

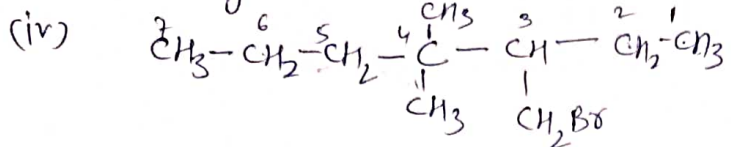
Solution Assignment - Alkyl Halide & Aryl Halide (1)

Q1

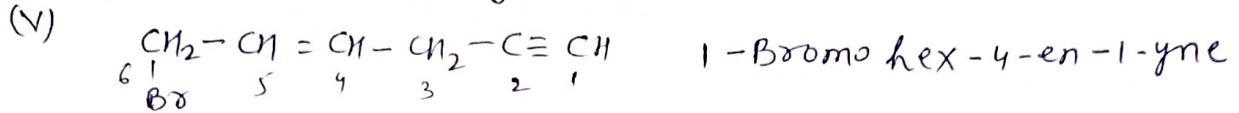
(i) 3-Bromo-3-methyl hexane

(ii) 1-Bromo-2,3-dimethyl butane

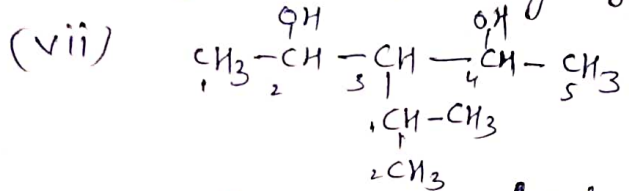
(iii) Benzyl chloride



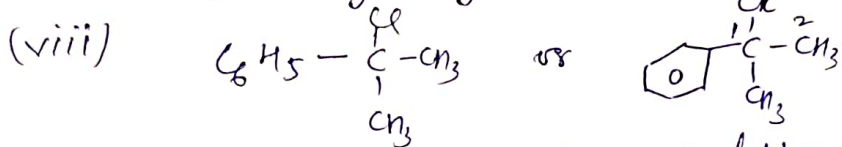
3-[1-Bromomethyl]-4,4-dimethyl heptane



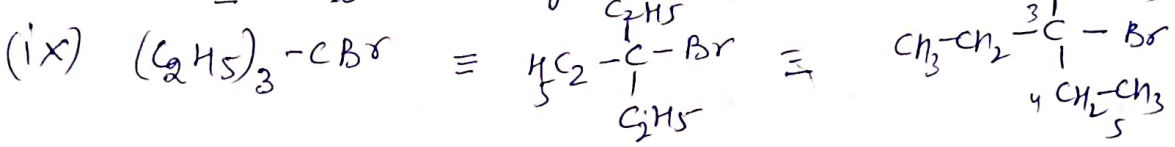
(vi) 1-Bromo-1-methyl cyclohexane



3-[1-Methyl ethyle] pentane-2,4-diol

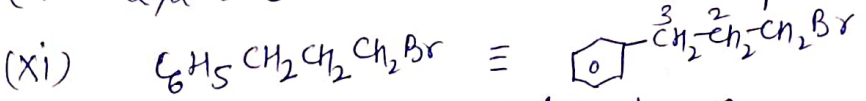


1-chloro-1-methyl-1-phenyl ethane

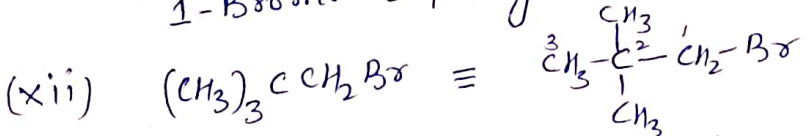


3-Bromo-3-ethyl pentane

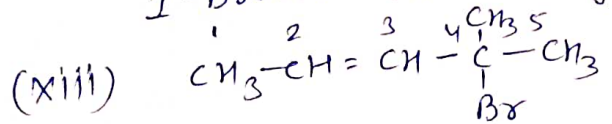
(x) 2,2-Dibromo-1,4-dichloro but-2-ene



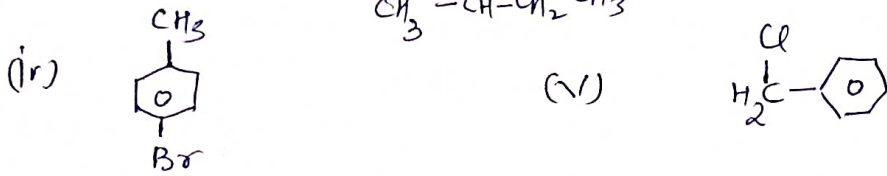
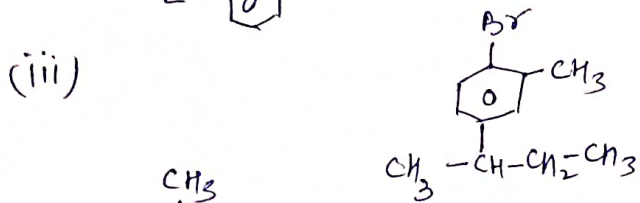
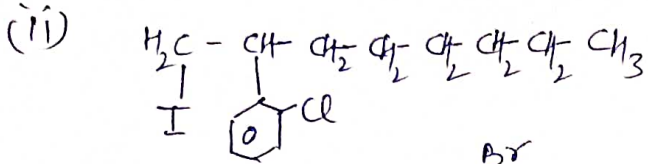
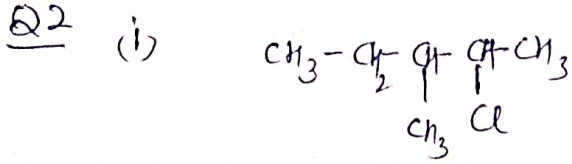
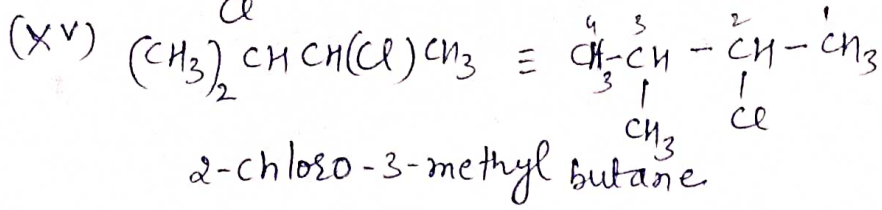
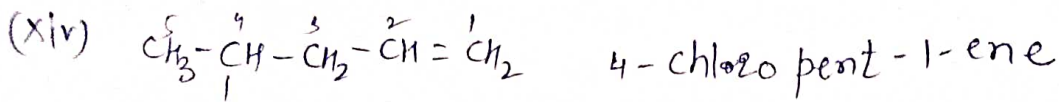
1-Bromo-3-phenyl propane



