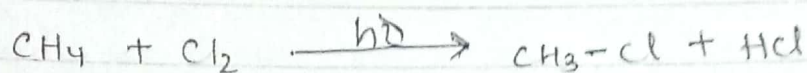


## General Method of preparation of alkyl halides:-

### 1) From alkane :-

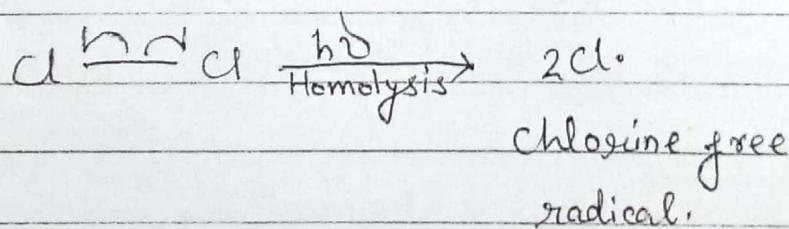
Chloro and Bromo derivative are prepared from alkane by action of halogen ( $\text{Cl}_2, \text{Br}_2$ ) in presence of sunlight.



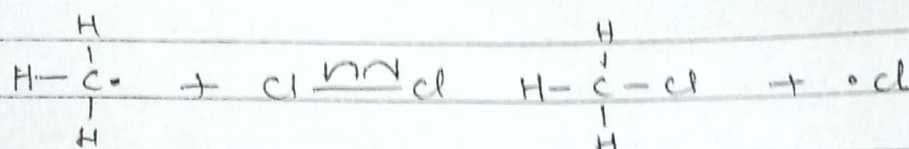
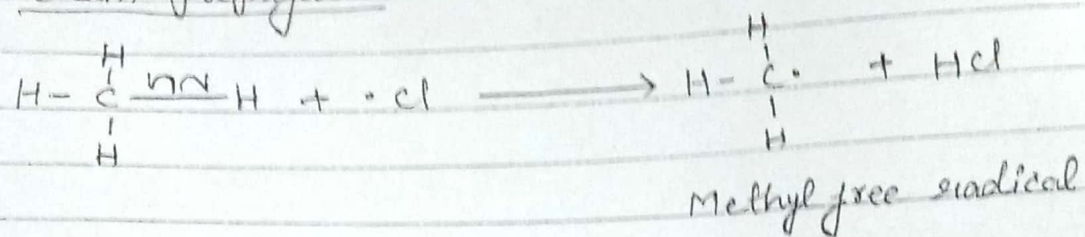
- \* Halogenation of alkane in presence of sunlight follows free radical mechanism therefore it is very fast.
- \* Fluorination occurs in dark and faster than chlorination.
- \* Iodination is reversible because HI is formed as byproduct which is strong reducer.

### Mechanism of chlorination :-

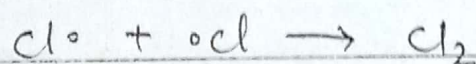
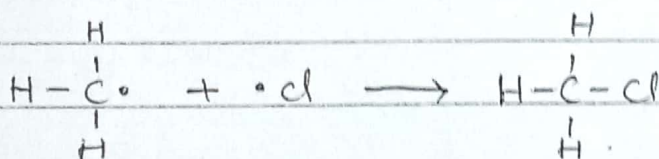
#### 1) Chain initiation :-



ii) Chain propagation :-



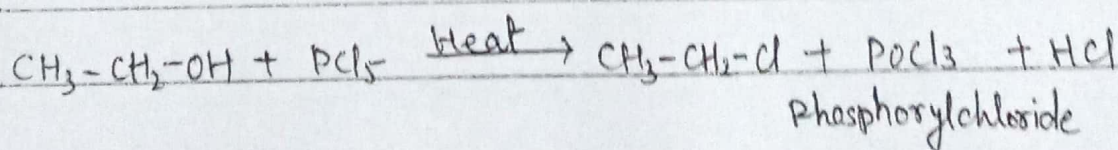
iii) Chain Termination :-



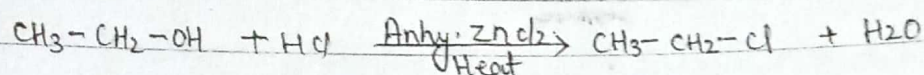
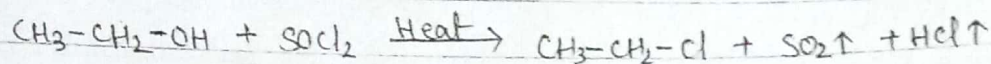
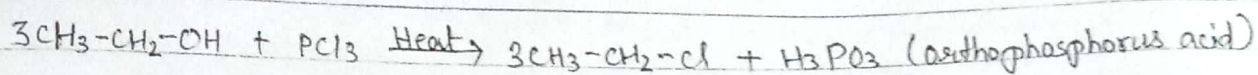
2) From alcohol :-

In the laboratory alkyl halides are prepared from alcohol.

a) From alcohols, alkyl chloride are prepared by action  $\text{PCl}_5$ ,  $\text{PCl}_3$ ,  $\text{SOCl}_2$  (Thionyl chloride) or  $\text{HCl}$  /  $\text{anh. ZnCl}_2$ .



