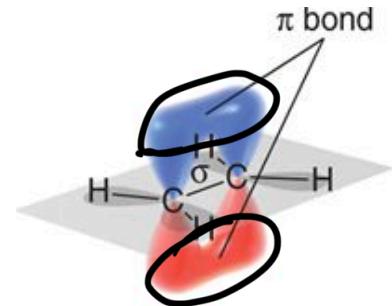
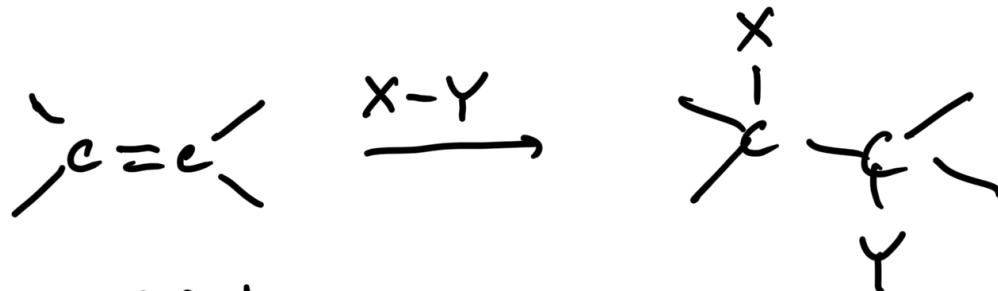


Reactions of alkenes: addition

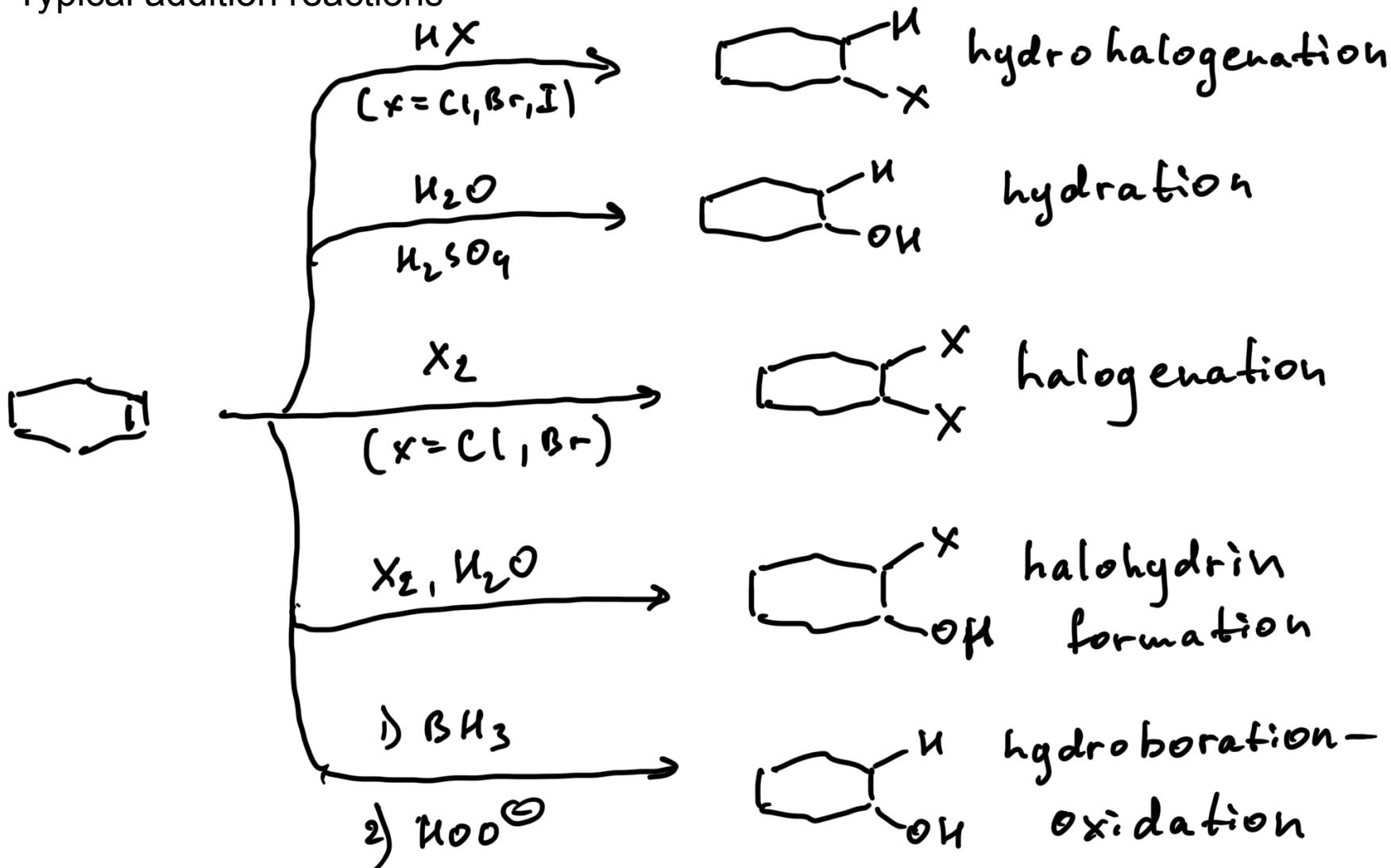
Nucleophilicity of simple alkenes. Syn addition and anti addition