1-Bromo-2,2-Dimethyl propane



4-Bromo-4-methyl penta-2-ene



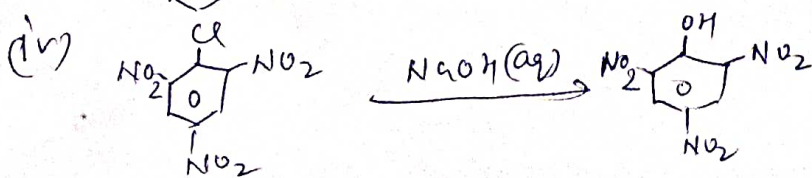
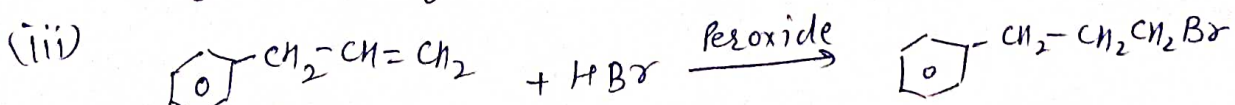
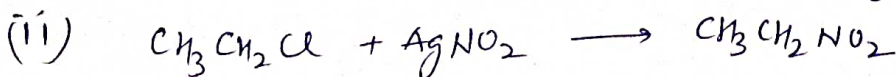
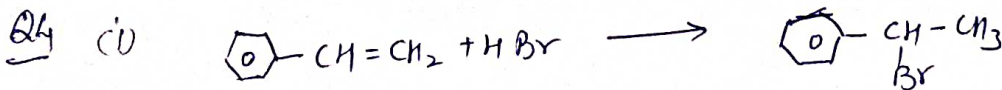
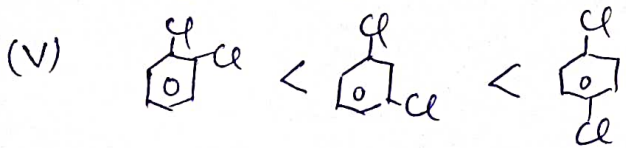
Q3 (i) chloromethane < dichloromethane < bromomethane

