Addition Reactions

M. Sc. (Chem.) Semester II

(Core course - 4)

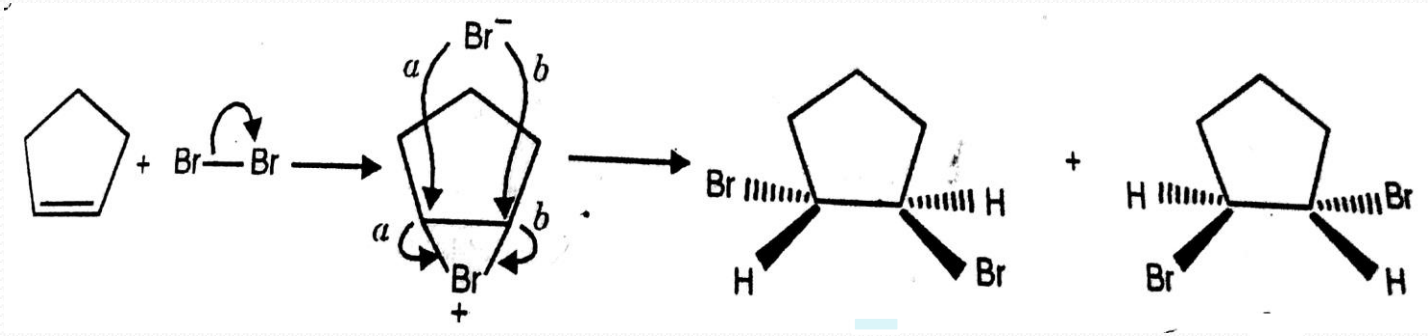
PART - II

Dr. Neeta Sinha

Jamshedpur Cooperative College Jamshedpur

Addition of halogen to alkenes:

i) Addition of bromine to cyclopentene – The nucleophile Br- attacks at either carbon atoms of the cyclic bromonium ion (a) to give racemic product.

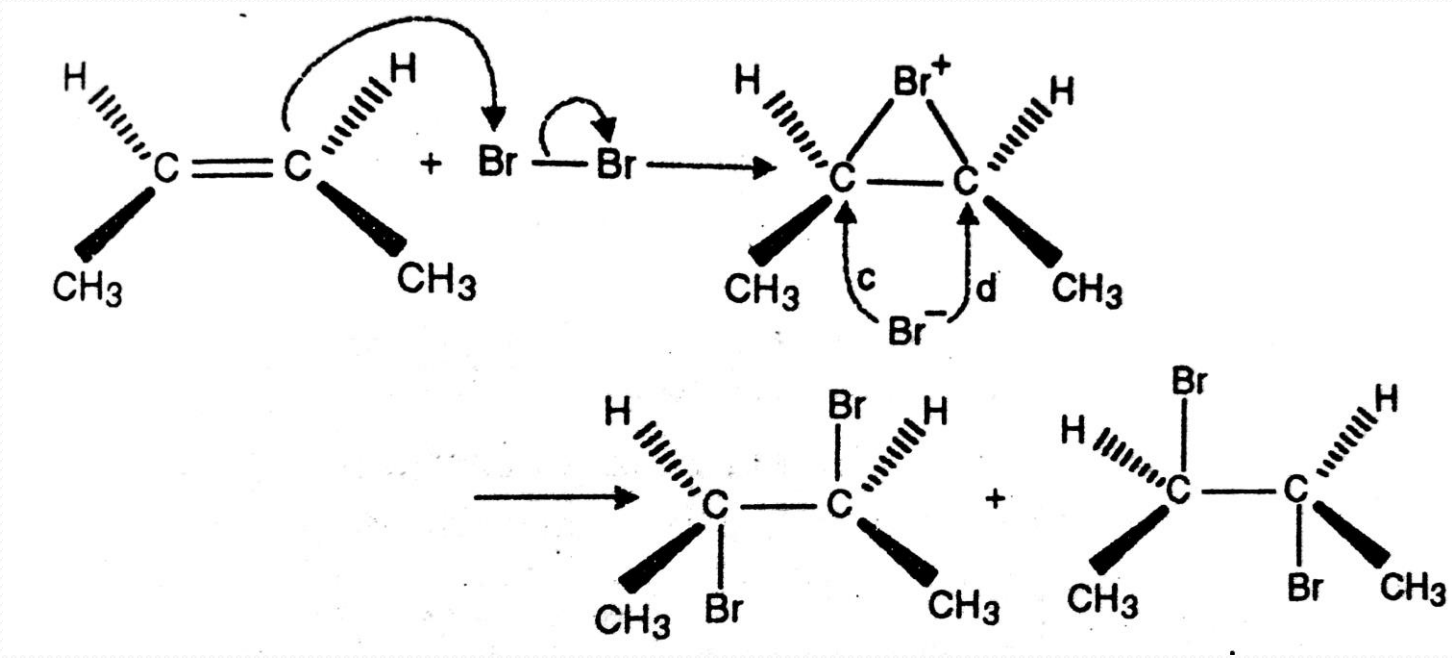


Cyclopentene (a) (b) (c)