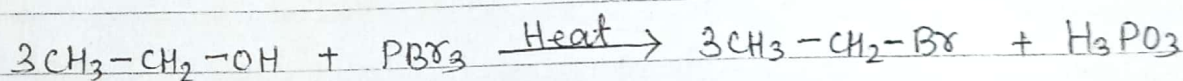
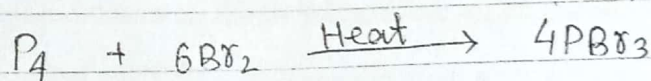




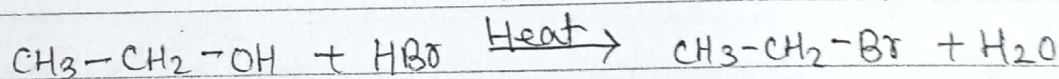
\*  $\text{Cl}^-$  is the weaker nucleophile than  $\text{OH}^-$  therefore anhy.  $\text{ZnCl}_2$  is used to remove water from reaction site.

b) From alcohol, alkyl bromide are obtained by reaction of  $\text{PBr}_3$  or  $\text{HBr}$ .

$\text{PBr}_3$  is obtained by heating bromine with red phosphorus.

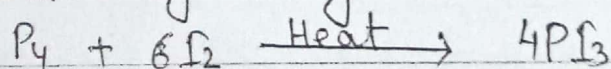


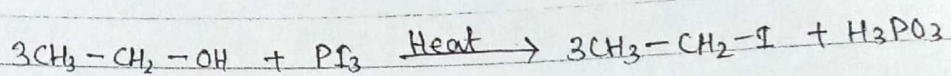
$\text{HBr}$  is produced during reaction from  $\text{NaBr}$  or  $\text{KBr}$  by heating conc.  $\text{H}_2\text{SO}_4$ .



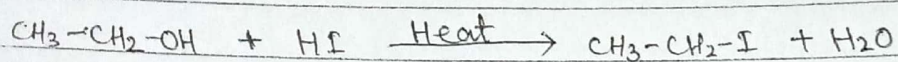
c) From alcohol, alkyl ~~bromide~~ iodide are prepared by heating with  $\text{PI}_3$  or  $\text{HI}$ .

$\text{PI}_3$  is obtained by heating iodine in presence of red phosphorus.

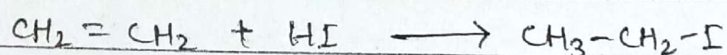
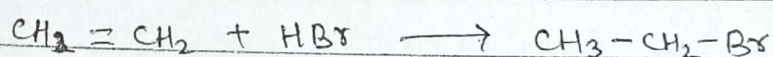
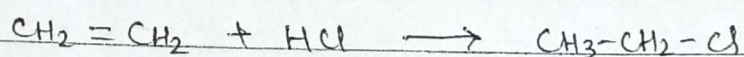




HI is produced during reaction from sodium iodide or potassium iodide by heating with conc  $\text{H}_2\text{SO}_4$ .

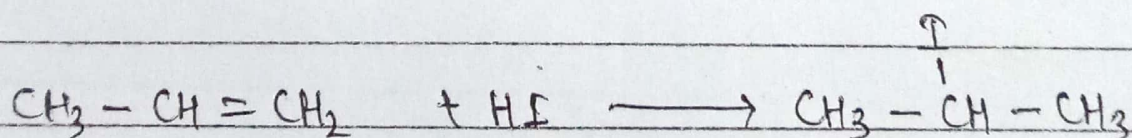
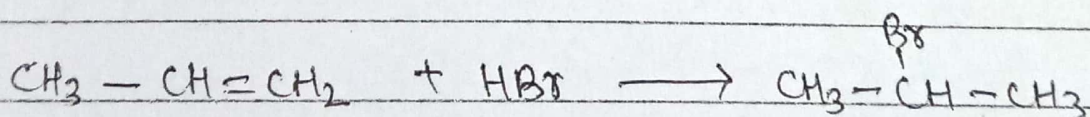
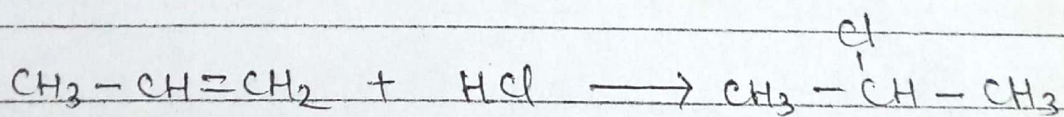


3) From alkene by addition of  $\text{HX}$  ( $\text{H-Cl}$ ,  $\text{H-Br}$ ,  $\text{HI}$ )



In case of asymmetric alkene Markovnikov's addition is observed.

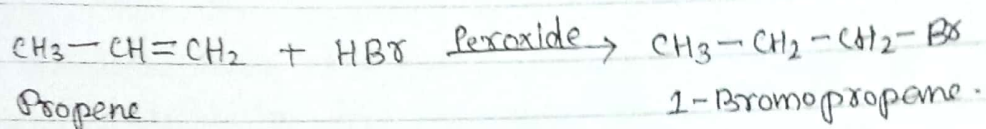
According to Markovnikov's negative part of the reagent is added to that carbon of alkene which forms most stable carbocation.





### Peroxide Effect or Antimarkovnikov's addition or Kharasch Effect :-

In presence of peroxide Antimarkovnikov's of addition of  $HX$  is observed, due to free radical intermediate.



- \* Among  $\text{HF}$ ,  $\text{HCl}$ ,  $\text{HBr}$  and  $\text{HI}$ , Antimarkovnikov's of is observed in  $\text{HBr}$  only.
- \* In case of  $\text{HF}$  and  $\text{HCl}$  homolysis requires high activation energy than heterolysis due to high electronegativity of fluorine and chlorine.

In case of  $\text{HI}$  peroxide is reduced by  $\text{HI}$  because  $\text{HI}$  is a strong reducer.