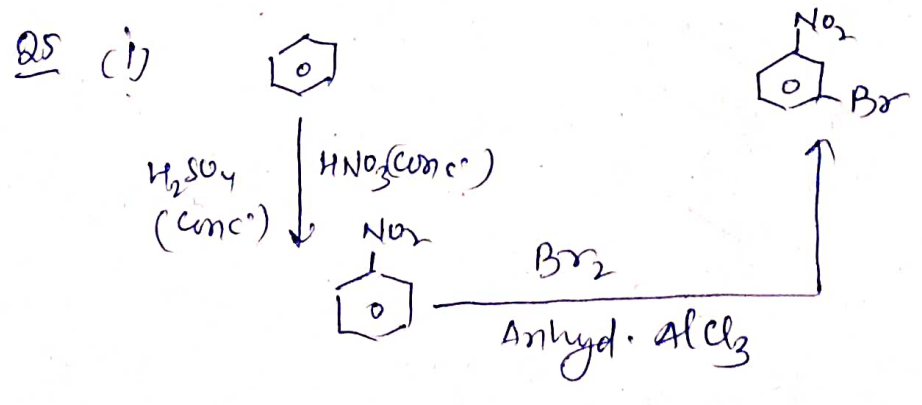
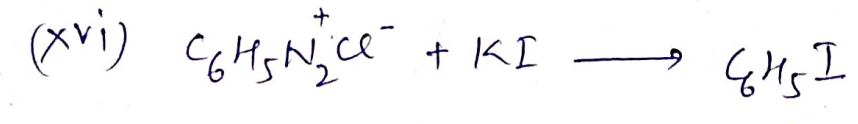
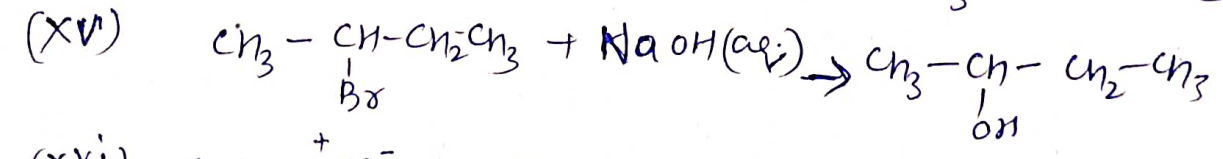
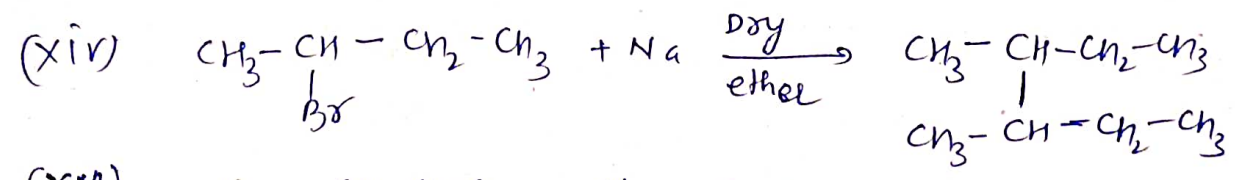
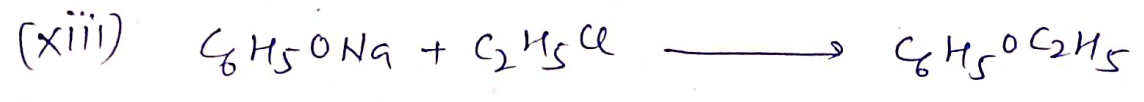
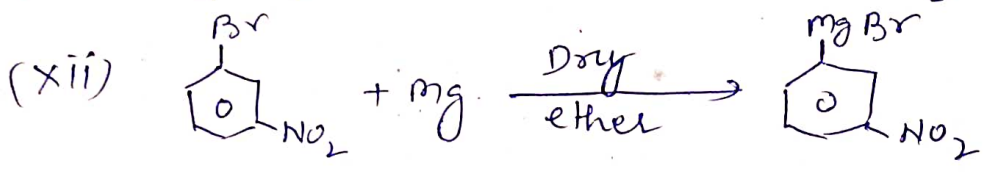
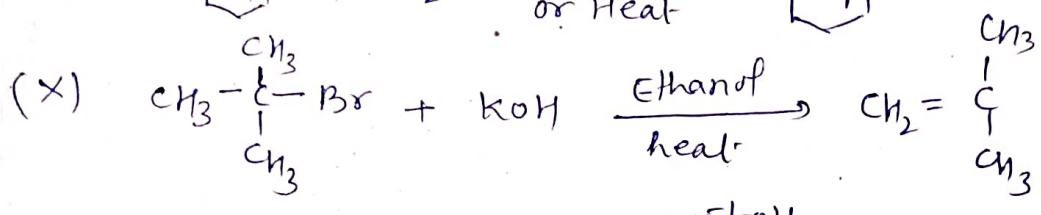
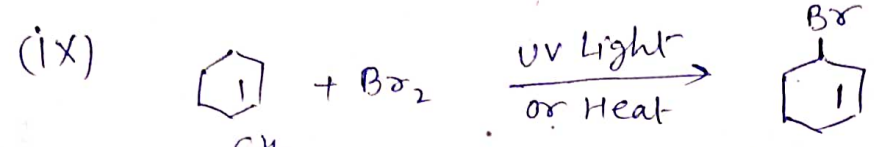
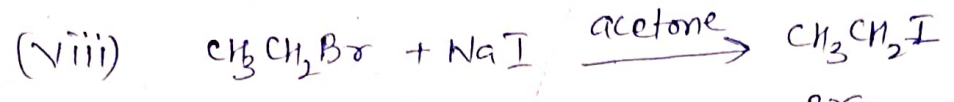
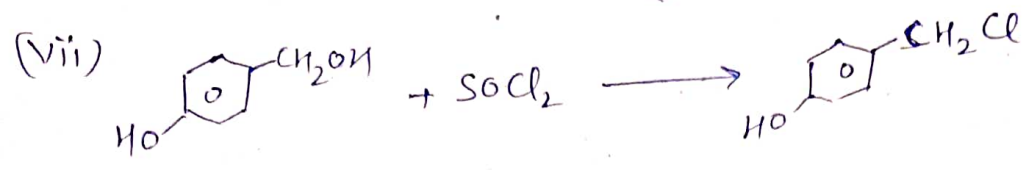
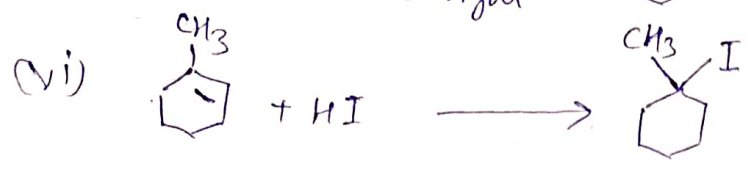
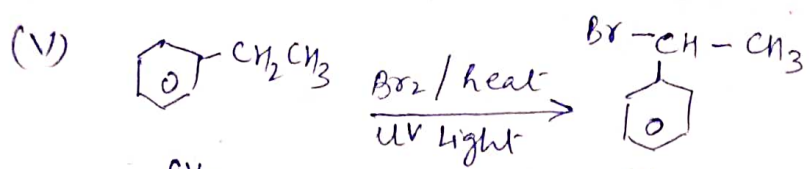
(ii) isopropyl chloride < 1-chloropropane < 1-chlorobutane

