH_2$ (2)
| |
OH OH

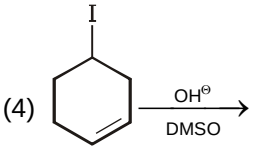
(3) (4)

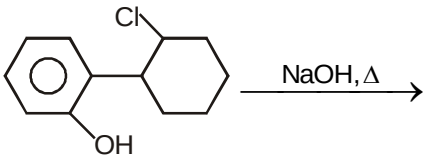
38. Which of the following reaction is most readily completed ?

(1) 

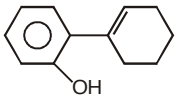
(2) 

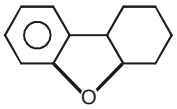
(3) 

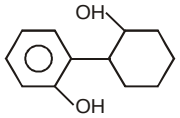
(4) 

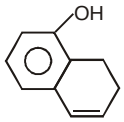
39. 

Major product is :

(1) 

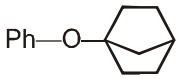
(2) 

(3) 

(4) 

40. Which of the following ether can be prepared by williamson's synthesis method. ?

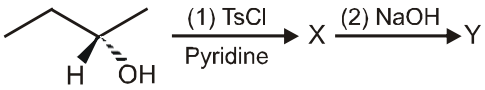
(1) Ph–O–Ph (2) $(CH_3)_3C–O–C(CH_3)_3$

(3) 

(4) Ph–O–CH_2–Ph

41. Reaction of alkyl halides with ethanolic KCN predominantly gives :

(1) Alkyl carbylamines (2) Alkyl cyanides (3) Nitroalkanes (4) Alkyl nitrites

42. 

Which is correct option for the above reaction.

(1) Reaction 2nd follows unimolecular mechanism mainly.

(2) Reactant & product Y have same configuration

(3) In the reaction 2nd Walden inversion takes place at α carbon.

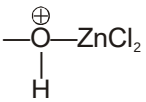
(4) All are correct.

43. Which of the following is most reactive towards nucleophilic substitution reaction by both S_N1 and S_N2 mechanism ?

(1) $H_2C=CH–Cl$ (2) C_6H_5Cl (3) $CH_3CH=CHCl$ (4) $ClCH_2–CH=CH_2$

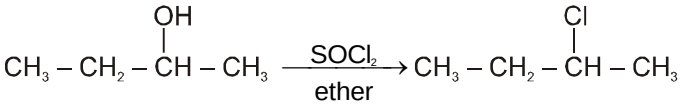
44. $CH_3CH_2OH + HCl \xrightarrow{ZnCl_2} CH_3CH_2Cl + H_2O$

In the above reaction, the leaving group is :

(1) $HO^{\ominus}$ (2) H_2O (3) 

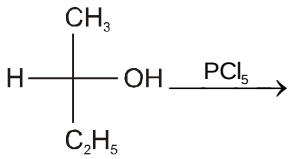
(4) $H_3O^{\oplus}$

45. Consider the following reaction ;



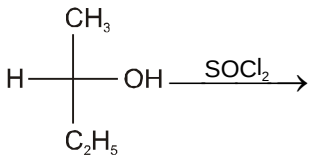
In the above reaction which phenomenon will take place :

(1) Inversion (2) Retention (3) Racemisation (4) Isomerisation

46.  X ; (X) is :

(D-2-Butanol)

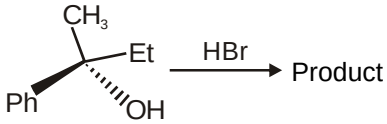
(1) S-2-Chlorobutane (2) R - 2-Chlorobutane
(3) mixture of R and S 2-Chlorobutane (4) 1-Chlorobutane

47.  X ; (X) is :

(D-2-Butanol)

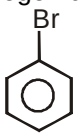
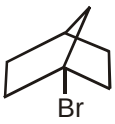
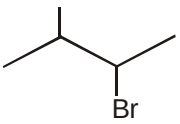
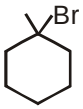
(1) S-2-Chlorobutane (2) R - 2-Chlorobutane
(3) mixture of R and S 2-Chlorobutane (4) 1-Chlorobutane

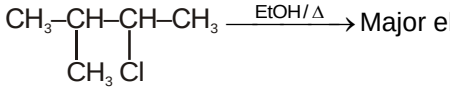
48. Which describes the best stereochemical aspects of the following reaction ?



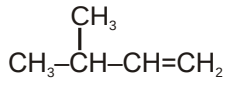
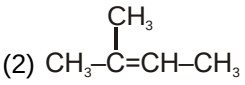
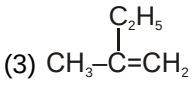
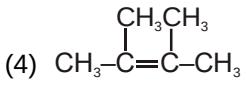
(1) Inversion of configuration occurs at the carbon undergoing substitution.
(2) Retention of configuration occurs at the carbon undergoing substitution.
(3) Racemization occurs at the carbon undergoing substitution.
(4) The carbon undergoing substitution is not stereogenic.

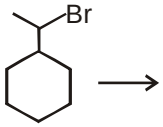
49. Halogen derivative having maximum rate of E1 reaction :

(1)  (2)  (3)  (4) 

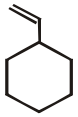
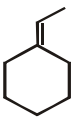
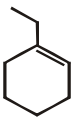
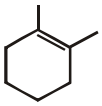
50.  Major elimination product X.

X is :

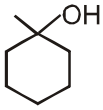
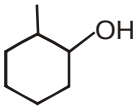
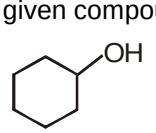
(1)  (2)  (3)  (4) 

51.  Major elimination product X.

X is :

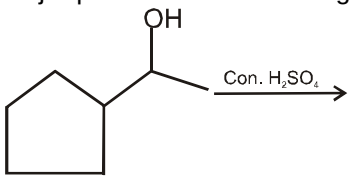
(1)  (2)  (3)  (4) 

52. Correct decreasing order of reactivity of given compounds towards E1 reaction is

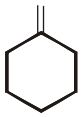
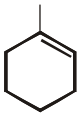
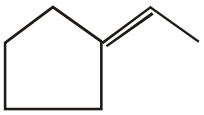
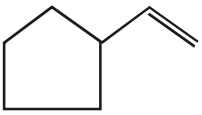
 (I)  (II)  (III)

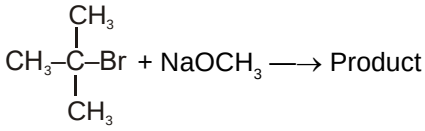
(1) I > II > III (2) I > III > II (3) III > I > II (4) II > III > I

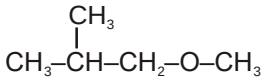
53. Major product of the following reaction is :

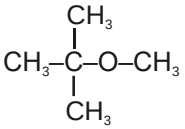


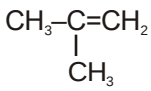
Product

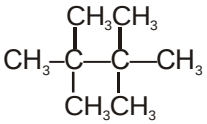
(1)  (2)  (3)  (4) 

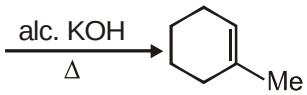
54. 

(1) 

(2) 

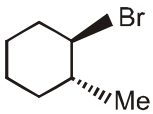
(3) 

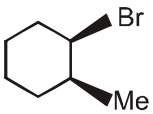
(4) 

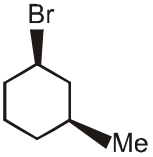
55. (X) 

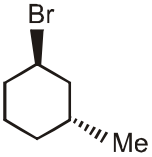
(major)

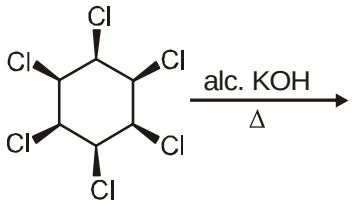
X is :

(1) 

(2) 

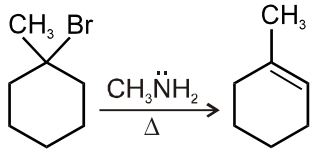
(3) 

(4) 

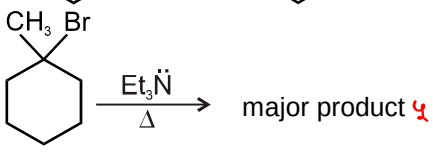
56. 

major product is :

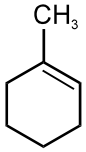
(1) 1,2,3-Trichlorobenzene (2) 1,3,5-Trichlorobenzene
(3) Benzene (4) Hexachlorobenzene

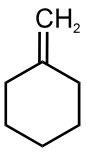
57. If 

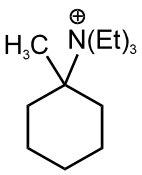
; Then what will be the major product of the following reaction



major product ५

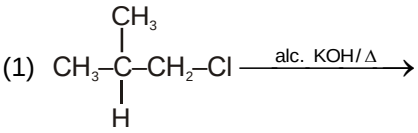
(1) 

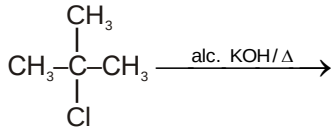
(2) 

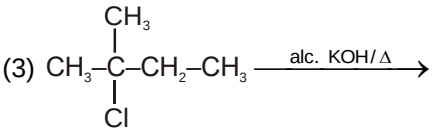
(3) 

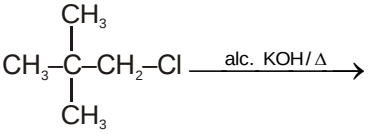
(4) 2 & 3 both

58. In which of the following reaction, regioselectivity can be observed ?

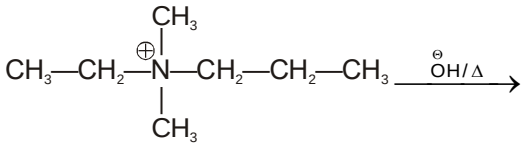
(1) 

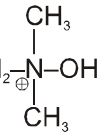
(2) 

(3) 

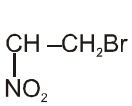
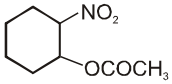
(4) 

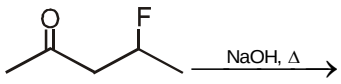
59. Identify the major product in the following reaction ?