- addition reactions
- react w/electrophiles, NOT nucleophiles
- electrophilic addition reactions
- π bond is broken

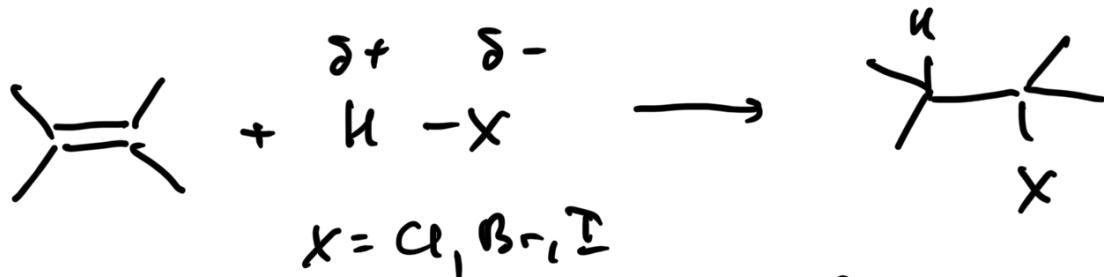
Reactions of alkenes: addition

Typical addition reactions



Reactions of alkenes: hydrohalogenation

General considerations and thermodynamics



broken: $\pi_{\text{C=C}}$, $\sigma_{\text{H-X}}$

formed: $\sigma_{\text{C-H}}$, $\sigma_{\text{C-X}}$



$$\text{BDE}_{\pi(\text{C=C})} = 264 \text{ kJ/mol}$$

$$\text{BDE}_{\sigma(\text{H-X})} = \underline{368 \text{ kJ/mol}}$$

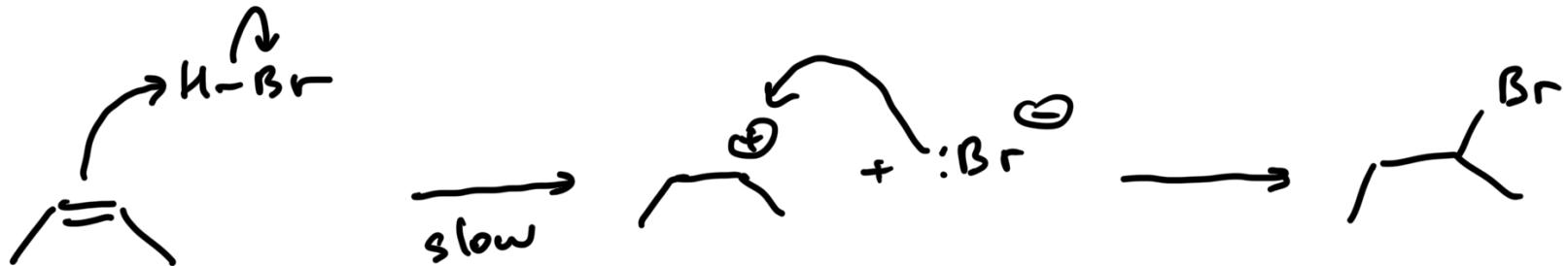
$$\text{BDE}_{\sigma(\text{C-H})} = 410 \text{ kJ/mol}$$