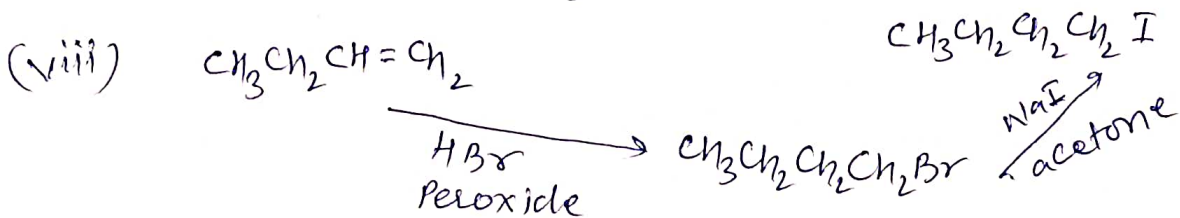
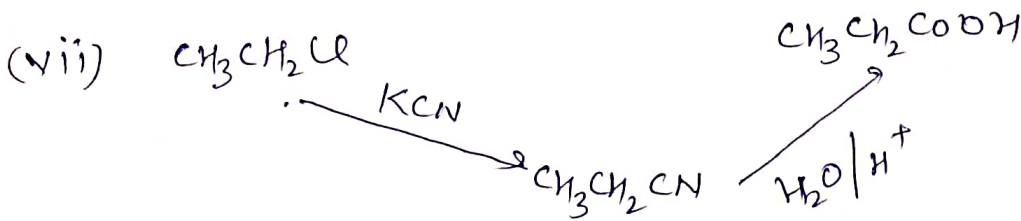
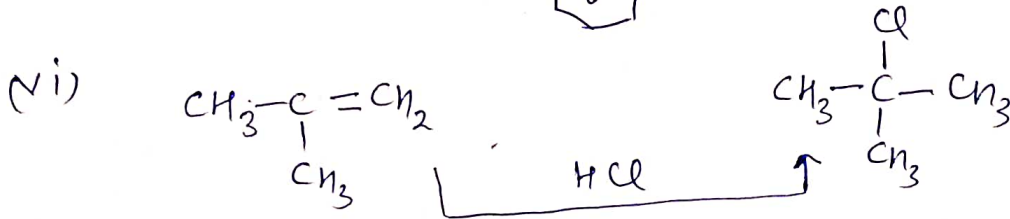
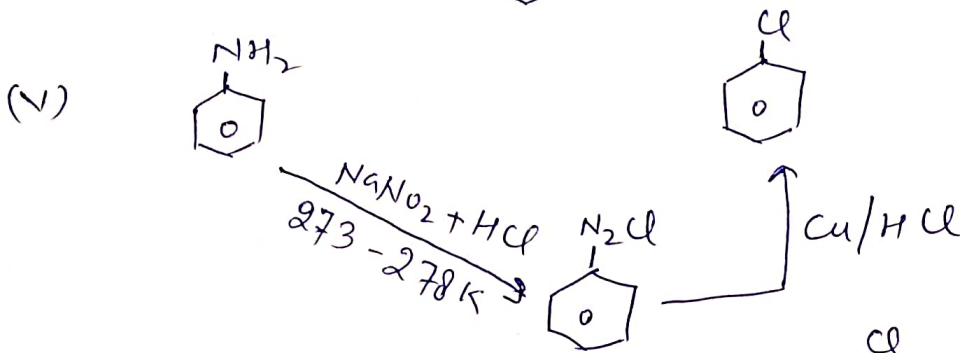
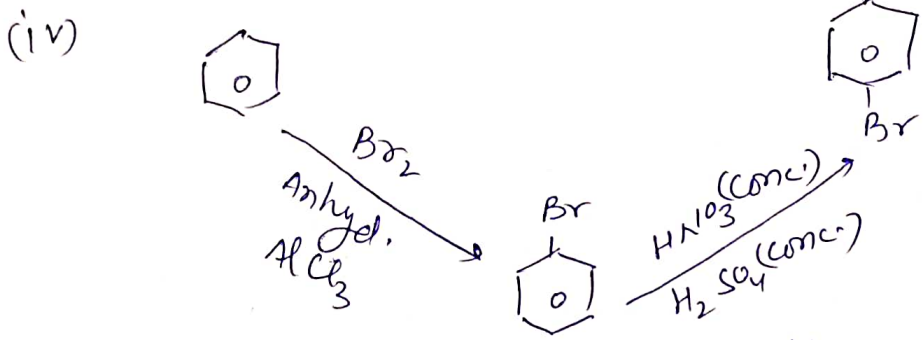
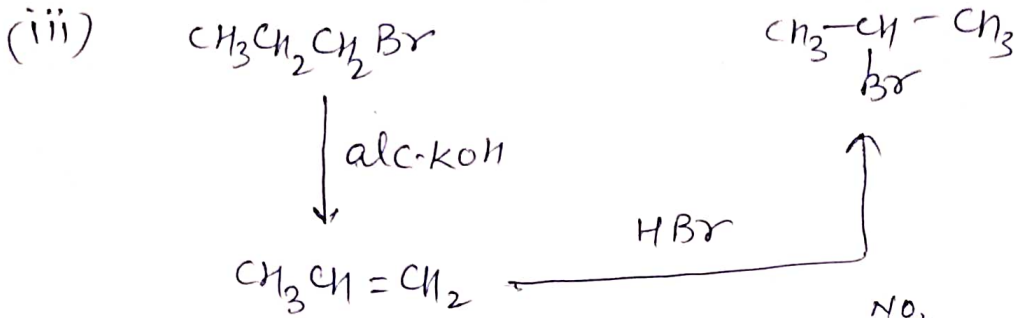
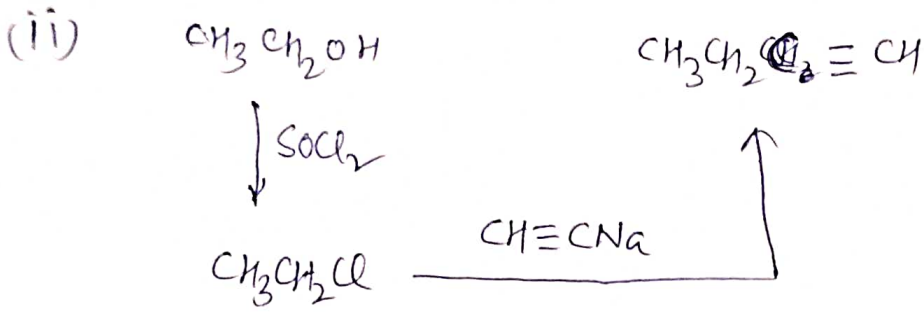
(iii) carbon tetrachloride < chloroform < dichloromethane