(1) $CH_3–CH=CH_2$ (2) $CH_2= CH_2$ (3)  (4) CH_3OH

60. On reaction with base which can gives elimination by E1 cB reaction.

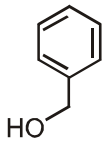
(1) $CF_3 – CHCl_2$ (2)  (3)  (4) All of these

61.  (Product)

The major product of the above reaction is obtained by mechanism

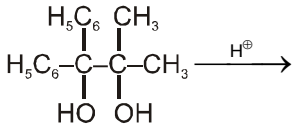
(1) S_N2 (2) E2 (3) E1cB (4) S_N2, E2 mixed mechanism

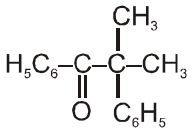
62. Which of them can be dehydrated by conc. H_2SO_4 at elevated temprature?

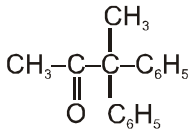
(1)  (2) $CH_3–OH$ (3)  (4) None of these

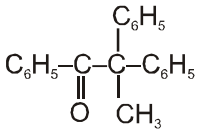
63. The major product obtained on acid–catalysed dehydration of 2–Phenylbutan -2-ol is :

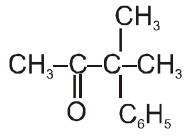
(1) 2-Phenylbut-1- ene (2) 2-Phenylbut-2- ene (3) 3-Phenylbut-1- ene (4) None of these

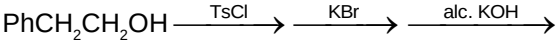
64.  Product is

(1) 

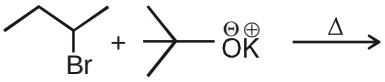
(2) 

(3) 

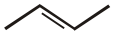
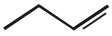
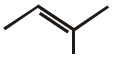
(4) 

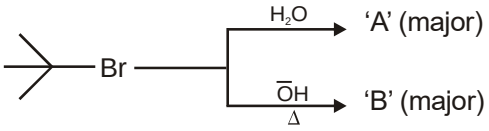
65.  product is

(1) $PhCH_2CH_2Br$ (2) $PhCH_2CH_2OH$ (3) $Ph–CH=CH_2$ (4) $PhCH(OH)CH_3$

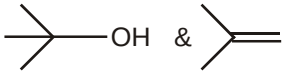
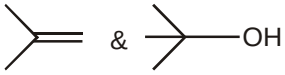
66. 

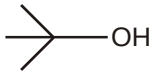
The major product of the above reaction :

(1)  (2)  (3)  (4) 

67. 

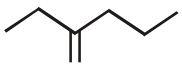
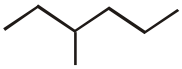
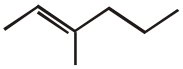
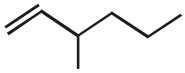
'A' and 'B' are respectively

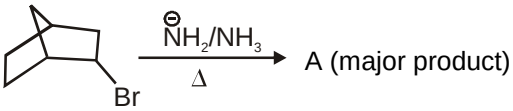
(1)  (2) 

(3)  in both case (4)  In both case

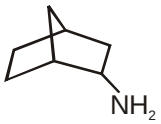
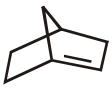
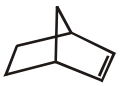
68. 

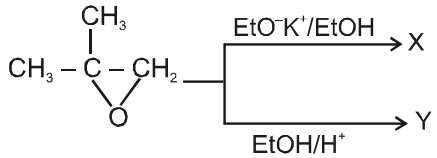
The major product 'X' is :

(1)  (2)  (3)  (4) 

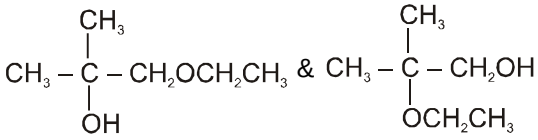
69. 

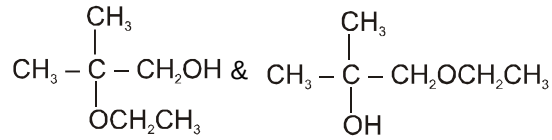
'A' is

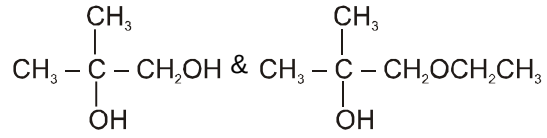
(1)  (2)  (3)  (4) 

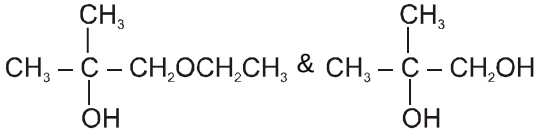
70. 

The product X and Y are respectively :

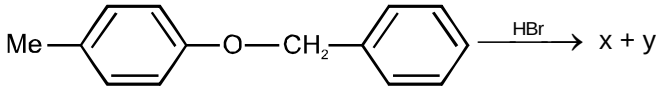
(1) 

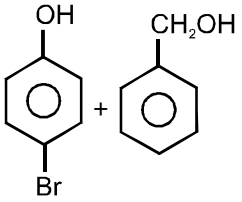
(2) 

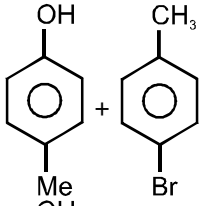
(3) 

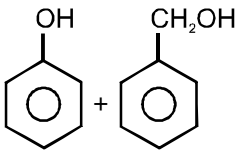
(4) 

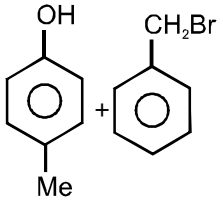
71. (X) and (Y) in the following reaction are respectively :



(1) 

(2) 

(3) 

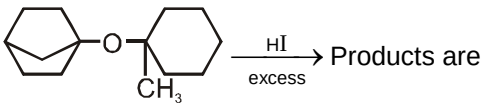
(4) 

72. Phosgene is a poisonous gas obtained in chloroform bottles, substance used to make it non-poisonous is :
(1) Formic acid (2) Ethanol (3) Dichloro methane (4) CH_3COOH

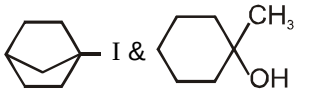
73. The compounds used as refrigerant are:
(1) NH_3 (2) CCl_4 (3) CF_4 (4) CF_2Cl_2

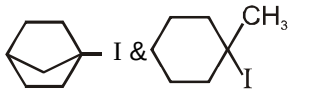
74. What product is formed when diethyl ether on exposure to sunlight and air with a long period :
(1) Peroxide (2) Ethyl alcohol (3) Di-ethyl ketone (4) Ethane

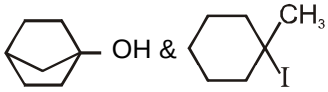
75. When CH_3CH_2Br reacts with sodium acetylide, the main product is :
(1) 1–Butyne (2) 1–Butene (3) 2–Butene (4) 2–Butyne

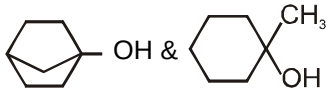
76. 

Products are

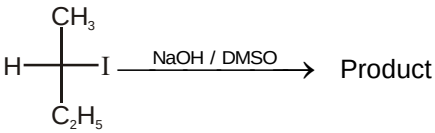
(1) 

(2) 

(3) 

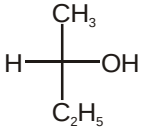
(4) 

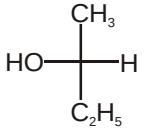
77. $CH_3– C \equiv CH + Na \longrightarrow X \xrightarrow{CH_3–Br} Y$, Y is
(1) $CH_3– C \equiv C–CH_2 – CH_3$ (2) $CH_3– C \equiv C– CH_3$
(3) $CH_3– CH_2–C \equiv C–H$ (4) $CH_3–CH = CH–CH_3$

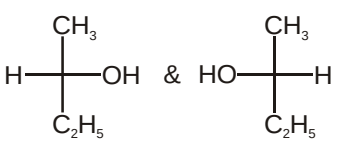
78. 