$$\text{BDE}_{\sigma(\text{C-Br})} = 285 \text{ kJ/mol}$$

$$\Delta H^\circ = -60 \text{ kJ/mol}$$

Reactions of alkenes: hydrohalogenation

Mechanism



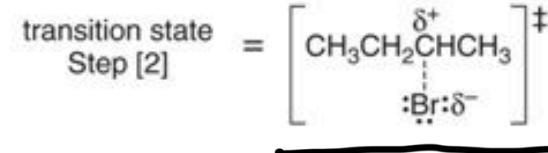
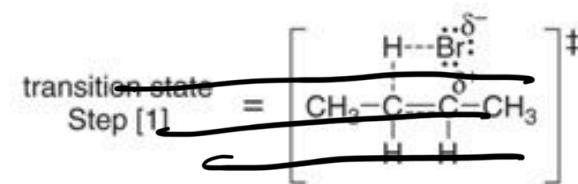
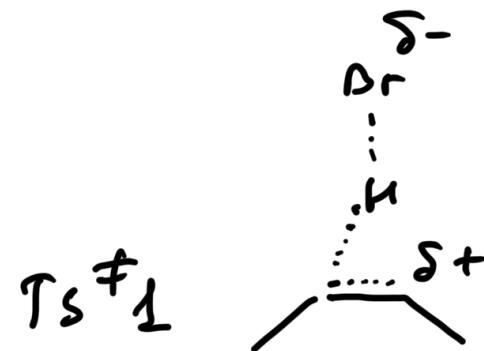
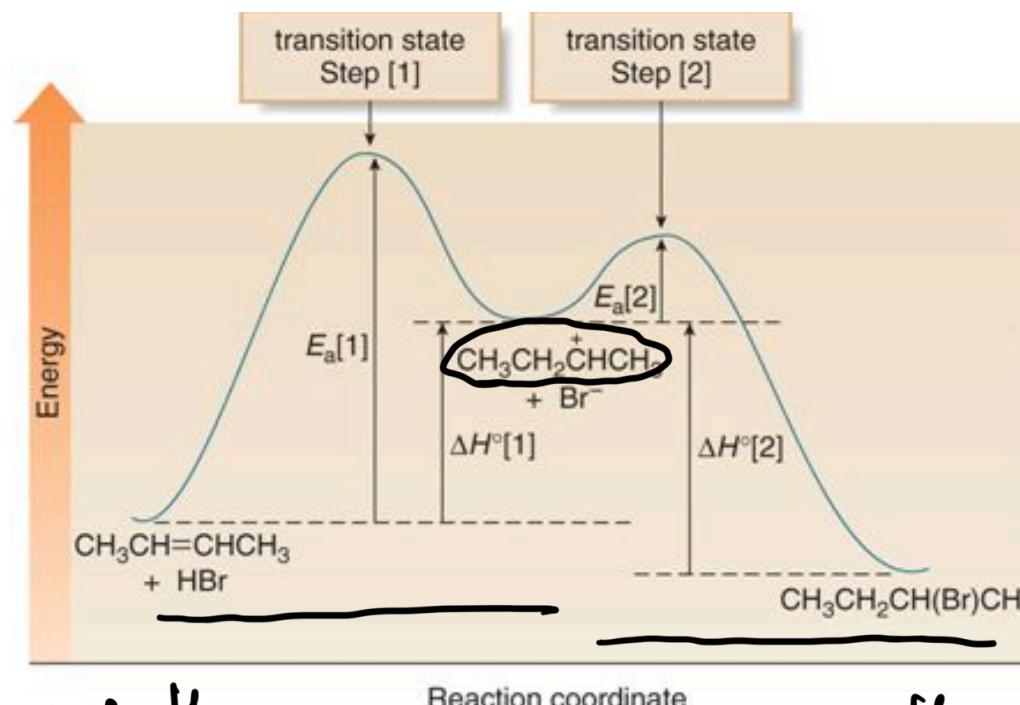
Lewis acid-base reaction:

alkene: Lewis base \longrightarrow carbocation: Lewis acid

H-Br : Lewis acid \longrightarrow :Br^- : Lewis base

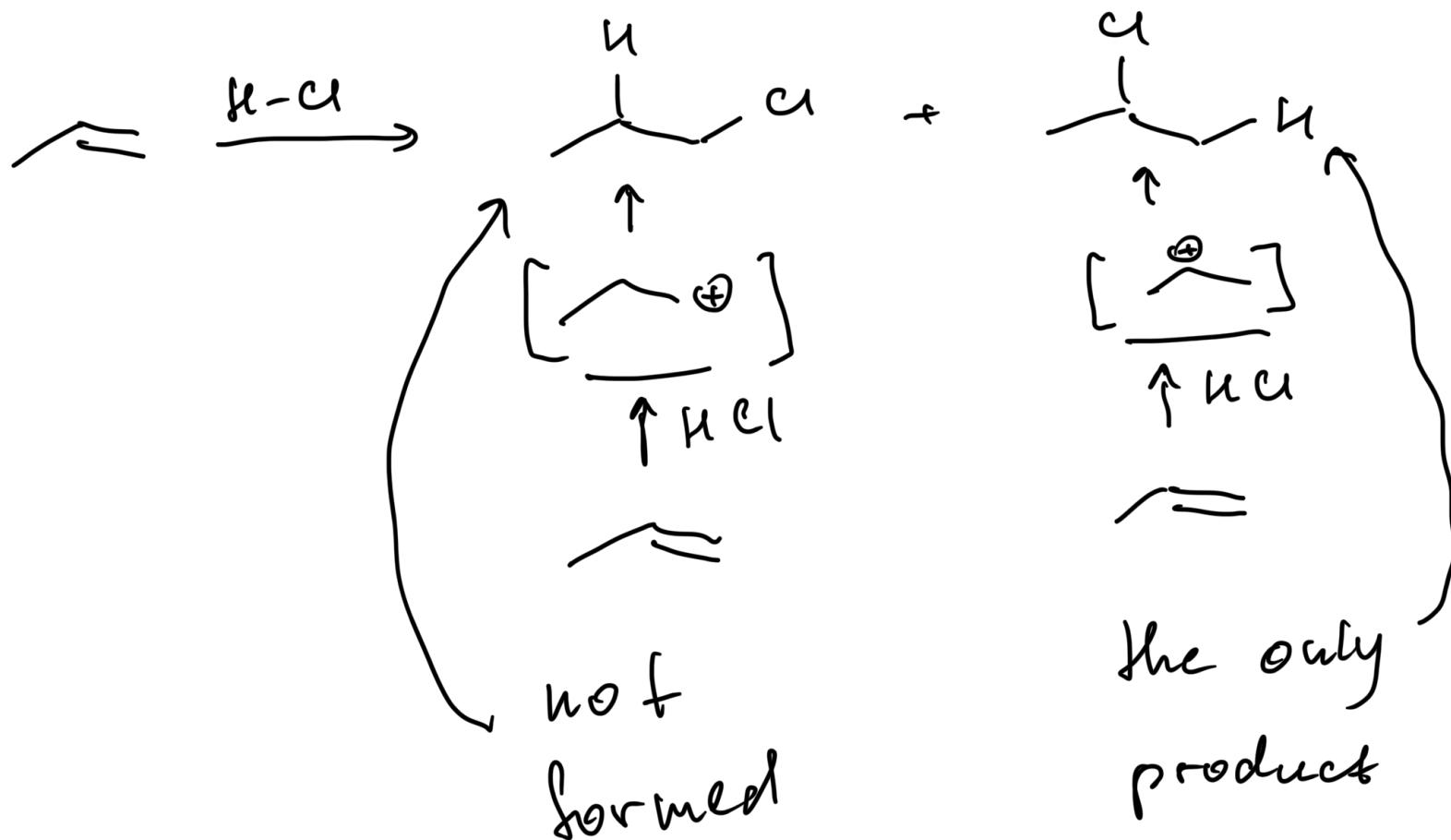
Reactions of alkenes: hydrohalogenation