(iv)  $\text{CH}_3\text{F} < \text{CH}_3\text{Cl} < \text{CH}_3\text{Br} < \text{CH}_3\text{I}$  (Increasing order of Nucleophilic substitution)

\*\*  $\text{CH}_3\text{I} < \text{CH}_3\text{Br} < \text{CH}_3\text{F} < \text{CH}_3\text{Cl}$  (Increasing order of dipole moment)

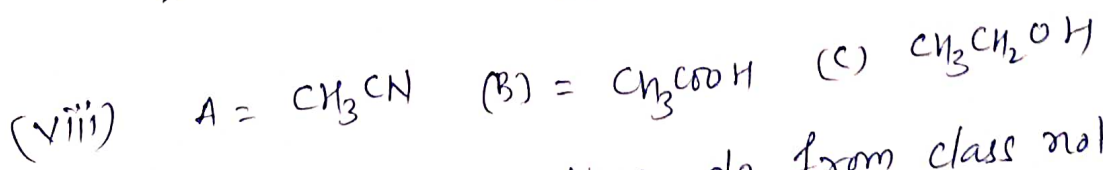
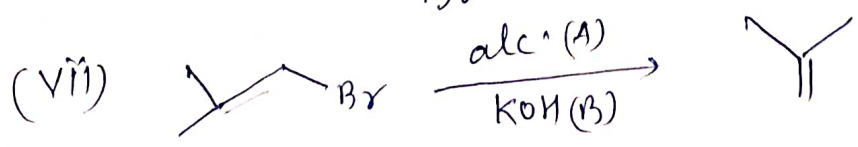
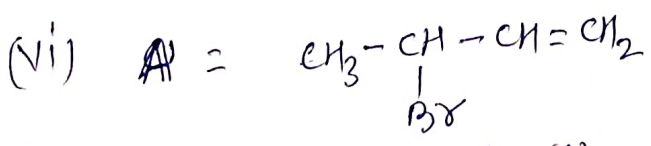
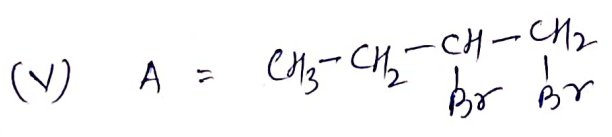
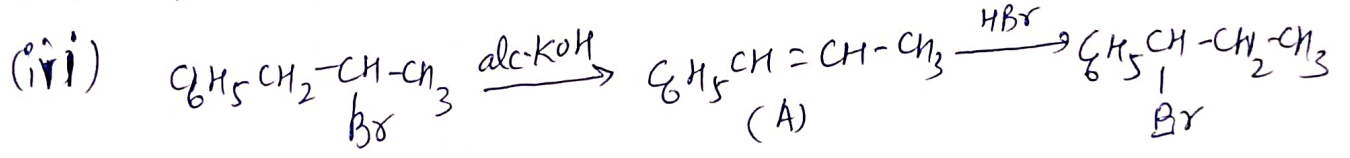
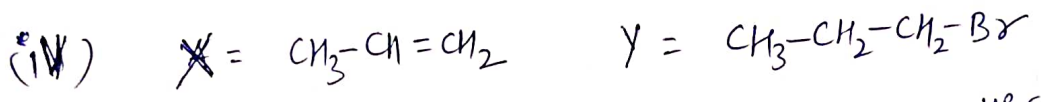
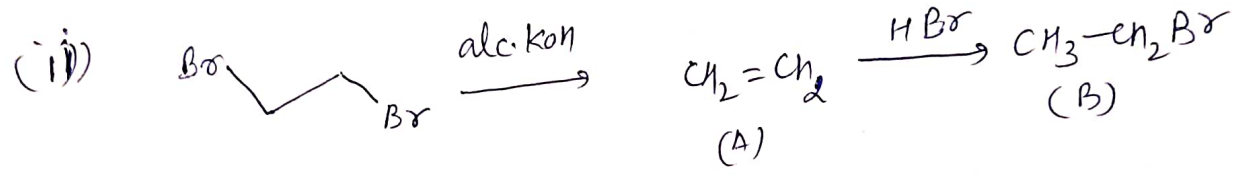
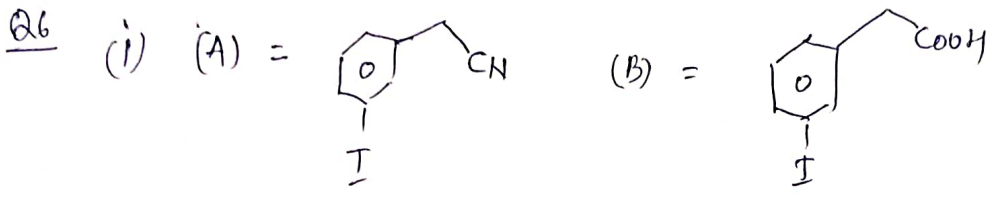
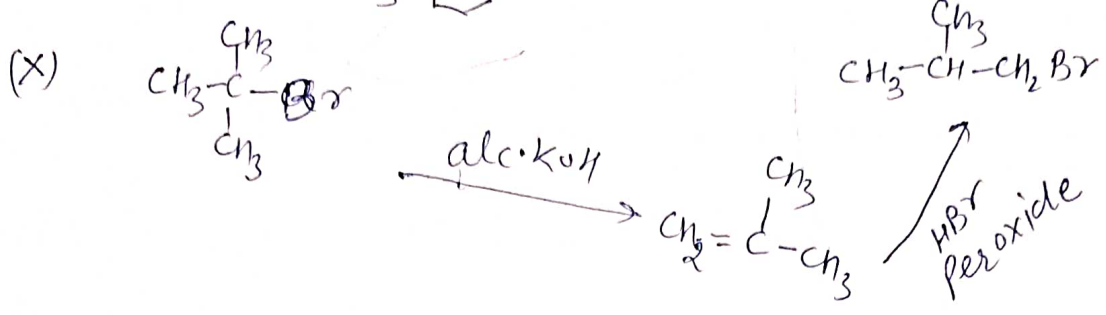
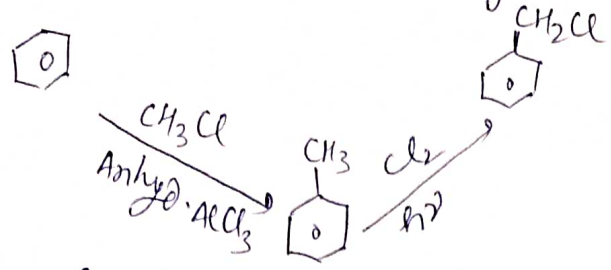