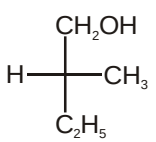
Product

Product is

(1) 

(2) 

(3) 

(4) 

Exercise-3

PART - I : NEET / AIPMT QUESTION (PREVIOUS YEARS)

1. Reactivity order of halides for dehydrohalogenation is **[AIPMT 2002]**

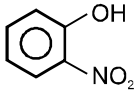
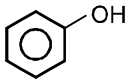
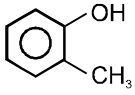
(1) R – F > R – Cl > R – Br > R – I (2) R – I > R – Br > R – Cl > R – F

(3) R – I > R – Cl > R – Br > R – F (4) R – F > R – I > R – Br > R – Cl

2. Which of the following is least reactive in a nucleophilic substitution reaction ? **[AIPMT 2004]**

(1) $(CH_3)_3$ C–Cl (2) CH_2 = CHCl (3) CH_3CH_2Cl (4) CH_2 =$CHCH_2Cl$

3. Which one of the following compound is most acidic ? **[AIPMT 2005]**

(1) $ClCH_2–CH_2OH$ (2)  (3)  (4) 

4. Consider the following reaction, **[AIPMT 2005]**

$$\text{Ethanol} \xrightarrow{PBr_3} X \xrightarrow{\text{alc. KOH}} Y \xrightarrow[\text{(ii) } H_2O,\ \text{heat}]{\text{(i) } H_2SO_4,\ \text{room temperature}} Z\ ;$$

the product Z, is

(1) CH_2=CH_2 (2) $CH_3CH_2OCH_2CH_3$ (3) $CH_3CH_2OSO_3H$ (4) CH_3CH_2OH

5. The major organic product in the reaction, **[AIPMT 2006]**

$CH_3OCH(CH_3)_2$ + HI $\rightarrow$Product, is/are

(1) $CH_3OH + (CH_3)_2CHI$ (2) $ICH_2OCH(CH_3)_2$ (3) $CH_3OC(CH_3)_2$ (I) (4) $CH_3I + (CH_3)_2CHOH$

6. In the reaction which of the following compounds will be formed? **[AIPMT 2007]**

$$H_3C-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2OCH_2-CH_3 + HI \xrightarrow{\text{Heated}} .....$$

(1) $H_3C-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-I + CH_3CH_2OH$ (2) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3 + CH_3CH_2OH$

(3) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2OH + CH_3CH_3$ (4) $H_3C-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2OH + CH_3CH_2I$

7. In a S_N2 substitution reaction which one of the following has the highest relative rate ? **[AIPMT 2008]**

$R — Br + Cl^- \xrightarrow{DMF} R — Cl + Br^-$

(1) $(CH_3)_3$ C — CH_2Br (2) CH_3CH_2Br (3) $CH_3CH_2CH_2Br$ (4) $(CH_3)_2$ CH — CH_2Br

8. Which of the following reactions is an example of nucleophilic substitution reaction ? **[AIPMT 2009]**

(1) RX + KOH $\longrightarrow$ ROH + KX (2) 2RX + 2Na $\longrightarrow$ R – R + 2NaX

(3) RX + H_2 $\longrightarrow$ RH + HX (4) RX + Mg $\longrightarrow$ RMgX

9. Consider the reactions : **[AIPMT 2011]**

(i) $(CH_3)_2\,CH–\,CH_2\,Br \xrightarrow{C_2H_5OH} (CH_3)_2\,CH–\,CH_2\,OC_2\,H_5 + HBr$

(ii) $(CH_3)_2\,CH–\,CH_2\,Br \xrightarrow{C_2H_5O^-} (CH_3)_2\,CH–\,CH_2\,OC_2\,H_5 + Br^-$

The mechanisms of reactions (i) and (ii) are respectively :

(1) S_N1 and S_N2 (2) S_N1 and S_N1 (3) S_N2 and S_N2 (4) S_N2 and S_N1

10. Among the following ethers, which one will produce methyl alcohol on treatment with hot concentrated HI ? **[NEET 2013]**

(1) $CH_3–CH_2–\underset{\displaystyle CH_3}{\underset{|}{CH}}–O–CH_3$

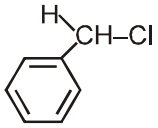
(2) $CH_3–\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}–O–CH_3$

(3) $CH_3–\underset{\displaystyle CH_3}{\underset{|}{CH}}–CH_2–O–CH_3$

(4) $CH_3 – CH_2 – CH_2 – CH_2 – O – CH_3$

11. In which of the following compounds, the C–Cl bond ionisation shall give most stable carbonium ion ? **[AIPMT-1 2015]**

(1) $H_3C–\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle H_3C}{\overset{|}{C}}}}–Cl$

(2) 

(3) $O_2NH_2C–\underset{\displaystyle H}{\underset{|}{C}}–Cl$

(4) $H_3C–\underset{\displaystyle H_3C}{\underset{|}{C}}(H)–Cl$

12. The reaction. **[AIPMT-1 2015]**

$CH_3–\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}–ONa + CH_3CH_2Cl \longrightarrow CH_2–\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}–O–CH_2–CH_3 – NaCl$ is called.

(1) Williamson continuous etherification process
(2) Etard reaction
(3) Gatterman-Koch reaction
(4) Williamson Synthesis

13. Which of the following reaction (s) can be used for the preparation of alkyl halideds ? **[AIPMT-2 2015]**

(I) $CH_3CH_2OH + HCl \xrightarrow{anh.\,ZnCl_2}$

(II) $CH_3CH_2OH + HCl \longrightarrow$

(III) $(CH_3)_3COH + HCl \longrightarrow$

(IV) $(CH_3)_2CHOH + HCl \xrightarrow{anh.\,ZnCl_2}$

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

14. Which of the following statements is not correct for a nucleophile ? **[AIPMT-2 2015]**

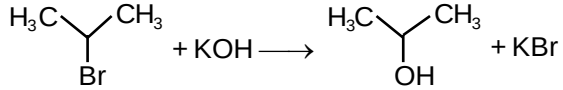
(1) Nucleophile is a Lewis acid (2) Ammonia is a nucleophile
(3) Nucleophiles attack low e^- density sites (4) Nucleophiles are not electron seeking.

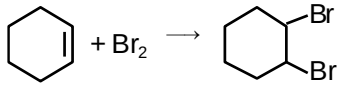
15. In an S_N1 reaction on chiral centres there is : **[AIPMT-2 2015]**

(1) 100 % racemization
(2) inversion more than retention leading to partial racemization
(3) 100 % retention
(4) 100 % inversion

16. For the following reaction : **[NEET-1 2016]**

(a) $CH_3CH_2CH_2Br + KOH \longrightarrow CH_3CH{=}CH_2 + KBr + H_2O$

(b) 

(c) 

Which of the following statements is correct ?

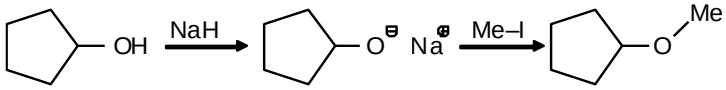
(1) (a) is substitution, (b) and (c) are addition reactions.

(2) (a) and (b) are elimination reactions and (c) is addition reaction.

(3) (a) is elimination, (b) is substitution and (c) is addition reaction.

(4) (a) is elimination, (b) and (c) are substitution reaction.

17. The reaction : **[NEET-1 2016]**



can be classified as :

(1) Williamson alcohol synthesis reaction (2) Williamson ether synthesis reaction

(3) Alcohol formation reaction (4) Dehydration reaction

18. In the reaction **[NEET-1 2016]**

$H{-}C{\equiv}CH \xrightarrow[(2)\,CH_3CH_2Br]{(1)NaNH_2\,/\,liq.NH_3} X \xrightarrow[(2)\,CH_3CH_2Br]{(1)NaNH_2\,/\,liq.NH_3} y$

X and Y are :

(1) X = 1-Butyne ; y = 2-Hexyne (2) X = 1-Butyne ; y = 3-Hexyne

(3) X = 2-Butyne ; y = 3-Hexyne (4) X = 2-Butyne ; 2 = 2-Hexyne

19. Consider the reaction : **[NEET-2 2016]**

$CH_3CH_2CH_2Br + NaCN \longrightarrow CH_3CH_2CH_2CN + NaBr$

This reaction will be the fastest in :

(1) water (2) ethanol

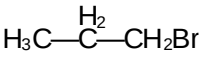
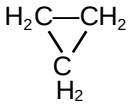
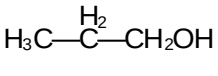
(3) methanol (4) N,N'-dimethylformamide (DMF)

20. Which of the following can be used as the halide component for Freidel–Crafts reaction? **[NEET-2 2016]**

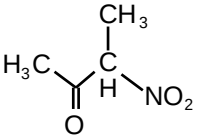
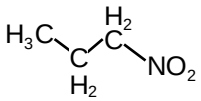
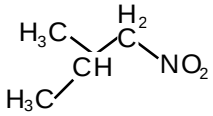
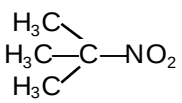
(1) Isopropyl chloride (2) Chlorobenzene