Mixture of enantiomers (b+c) is obtained.

b = 1R , 2R
c = 1S, 2S

Addition of bromine to (Z)-2 – butene :

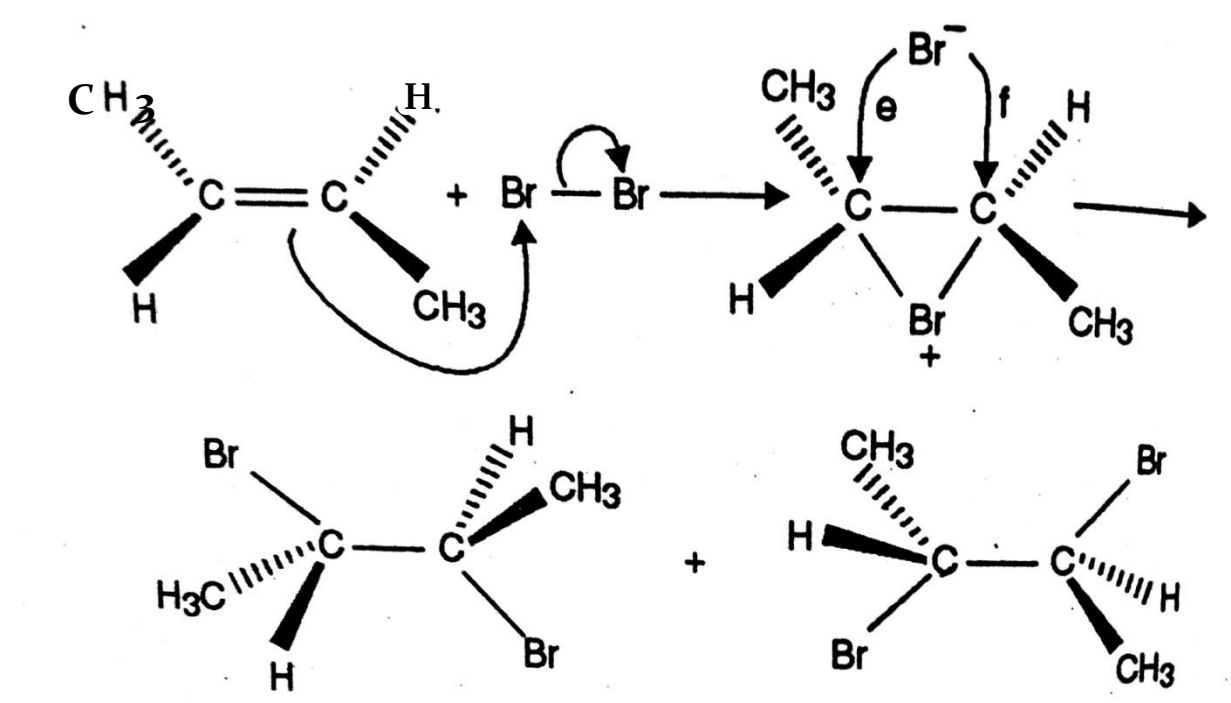


(d) **(e)**

d - (2S ,3S)

e – (2R, 3R) **Enantiomers**

Addition of bromine to (E) -2-butene:



(f) (g)

2,3- Dibromobutane

f – (2S,3R)
g – (2R,3S)

Addition of halogen acid to alkene (HBr):

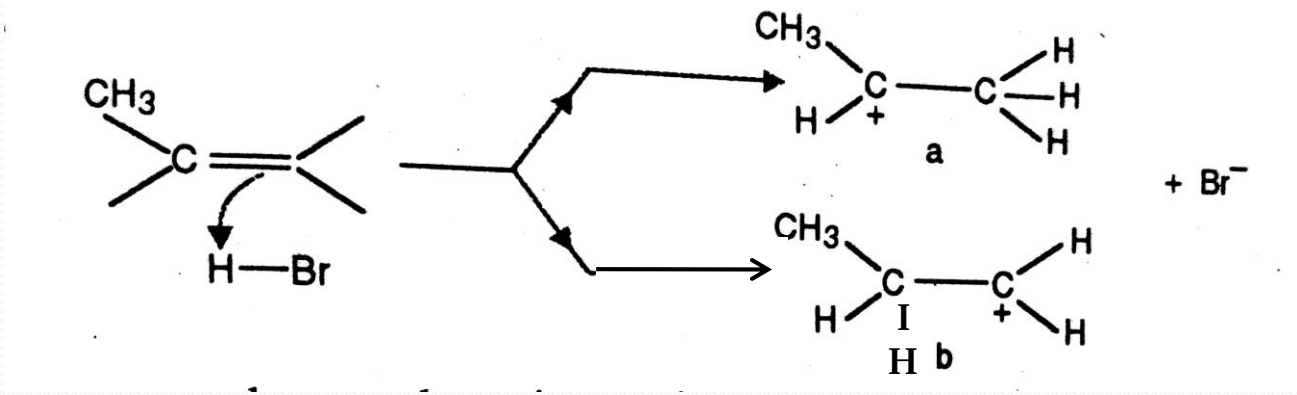
The HBr molecule is polarised due to the pi electrons of alkenes .The hydrogen atom has aquires partial positive charge and the bromine atom has a partial negative charge.