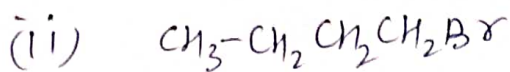
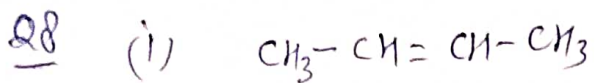




(ix) Benzene to Phenylchloromethane



Q7 = All the Name reactions do from class notes



Q9. (i) Enantiomers

They are the non-super-imposable mirror images of a molecule having same molecular formula

(ii) Retention

It is defined as a state or configuration in which the group attached to chiral carbon remain in the same position before and after the reaction

(iii) Electrophilic Substitution

(a) In this substitution displacement of functional group by electrophile

(b) Electrophile accepts electron

Diastereomers

They are the non-super-imposable ~~non~~ non-mirror images of a molecules having same molecular formula

Inversion

Inversion is the back attack of the nucleophile takes place and in the retention front attack of nucleophile takes place



Nucleophilic Substitution

a) In this substitution displacement of leaving group by nucleophile

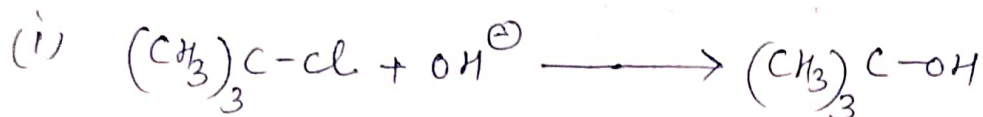
(b) Nucleophile donates its electron

Q10

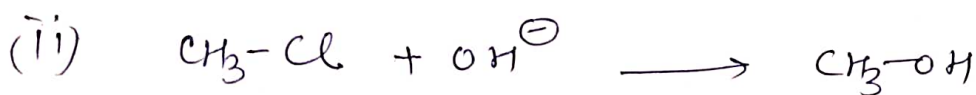
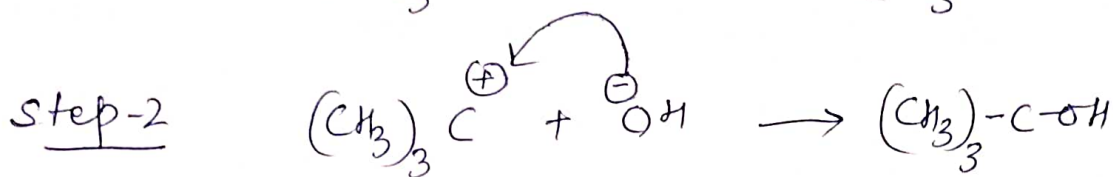
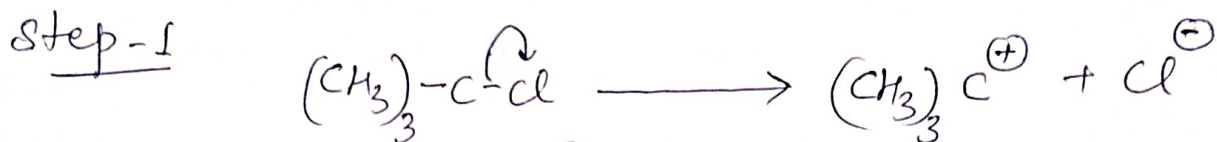
Distinguish test