(3) Bromobenzene (4) Chloroethene

21. Which of the following compounds shall not produce propene by reaction with HBr followed by elimination or direct only elimination reaction ? **[NEET-2 2016]**

(1)  (2)  (3)  (4) $H_2C{=}C{=}O$

22. Which one of the following nitro-compounds does not react with nitrous acid **[NEET-2 2016]**

(1)  (2)  (3)  (4) 

23. The correct statement regarding electrohile is : **[NEET- 2017]**

(1) Electrophile is a negatively charged species and can form a bond by acepting a pair of electrons from a nucleophile

(2) Electrophile is a negatively charged species and can form a bond by acepting a pair of electrons from another electrophile

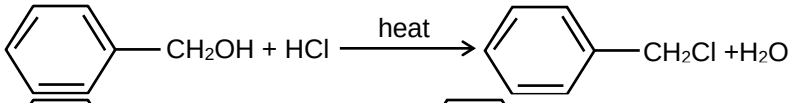
(3) Electrophiles are generally neutral species and can form a bond by accepting a pair of electrons from a nucleophile

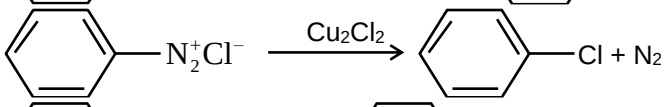
(4) Electrophile can be either neutral or positively charged species and can form a bond by accepting a pair of electrons from a nucleophile

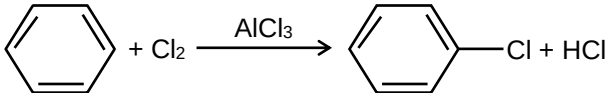
24. The heating of phenyl-methyl ethers with HI produces. **[NEET- 2017]**
(1) ethyl chlorides (2) iodobenzene (3) phenol (4) benzene

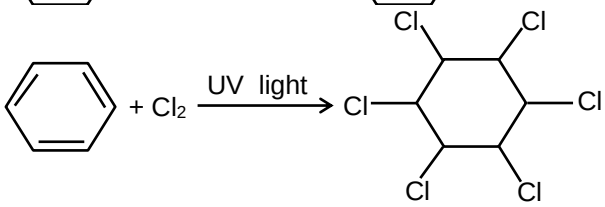
25. The compound A on treatment with Na gives B, and with PCl_5 gives C, B and C react together to give diethyl ether. A, B and C are in the order **[NEET- 2018]**
(1) C_2H_5OH, C_2H_6, C_2H_5Cl (2) C_2H_5OH, C_2H_5ONa, C_2H_5Cl
(3) C_2H_5Cl, C_2H_6, C_2H_5OH (4) C_2H_5OH, C_2H_5Cl, C_2H_5ONa

26. Among the following the reaction that produce through an electrophilic substitution is :
[NEET-1- 2019]

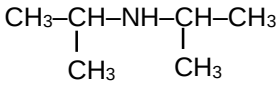
(1) 

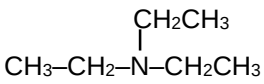
(2) 

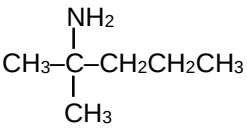
(3) 

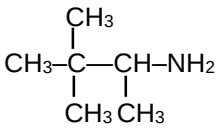
(4) 

27. The amine that reacts with Hinsberg's reagent to give an alkali insoluble product is - **[NEET-2- 2019]**

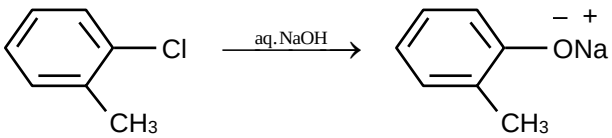
(1) 

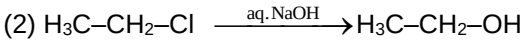
(2) 

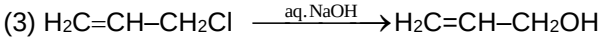
(3) 

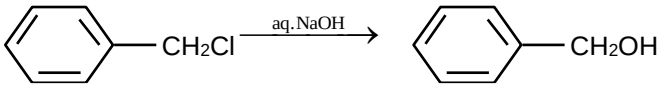
(4) 

28. The hydrolysis reaction that takes palce at the slowest rate among the following is **[NEET-2- 2019]**

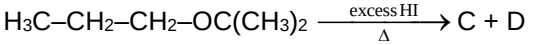
(1) 

(2) 

(3) 

(4) 

29. The major product C and D formed in the following reaction respectively are : **[NEET-2- 2019]**



(1) $H_3C–CH_2–CH_2–I$ and $I–C(CH_3)_3$ (2) $H_3C–CH_2–CH_2–OH$ and $I–C(CH_3)_3$
(3) $H_3C–CH_2–CH_2–I$ and $HO–C(CH_3)_3$ (4) $H_3C–CH_2–CH_2–OH$ and $HO–C(CH_3)_3$

PART - II : AIIMS QUESTION (PREVIOUS YEARS)

1. The most reactive nucleophile among the following is : **[AIIMS 2003]**

(1) CH_3O^- (2) $C_6H_5O^-$ (3) $(CH_3)_2\ CHO^-$ (4) $(CH_3)_3\ CO^-$

2. **Assertion :** Benzyl bromide when kept in acetone water it produces benzyl alcohol. **[AIIMS 2003]**

Reason : The reaction follows S_N1 mechanism.

(1) If both assertion and reason are true and reason is the correct explanation of assertion.

(2) If both assertion and reason are true but reason is not the correct explanation of assertion.

(3) If Assertion is true but reason is false.

(4) If both assertion and reason are false.

3. **Assertion :** 1-bromobutane on reaction with sodium ethoxide in ethanol gives 1-butene as a major product. **[AIIMS 2004]**

Reason : 1-butene is more stable than 2-butene

(1) If both assertion and reason are true and reason is the correct explanation of assertion.

(2) If both assertion and reason are true but reason is not the correct explanation of assertion.

(3) If Assertion is true but reason is false.

(4) If both assertion and reason are false.

4. **Assertion :** The major products formed by heating $C_6H_5CH_2OCH_3$ with HI are $C_6H_5CH_2I$ and CH_3OH.

Reason : Benzyl cation is more stable than methyl cation **[AIIMS 2004]**

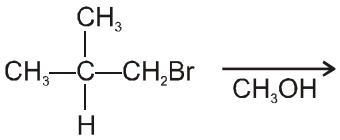
(1) If both assertion and reason are true and reason is the correct explanation of assertion.

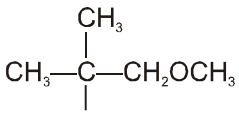
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.

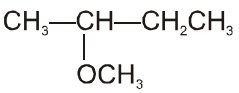
(3) If Assertion is true but reason is false.

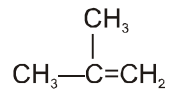
(4) If both assertion and reason are false.

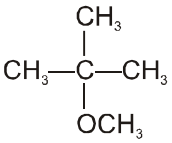
5. The major product formed in the following reaction is : **[AIIMS 2005]**



(1) 

(2) 

(3) 

(4) 

6. The correct increasing order of the reactivity of halides for S_N1 reaction is : **[AIIMS 2006]**

(1) $CH_3 - CH_2 - X < (CH_3)_2CH - X < CH_2 == CH - CH_2 - X < PhCH_2 - X$

(2) $(CH_3)_2CH - X < CH_3 - CH_2 - X < CH_2 == CH - CH_2X < PhCH_2 - X$

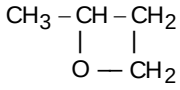
(3) $PhCH_2 - X < (CH_3)_2CH - X < CH_3 - CH_2 - X < CH_2 == CH - CH_2 - X$

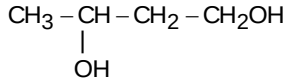
(4) $CH_2{=}CH{-}CH_2{-}X < Ph - CH_2 - X < (CH_3)_2CH - X < CH_3 - CH_2 - X$

7. The major product formed in the following reaction $CH_3CH(Cl)CH_2 - CH_2OH \xrightarrow{\text{aq. KOH}}$ is : **[AIIMS 2006]**

(1) $CH_3CH == CH - CH_2OH$

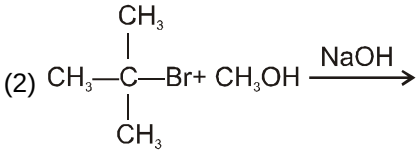
(2) $CH_2 == CH - CH_2 - CH_2OH$

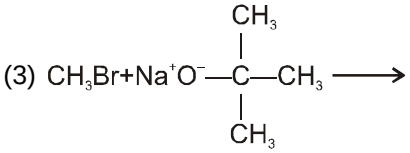
(3) 

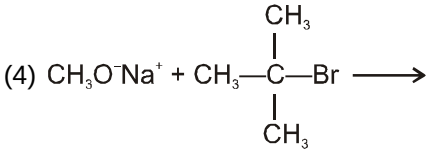
(4) 

8. In which of the following reaction the product obtained is t-butyl methyl ether ? **[AIIMS 2008]**

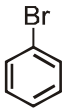
(1) $CH_3OH + HO—CH_2—CH_3 \xrightarrow{\text{conc.}H_2SO_4}$

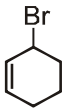
(2) 

(3) 

(4) 

9. The increasing order of rate of hydrolysis of the following compounds is **[AIIMS 2009]**


(i)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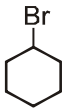
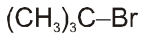

(iii)


(iv)

(1) (i) < (iii) < (ii) < (iv) (2) (i) < (iv) < (iii) < (ii) (3) (iv) < (ii) < (iii) < (i) (4) (i) < (iii) < (iv) < (ii)

10. **Assertion :** S_N1 reaction is basically a solvolysis reaction. **[AIIMS 2010]**

Reason : Polar protic solvents help the substrate to ionise and by the way get involved in S_N1 reaction.