a) $= C = C = + HBr \longrightarrow = C - C = + Br^-$ (H+ bonded to C)

b) $= C - C = + Br^- \longrightarrow - C(Br) - C(H) -$ (H+ bonded to C)

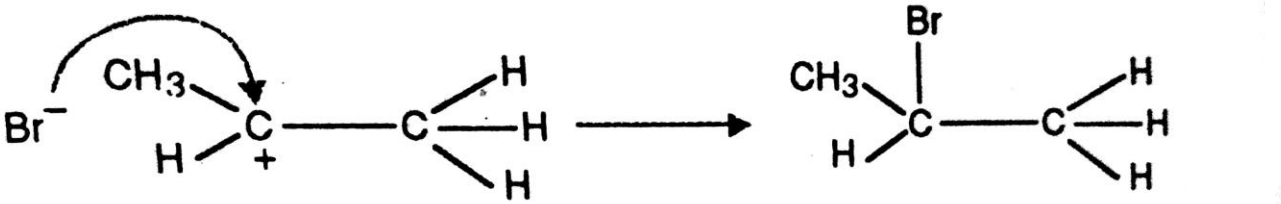
The existance of cyclic protium complex has not been proved as yet. Then the mechanism of the reaction can be suggested as :

i) Attack of H+ ion:



(a) is secondary carbocation , hence it is more stable than (b) which is primary carbocation.

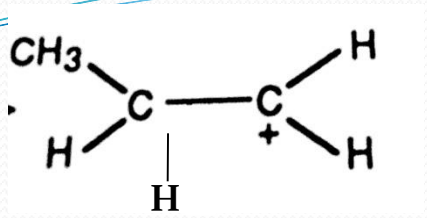
ii) Attack of nucleophile (Br-) :



(a)

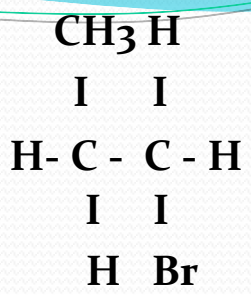
(major product)

It is noted that , the major product is that isomer which results from the more stable carbocation.



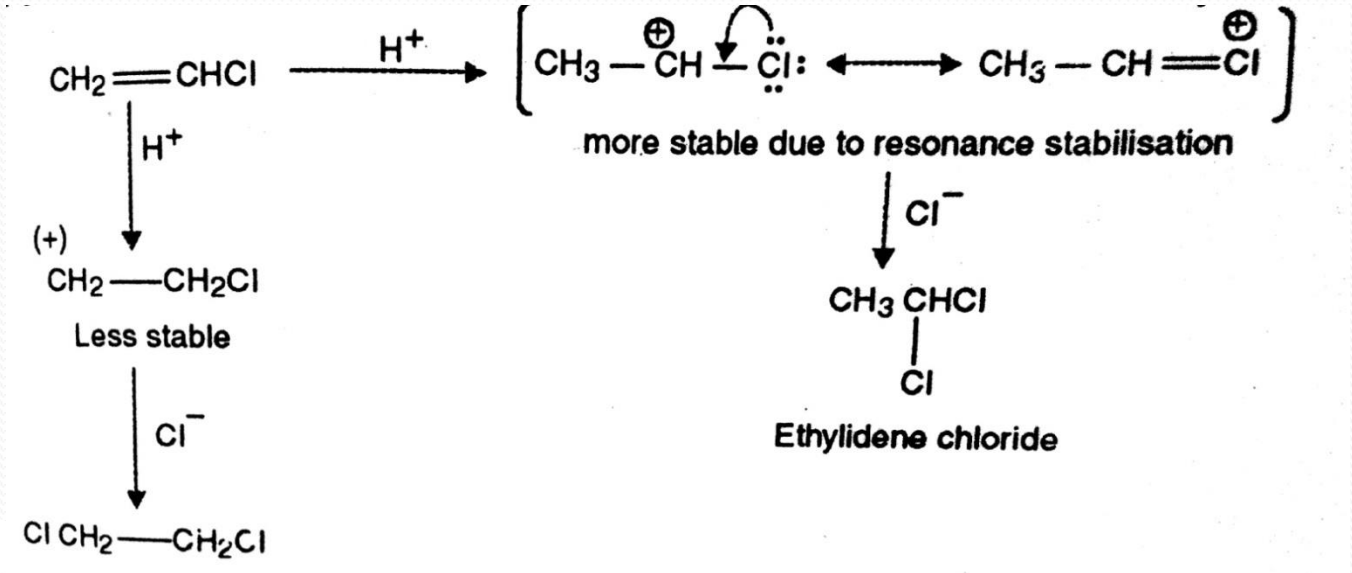
b

Br-



(minor product)

Addition of HCl to vinyl chloride



(not formed)

(..... to be continued in next class lecture)

THANK YOU