(i)	Test	 chlorobenzene	 cyclohexyl chloride
	AgNO <sub>3</sub> Test	chlorobenzene + AgNO <sub>3</sub> No ↓ No change	cyclohexyl chloride + AgNO <sub>3</sub> ↓ white ppt of AgCl
(ii)	Test	vinyl chloride $CH_2=CHCl$	ethyl chloride $CH_3CH_2Cl$
	AgNO <sub>3</sub> Test	vinyl chloride + AgNO <sub>3</sub> ↓ No change	ethyl chloride + AgNO <sub>3</sub> ↓ white ppt of AgCl
(iii)	Test	n-Propyl Bromide $CH_3CH_2CH_2Br$	Isopropyl bromide $CH_3-\underset{\substack{  \\ Br}}{CH}-CH_3$
	Luca's Test HCl (conc.) + Anhyd. ZnCl <sub>2</sub>	n-Propyl Bromide ↓ aq. KOH n-Propyl alcohol ↓ HCl (conc.) + Anhyd. ZnCl <sub>2</sub> No change	Isopropyl bromide ↓ aq. KOH Iso propyl alcohol ↓ HCl (conc.) + Anhyd. ZnCl <sub>2</sub> White fumes appears after 5 min.

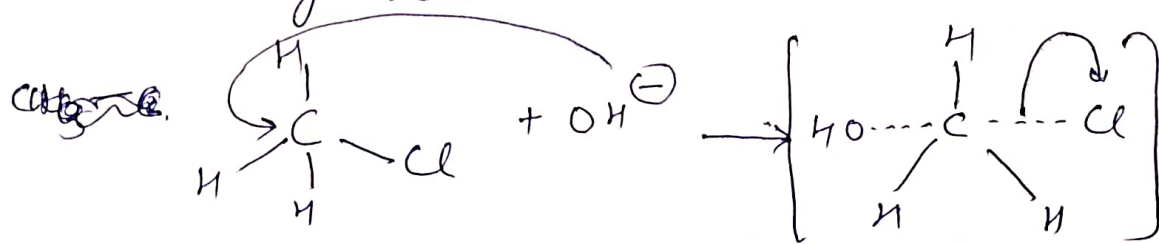
Q11 Mechanism



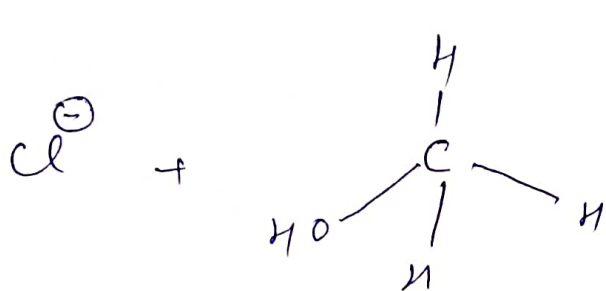
As alkyl halide is  $3^\circ$  so, it is  $\text{S}_\text{N}1$  mechanism.



As alkyl halide is  $1^\circ$  so, it is  $\text{S}_\text{N}2$  mechanism



Transition state



Remaining (iii), (iv) & (v) Question now not in course  
So, no need to do mechanism of these questions



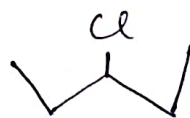
Q12 Faster in  $S_N2$  reaction with  $OH^-$  + reason

- (i)  $CH_3-Br < CH_3I$  because  $I^-$  is bigger than  $Br^-$  so,  $I^-$  is a good leaving group.
- (ii)  $(CH_3)_3CCl < CH_3Cl$  because  $1^\circ$  alkyl halide is faster than  $2^\circ$  or  $3^\circ$  alkyl halide as in  $1^\circ$  alkyl halide there is very less steric hindrance.

Q13 ~~is~~ faster towards  $S_N1$

faster towards  $S_N2$

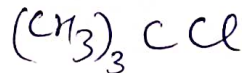
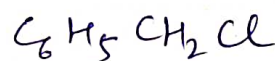
(i)



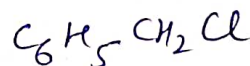
(ii)



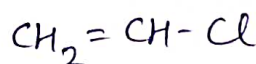
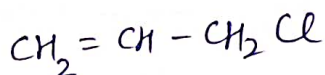
(iii)



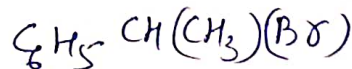
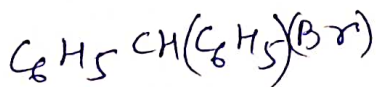
(iv)



(v)



(vi)



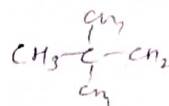
(vii)

This part is wrongly printed.

Q14 (i) The bond length of C-Cl bond is larger in haloalkanes because in haloalkanes this bond is purely single bond but in case of haloarenes due to resonance C-Cl bond acquire partly double bond character so it is comparatively smaller.

- (10)
- (i) Do answer from class notes.
- (ii) tert. Butyl bromide has lower boiling point than n-butyl bromide because n-butyl bromide has larger surface area than tert. Butyl bromide. So, n-butyl bromide has stronger intermolecular van der Waals forces than ~~is~~ tert. Butyl bromide.
- (iii) Do answer from class notes.
- (iv) Do answer from class notes.
- (v) Do answer from class notes.
- (vi) Do answer from class notes.
- (vii) As haloarenes are resonating stabilized and C-Cl bond in haloarene acquires double bond character while in haloalkane there is no such resonance.
- (viii) As chlorobenzene is ortho, para directing i.e. in chlorobenzene due to resonance ortho & para positions are electron rich positions. So, electrophilic substitution can be easily take place at ortho & para positions.
- (ix) 2,4-dinitrochlorobenzene is much more reactive than chlorobenzene towards hydrolytic reaction with NaOH as in 2,4-dinitrochlorobenzene, nitro group is the electron withdrawing group, which decreases the electron density over the benzene ring carry out the nucleophilic substitution reaction easily but in case of chlorobenzene there is no such electron withdrawing group.