(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If Assertion is true but reason is false.
(4) If both assertion and reason are false.

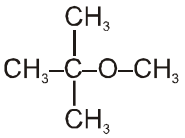
11. **Assertion :** In the E2 elimination, β-H and leaving group should be antiperiplanar. **[AIIMS 2010]**

Reason : In the E2 elimination, base always abstracts unhindered β-H.

(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If Assertion is true but reason is false.
(4) If both assertion and reason are false.

12. S_N2 reaction readily occurs in : **[AIIMS 2011]**

(1) $CH_3CH_2–O–CH_3$

(2) 

(3) $CH_2=CH–CH_2–O–CH_3$

(4) $Ph–CH_2–O–CH_2–CH_3$

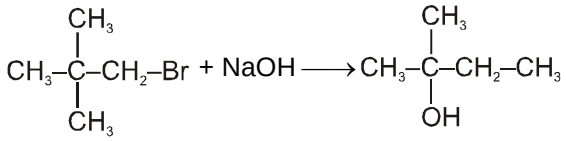
13. Find the product for : $CH_3CH_2–O–CH_2–CH_2–O–CH_2–C_6H_5$ + HI (excess) **[AIIMS 2011]**

(1) $HO–CH_2CH_2OH$, $C_6H_5CH_2–I$, $CH_3CH_2–I$

(2) $C_6H_5CH_2–OH$, $CH_3CH_2–I$, $I–CH_2CH_2–OH$

(3) $I–CH_2CH_2–I$, $C_6H_5CH_2–I$, $CH_3CH_2–OH$

(4) $HO–CH_2CH_2–OH$, $C_6H_5CH_2–I$, $CH_3CH_2–OH$

14. **Assertion :**  **[AIIMS 2011]**

Reason : It follows with formation of more stable carbocation.

(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If Assertion is true but reason is false.
(4) If both assertion and reason are false.

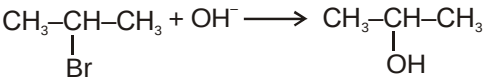
15. **Assertion :** Rate of reaction of alkyl halide in Williamson's synthesis reaction is 1° RX > 2°RX > 3°RX.
Reason : It is a type of bimolecular substitution reaction (S_N2). **[AIIMS 2011]**

(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If Assertion is true but reason is false.
(4) If both assertion and reason are false.

16. Rectified spirit is a mixture of **[AIIMS 2012]**

(1) 5% ethyl alcohol + 95% water (2) 94% ethyl alcohol + 6% water
(3) 94.4% methyl alcohol + 5.6% water (4) 95.6% ethyl alcohol + 4.4% water

17. Which of the following is an example of S_N2 reaction ? **[AIIMS 2013]**

(1) $CH_3Br + OH^- \rightarrow CH_3OH + Br^-$ (2) 

(3) $CH_3CH_2OHCH_2 = CH_2$ (4) $(CH_3)_3C - Br + OH^- (CH_3)_3COH + Br^-$

18. Ethanol when reacted with PCl_5 gives A, $POCl_3$ and HCl. **A** reacts with silver nitrite to form **B** (major product) and AgCl. A and B respectively are : **[AIIMS 2013]**

(1) C_2H_5 Cl and $C_2H_5OC_2H_5$ (2) C_2H_6 and $C_2H_5OC_2H_5$
(3) C_2H_5 Cl and $C_2H_5NO_2$ (4) C_2H_6 and $C_2H_5NO_2$

19. **Assertion :** S_N2 reaction of an optically active aryl halide with an aqueous solution of KOH always gives an alcohol with opposite sign of rotation. **[AIIMS 2013]**
Reason: S_N2 reaction always proceed with inversion of configuration in aryl halide.

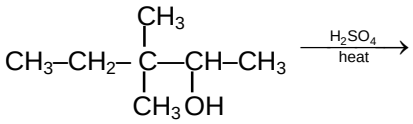
(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If Assertion is true but reason is false.
(4) If both assertion and reason are false.

20. Which of the following alcohol gives the best yield of dialkyl ether on being heated with a trace of sulphuric acid ? **[AIIMS 2014]**

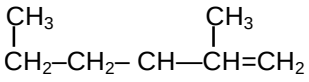
(1) 2-Pentanol (2) Cyclopentanol (3) 2-Methyl-2-butanol (4) 1-Pentanol

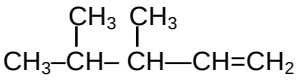
21. The order of reactivity of halides towards S_N1 mechanism is : **[AIIMS 2015]**

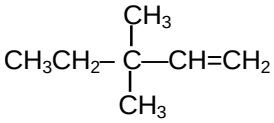
(1) benzyl > allyl > 1° > 2° > 3° > Me (2) Me > 1° > 2° > 3° > allyl > benzyl
(3) 3° > 2° > 1° > Me > allyl > benzyl (4) benzyl > allyl > 3° > 2° > 1° > Me

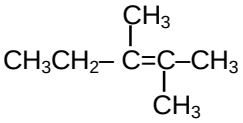
22.  **[AIIMS 2015]**

What is the major product P in the above reaction ?

(1) 

(2) 

(2) 

(4) 

23. **Assertion :** tert–butyl methyl ether on treatment with HI at 100ºC gives a mixture of methyl iodide and tert-butyl alcohol. **[AIIMS 2015]**

Reason : This reaction occur via S_N2 mechanism

(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If Assertion is true but reason is false.
(4) If both assertion and reason are false.

24. **Assertion :** In comparison to ethyl chloride, it is not easy to carry out nucleophilic substitution on vinyl chloride. **[AIIMS 2015]**

Reason : Vinyl group is an electron donating.

(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If Assertion is true but reason is false.
(4) If both assertion and reason are false.

25. **Assertion :** Acyl halide are more reactive than acid substance amide toward nuclephilic substitution.
Reason : X^- are better leaving group than NH_2^- . **[AIIMS 2016]**

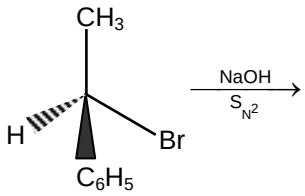
(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If Assertion is true but reason is false.
(4) If both assertion and reason are false.

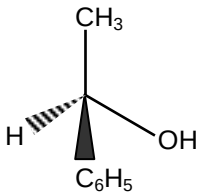
26. In the presence of light perchlorodiethyl ether is obtained from diethyl ether. **[AIIMS 2017]**

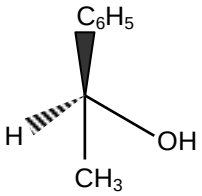
$(C_2H_5)_2O \xrightarrow{Cl_2} (C_2Cl_5)_2O$

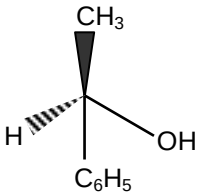
The mechanism through which this reaction proceed.

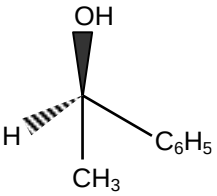
(1) Addition mechanism (2) Substitution mechanism
(3) Free radical mechanism (4) Elimination mechanism

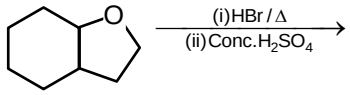
27.  **[AIIMS 2018]**

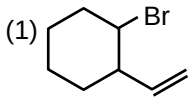
(1) 

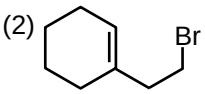
(2) 

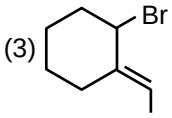
(3) 

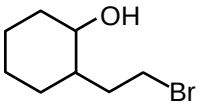
(4) 

28.  **[AIIMS 2018]**

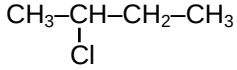
(1) 

(2) 

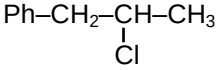
(3) 

(4) 

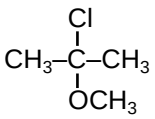
29. Reactivity order for SN1 **[AIIMS 2018]**



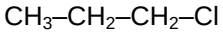
(i)



(ii)



(iii)



(iv)

(1) I > ii > iii > iv (2) ii > I > iii > iv (3) iii > ii > i > iv (4) iv > iii > ii > i

30. Order nucleophilicity **[AIIMS 2018]**

(i) OH^- (ii) HS^- (iii) $Ph–O^-$ (iv) $C_2H_5–O^-$

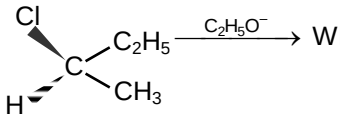
(1) i > ii > iii > iv (2) ii > iv > i > iii (3) ii > iii > i > iv (4) iii > iv > i > ii

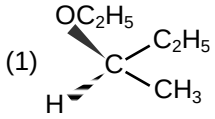
31.  **[AIIMS 2018]**

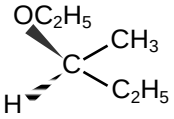
(I) (II) (III) (IV)

Write decreasing order of SN^2 reaction ?

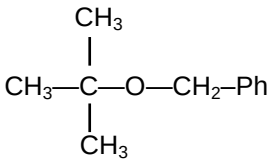
(1) I > II > III > IV (2) II > I > III > IV (3) IV > III > II > I (4) IV > III > I > II

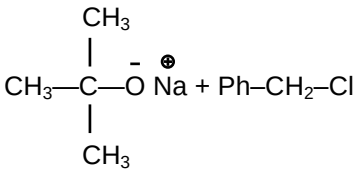
32.  What is product of following reaction ? **[AIIMS 2018]**

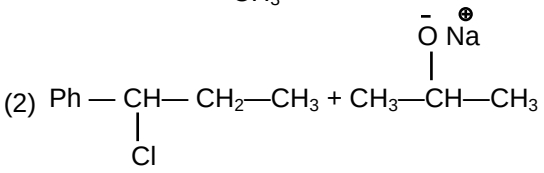
(1) 

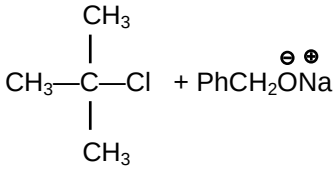
(2) 

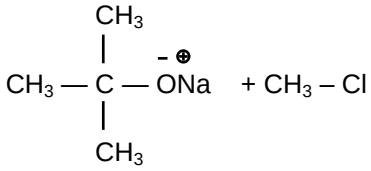
(3) $CH_3–CH=CH–CH_3$ (4) $H_3C–CH_2–CH=CH_2$

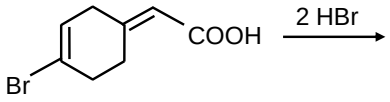
33. What are the suitable rectant for the following ether synthesis  **[AIIMS 2018]**

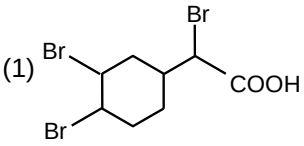
(1) 

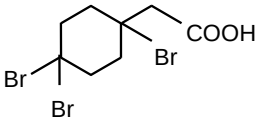
(2) 

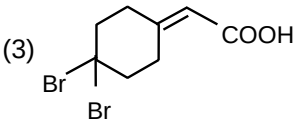
(3) 

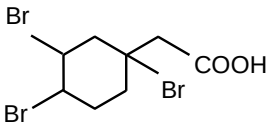
(4) 

34.  **[AIIMS 2018]**

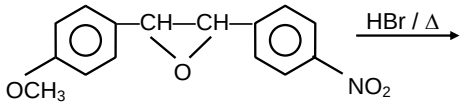
(1) 

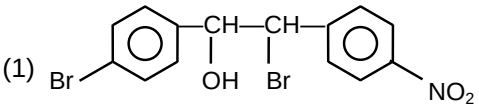
(2) 

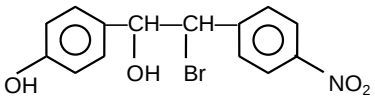
(3) 

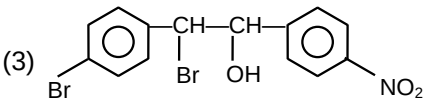
(4) 

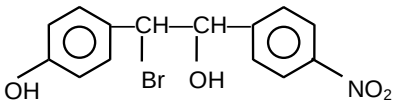
35. Find product of given reaction : **[AIIMS 2018]**



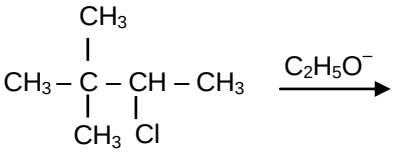
(1) 

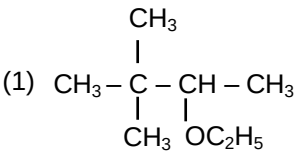
(2) 

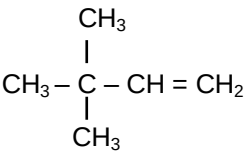
(3) 

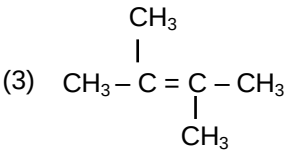
(4) 

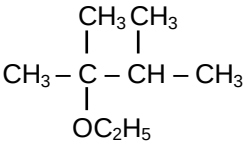
36. Major product of following reaction: **[AIIMS 2018]**



(1) 

(2) 

(3) 

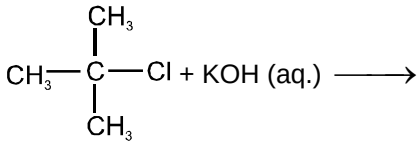
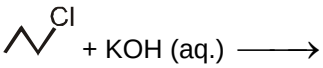
(4) 

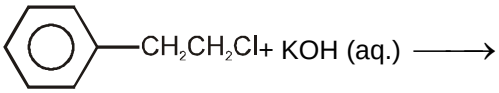
PART - III : JEE (MAIN) / AIEEE PROBLEMS (PREVIOUS YEARS)

1. Following reaction $(CH_3)_3CBr + H_2O \longrightarrow (CH_3)_3COH + HBr$ is an example of : **[AIEEE-2002]**

(1) Elimination reaction (2) Free radical substitution
(3) Nucleophilic substitution (4) Electrophilic substitution

2. S_N1 reaction is feasible in : **[AIEEE-2002]**

(1)  (2) 

(3)  (4) 

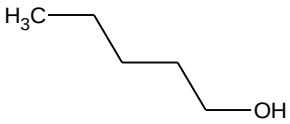
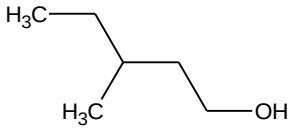
3. Bottles containing C_6H_5I and $C_6H_5CH_2I$ lost their original labels. They were labelled A and B for testing. A and B were separately taken in a test tube and boiled with NaOH solution. The end solution in each tube was made acidic with dilute HNO_3 and then some $AgNO_3$ solution was added. Substance B gave a yellow precipitate. Which one of the following statements is true for this experiment ? **[AIEEE-2003]**

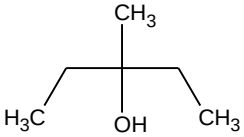
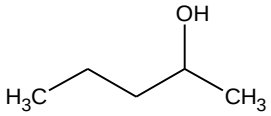
(1) A was C_6H_5I (2) A was $C_6H_5CH_2I$
(3) B was C_6H_5I (4) Addition of HNO_3 was unnecessary

4. During dehydration of alcohols to alkenes by heating with concentrated H_2SO_4 the initation step is

(1) Protonation of alcohol molecule (2) Formation of carbocation **[AIEEE-2003]**
(3) Elimination of water (4) Formation of an ester

5. Among the following compound which can be dehydrated very easily is : **[AIEEE-2004]**

(1)  (2) 

(3)  (4) 

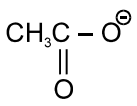
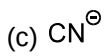
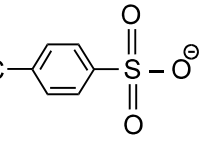
6. Tertiary alkyl halides are practically inert to substitution by S_N2 mechanism because of : **[AIEEE-2005]**

(1) steric hindrance (2) inductive effect (3) instability (4) insolubility

7. Elimination of HBr from 2-bromobutane result in the formation of : **[AIEEE-2005]**

(1) Predominantly 2-butyne (2) Predominantly 1-butene
(3) Predominantly 2-butene (4) Equimolar mixture of 1 and 2-butene

8. The decreasing order of nucleophilicity among the nucleophiles : **[AIEEE-2005]**

(a)  (b)  (c)  (d) 

(1) (c), (b), (a), (d) (2) (b), (c), (a), (d) (3) (d), (c), (b), (a) (4) (a), (b), (c), (d)

9. Reaction of trans 2–phenyl –1 – bromocyclopentane on reaction with alcoholic KOH produces:

[AIEEE-2006]

(1) 2–phenylcyclopentene (2) 1–phenylcyclopentene
(3) 3-phenylcyclopentene (4) 4-phenylcyclopentene

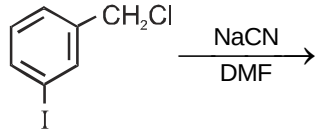
10. $CH_3Br + Nu^- \longrightarrow CH_3 - Nu + Br^-$