(X) Do answer from class notes.



(11)

(XI) Do answer from class notes.

\*\* (XII) neopentyl bromide undergoes nucleophilic substitution reaction very slowly due because of following reasons

In case of  $S_N1$  reaction

If neopentyl bromide carry out  $S_N1$  reaction than primary carbocation is formed which is unstable so in this case rearrangement takes place by methyl shift to form stable  $3^\circ$  carbocation & then nucleophilic substitution takes place which takes time

In case of  $S_N2$  reaction

In Neopentyl bromide there steric hinderance so  $S_N2$  reaction takes place with difficulty.

(XIII) In vinyl chloride, chloride group attached to  $sp^2$  hybridised carbon which is electron rich so nucleophile can't attack easily.

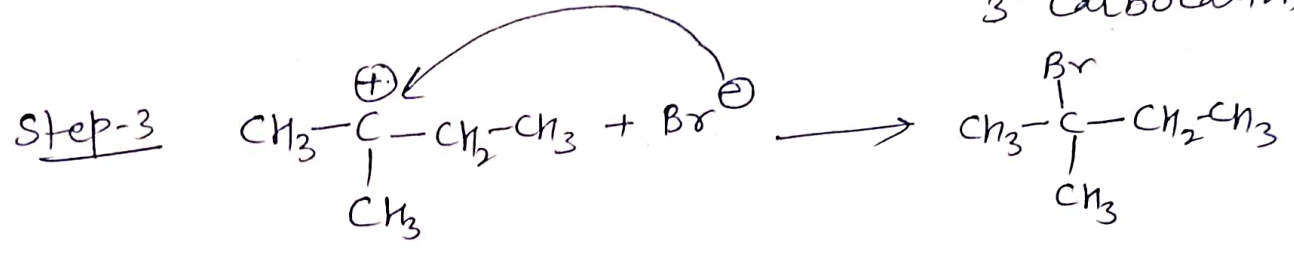
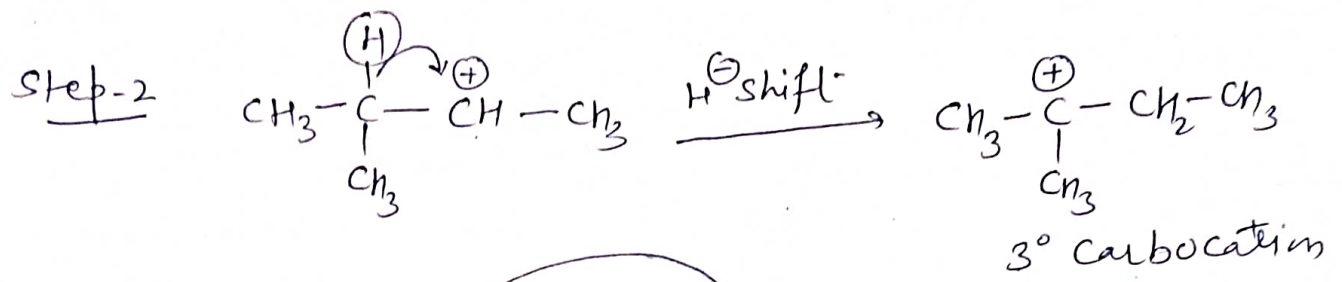
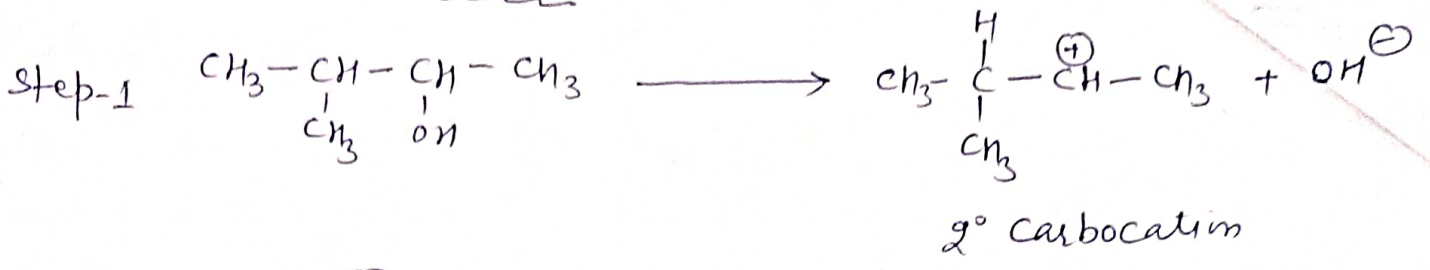
(XIV) Hint is given in Assignment

(XV) methyl iodide is hydrolysed at faster rate than methyl chloride, because due to larger size of iodide ion than chloride ion, Iodide ion is a good leaving group.



Q15 Hint is given in the assignment

Q16 (a) Mechanism of Rxn



(b) Hint is given the Assignment

Q17 Do the Answer from class notes.

Q18, Q19, Q20, Q21 Hint is given in the assignment

Q22.