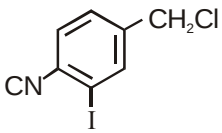
The decreasing order of the rate of the above reaction with nucleophiles (Nu^-) A to D is :

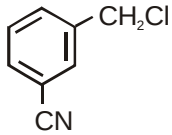
[Nu^- = (A) $\rightarrow PhO^-$, (B) $\rightarrow AcO^-$, (C) $\rightarrow HO^-$, (D) $\rightarrow CH_3O^-$] **[AIEEE-2006]**

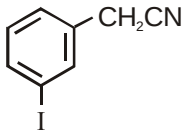
(1) D > C > B > A (2) A > B > C > D (3) B > D > C > A (4) D > C > A > B

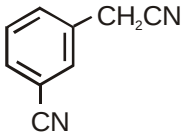
11. The structure of the major product formed in the following reaction is : **[AIEEE-2006]**

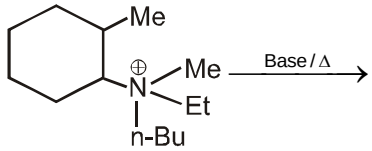


(1) 

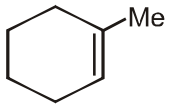
(2) 

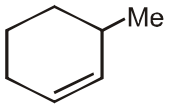
(3) 

(4) 

12. 

The alkene formed as a major product in the above elimination reaction is : **[AIEEE-2006]**

(1)  (2) $CH_2 = CH_2$ (3) 

(4) 

13. Which of the following is the correct order of decreasing S_N2 reactivity ? **[AIEEE-2007, 3/120]**

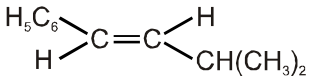
(1) $RCH_2X > R_3CX > R_2CHX$ (2) $RCH_2X > R_2CHX > R_3CX$
(3) $R_3CX > R_2CHX > RCH_2X$ (4) $R_2CHX > R_3CX > RCH_2X$

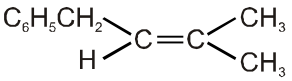
14. Which of the following on heating with aqueous KOH, produces acetaldehyde ? **[AIEEE-2009, 4/144]**

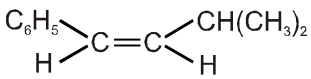
(1) CH_3CH_2Cl (2) CH_2ClCH_2Cl (3) CH_3CHCl_2 (4) CH_3COCl

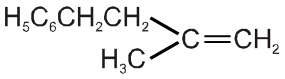
15. The main product of the following reaction is : **[AIEEE-2010, 4/144]**

$C_6H_5CH_2CH(OH)CH(CH_3)_2 \xrightarrow{\text{conc. } H_2SO_4}$

(1) 

(2) 

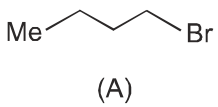
(3) 

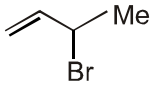
(4) 

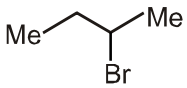
16. From amongst the following alcohols the one that would react fastest with conc. HCl and anhydrous $ZnCl_2$, is **[AIEEE-2010, 4/144]**

(1) 2-Butanol (2) 2-Methylpropan-2-ol (3) 2-Methylpropanol (4) 1-Butanol

17. Consider the following bromides : **[AIEEE-2010, 4/144]**


(A)


(B)


(C)

The correct, order of S_N1 reactivity is

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

18. Consider thiol anion ($RS^{\ominus}$) and alkoxy anion ($RO^{\ominus}$). Which of the following statement is correct ? **[AIEEE-2011]**

(1) $RS^{\ominus}$ is less basic but more nucleophilic than $RO^{\ominus}$.
(2) $RS^{\ominus}$ is more basic and more nucleophilic than $RO^{\ominus}$.
(3) $RS^{\ominus}$ is more basic but less nucleophilic than $RO^{\ominus}$.
(4) $RS^{\ominus}$ is less basic and less nucleophilic than $RO^{\ominus}$.

19. A solution of (–) – 1 – chloro–1–phenylethane in toluene racemises slowly in the presence of a small amount of $SbCl_5$, due to the formation of : **(JEE MAINS 2013)**

(1) carbanion (2) carbene (3) carbocation (4) free radical

20. An unknown alochol is treated with the "Lucas reagent" to determine whether the alcohol is primary, secondary or tertiary. Which alcohol reacts fastest and by what mechanism : **(JEE MAINS 2013)**

(1) secondary alcohol by S_N1 (2) tertiary alcohol by S_N1
(3) secondary alcohol by S_N2 (4) tertiary alcohol by S_N2

21. In S_N2 reactions, the correct order of reactivity for the following compounds : CH_3Cl, CH_3CH_2Cl, $(CH_3)_2CHCl$ and $(CH_3)_3CCl$ is : **(JEE MAINS 2014)**

(1) $CH_3Cl > (CH_3)_2\ CHCl > CH_3CH_2Cl > (CH_3)_3CCl$
(2) $CH_3Cl > CH_3CH_2Cl > (CH_3)_2CHCl > (CH_3)_3\ CCl$
(3) $CH_3CH_2Cl > CH_3Cl > (CH_3)_2CHCl > (CH_3)_3\ CCl$
(4) $(CH_3)_2CHCl > CH_3CH_2Cl > CH_3Cl > (CH_3)_3\ CCl$

22. The major organic compound formed by the reaction of 1,1,1- trichloroethane with silver powder is :

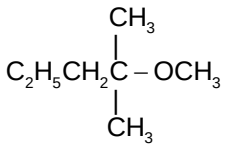
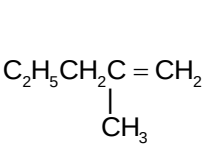
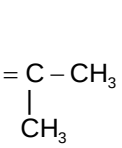
(1) Acetylene (2) Ethene (3) 2-Butyne (4) 2-Butene

[JEE MAINS 2014]

23. The synthesis of alkyl fluorides is best accomplished by : **[JEE MAINS 2015]**

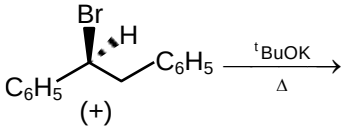
(1) Free radical fluorination (2) Sandmeyer's reaction
(3) Finkelstein reaction (4) Swarts reaction

24. 2-chloro-2-methylpentane on reaction with sodium methoxide in methanol yields : **[JEE MAINS 2016]**

(a)  (b)  (c) 

(1) (a) and (c) (2) (c) only (3) (a) and (b) (4) All of these

25. The major product obtained in the following reaction is : **[JEE MAINS 2017]**


(+)

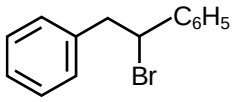
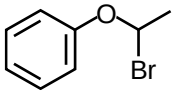
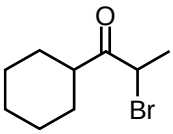
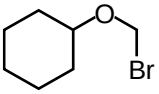
(1) $C_6H_5CH{=}CHC_6H_5$ (2) $(+)C_6H_5CH(O^tBu)CH_2C_6H_5$
(3) $(-)C_6H_5CH(O^tBu)CH_2C_6H_5$ (4) $(\pm)C_6H_5CH(O^tBu)CH_2C_6H_5$

26. The increasing order of the reactivity of the following halides for the S_N1 reaction is :**[JEE MAINS 2017]**

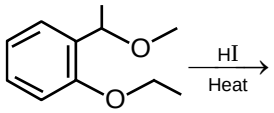
$CH_3\underset{\underset{Cl}{|}}{C}HCH_2CH_3$ (I) $CH_3CH_2CH_2Cl$ (II) $p–H_3CO–C_6H_4–CH_2Cl$ (III)

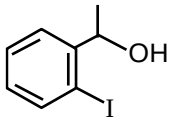
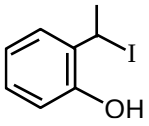
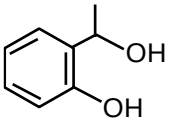
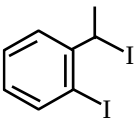
(1) (II) < (I) < (III) (2) (I) < (III) < (II) (3) (II) < (III) < (I) (4) (III) < (II) < (I)

27. Which of the following, upon treatment with tert-BuONa followed by addition of bromine water, fails to decolourize the colour of bromine ? **[JEE MAINS 2017]**

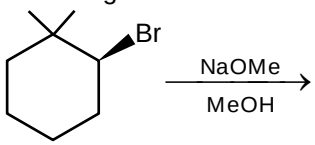
(1)  (2)  (3)  (4) 

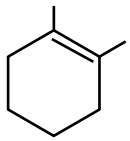
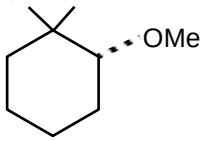
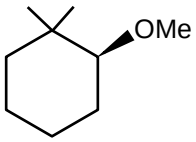
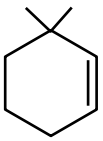
28. The major product formed in the following reaction is : **[JEE MAINS 2018]**



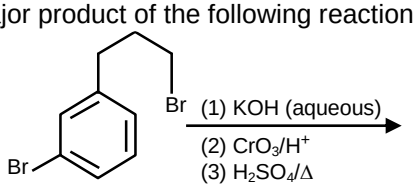
(1)  (2)  (3)  (4) 

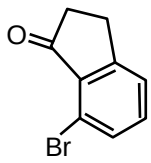
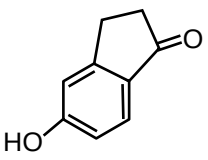
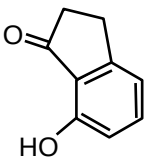
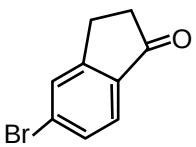
29. The major product of the following reaction is : **[JEE MAINS 2018]**



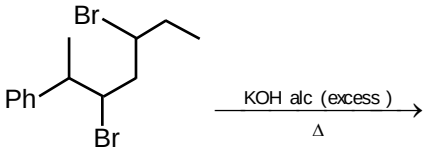
(1)  (2)  (3)  (4) 

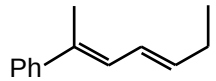
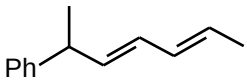
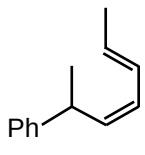
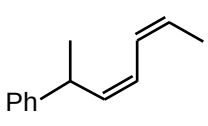
30. The major product of the following reaction is : **[JEE MAINS 2019]**



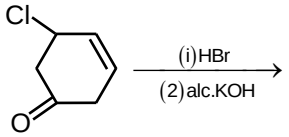
(1)  (2)  (3)  (4) 

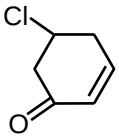
31. The major product of the following reaction is : **[JEE MAINS 2019]**

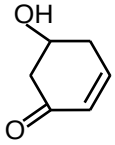


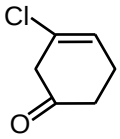
(1)  (2)  (3)  (4) 

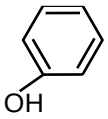
32. The major product of the following reaction is **[JEE MAINS 2019]**



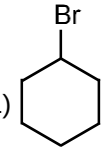
(1) 

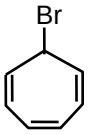
(2) 

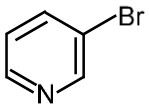
(3) 

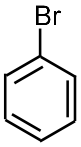
(4) 

33. Which of the following compounds will produce a precipitate with $AgNO_3$? **[JEE MAINS 2019]**

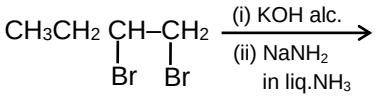
(1) 

(2) 

(3) 

(4) 

34. The major product of the following reaction is : **[JEE MAINS 2019]**



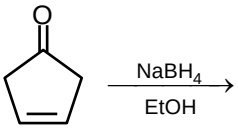
(1) $CH_3CH=C=CH_2$

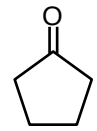
(2) $CH_3CH=CHCH_2NH_2$

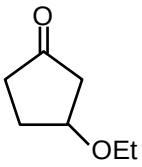
(3) $CH_3CH_2C\equiv CH$

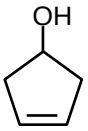
(4) $CH_3CH_2\underset{NH_2}{CH}–\underset{NH_2}{CH_2}$

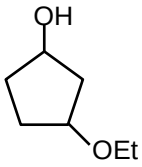
35. The major product of the following reaction is : **[JEE MAINS 2019]**



(1) 

(2) 

(3) 

(4) 

Answers

EXERCISE - 1

SECTION (A)

1. (1) **2.** (2) **3.** (4) **4.** (3) **5.** (1) **6.** (4) **7.** (1)
8. (3) **9.** (3) **10.** (2)

SECTION (B)

1. (1) **2.** (3) **3.** (1) **4.** (2) **5.** (3) **6.** (2) **7.** (4)
8. (1) **9.** (3) **10.** (4) **11.** (2) **12.** (1) **13.** (3) **14.** (3)
15. (4)

SECTION (C)

1. (1) **2.** (3) **3.** (2) **4.** (2) **5.** (4) **6.** (2) **7.** (2)
8. (4) **9.** (4) **10.** (3) **11.** (2) **12.** (2) **13.** (2) **14.** (3)
15. (2) **16.** (3)

SECTION (D)

1. (2) **2.** (2) **3.** (1) **4.** (1) **5.** (2) **6.** (1) **7.** (2)

SECTION (E)

1. (2) **2.** (3) **3.** (2) **4.** (4) **5.** (2) **6.** (3) **7.** (1)
8. (1) **9.** (2) **10.** (3)

SECTION (F)

1. (2) **2.** (3) **3.** (3) **4.** (4) **5.** (2) **6.** (1) **7.** (2)
8. (1) **9.** (1) **10.** (3) **11.** (1) **12.** (3) **13.** (3) **14.** (3)
15. (1) **16.** (1)

SECTION (G)

1. (3) **2.** (2) **3.** (1) **4.** (4) **5.** (4)

SECTION (H)

1. (4) **2.** (2) **3.** (2) **4.** (1) **5.** (3) **6.** (4) **7.** (3)
8. (1) **9.** (2) **10.** (1) **11.** (2) **12.** (1) **13.** (4)

SECTION (I)

1. (3) **2.** (4) **3.** (3) **4.** (2) **5.** (3) **6.** (1) **7.** (3)
8. (1) **9.** (2) **10.** (1)

SECTION (J)

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

SECTION (K)

1. (2) **2.** (3) **3.** (1) **4.** (1) **5.** (3) **6.** (1)

SECTION (L)

1. (2) **2.** (1) **3.** (3) **4.** (4) **5.** (3) **6.** (3) **7.** (2)
8. (3) **9.** (2) **10.** (2) **11.** (3) **12.** (1)

EXERCISE - 2

1.	(1)	**2.**	(1)	**3.**	(4)	**4.**	(4)	**5.**	(1)	**6.**	(1)	**7.**	(4)
8.	(3)	**9.**	(4)	**10.**	(3)	**11.**	(4)	**12.**	(4)	**13.**	(2)	**14.**	(4)
15.	(3)	**16.**	(3)	**17.**	(1)	**18.**	(3)	**19.**	(4)	**20.**	(2)	**21.**	(1)
22.	(2)	**23.**	(1)	**24.**	(4)	**25.**	(3)	**26.**	(1)	**27.**	(2)	**28.**	(1)
29.	(3)	**30.**	(4)	**31.**	(2)	**32.**	(4)	**33.**	(1)	**34.**	(3)	**35.**	(3)
36.	(2)	**37.**	(2)	**38.**	(3)	**39.**	(2)	**40.**	(4)	**41.**	(2)	**42.**	(3)
43.	(4)	**44.**	(3)	**45.**	(2)	**46.**	(2)	**47.**	(1)	**48.**	(3)	**49.**	(4)
50.	(2)	**51.**	(3)	**52.**	(1)	**53.**	(2)	**54.**	(3)	**55.**	(2)	**56.**	(2)
57.	(2)	**58.**	(3)	**59.**	(2)	**60.**	(4)	**61.**	(3)	**62.**	(4)	**63.**	(2)
64.	(2)	**65.**	(3)	**66.**	(2)	**67.**	(1)	**68.**	(3)	**69.**	(3)	**70.**	(1)
71.	(4)	**72.**	(2)	**73.**	(1)	**74.**	(1)	**75.**	(1)	**76.**	(3)	**77.**	(2)
78.	(2)												

EXERCISE - 3

PART-I

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

PART-II

1.	(1)	**2.**	(1)	**3.**	(3)	**4.**	(1)	**5.**	(4)	**6.**	(1)	**7.**	(4)
8.	(3)	**9.**	(1)	**10.**	(1)	**11.**	(3)	**12.**	(1)	**13.**	(1)	**14.**	(1)
15.	(1)	**16.**	(4)	**17.**	(1)	**18.**	(3)	**19.**	(4)	**20.**	(4)	**21.**	(4)
22.	(4)	**23.**	(4)	**24.**	(3)	**25.**	(1)	**26.**	(3)	**27.**	(2)	**28.**	(1)
29.	(3)	**30.**	(2)	**31.**	(2)	**32.**	(2)	**33.**	(1)	**34.**	(2)	**35.**	(3)
36.	(1)												

PART-III

1.	(3)	**2.**	(1)	**3.**	(1)	**4.**	(1)	**5.**	(3)	**6.**	(1)	**7.**	(3)
8.	(2)	**9.**	(3)	**10.**	(4)	**11.**	(3)	**12.**	(2)	**13.**	(2)	**14.**	(3)
15.	(1)	**16.**	(2)	**17.**	(1)	**18.**	(1)	**19.**	(3)	**20.**	(2)	**21.**	(2)
22.	(3)	**23.**	(4)	**24.**	(4)	**25.**	(1)	**26.**	(1)	**27.**	(4)	**28.**	(2)
29.	(4)	**30.**	(4)	**31.**	(1)	**32.**	(4)	**33.**	(2)	**34.**	(3)	**35.**	(3)