Energy diagram



Reactions of alkenes: hydrohalogenation

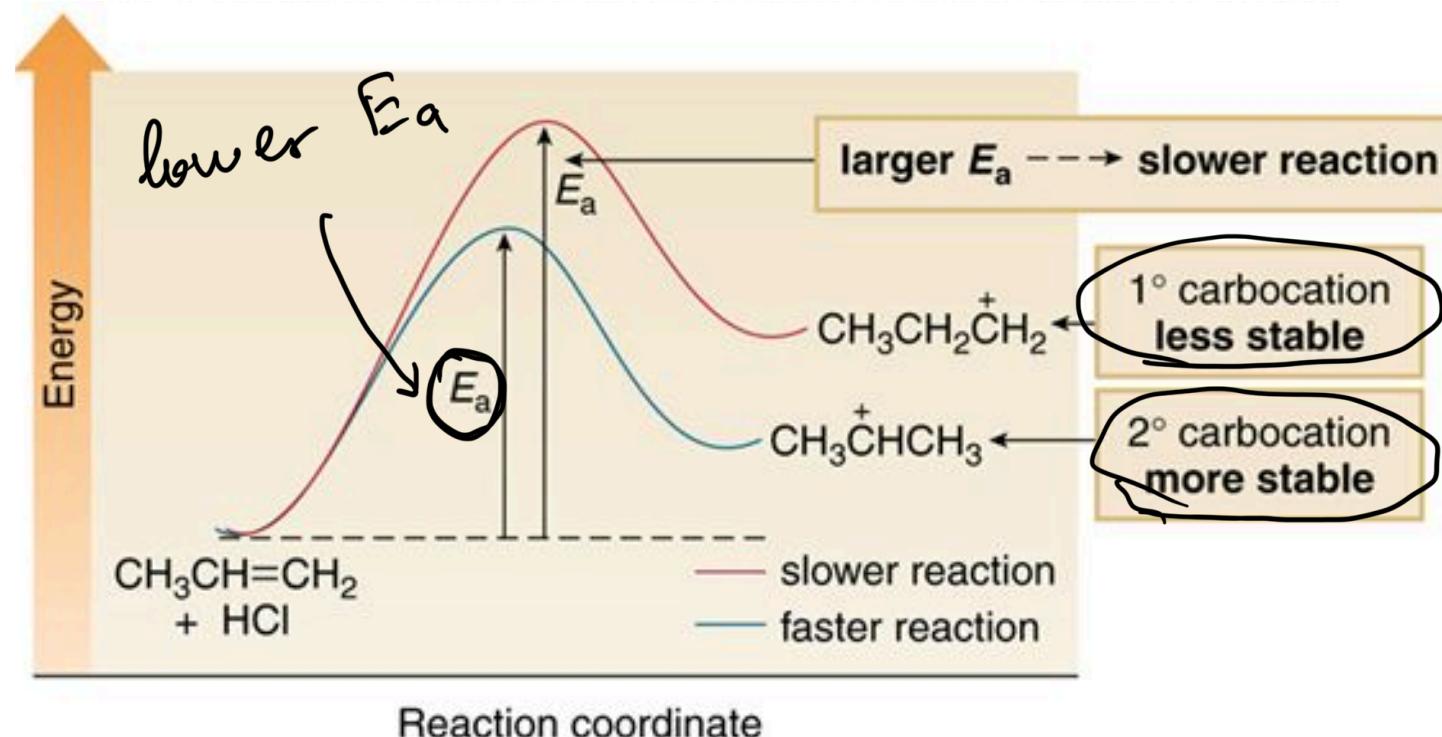
Selectivity. Markovnikov's rule



Reactions of alkenes: hydrohalogenation

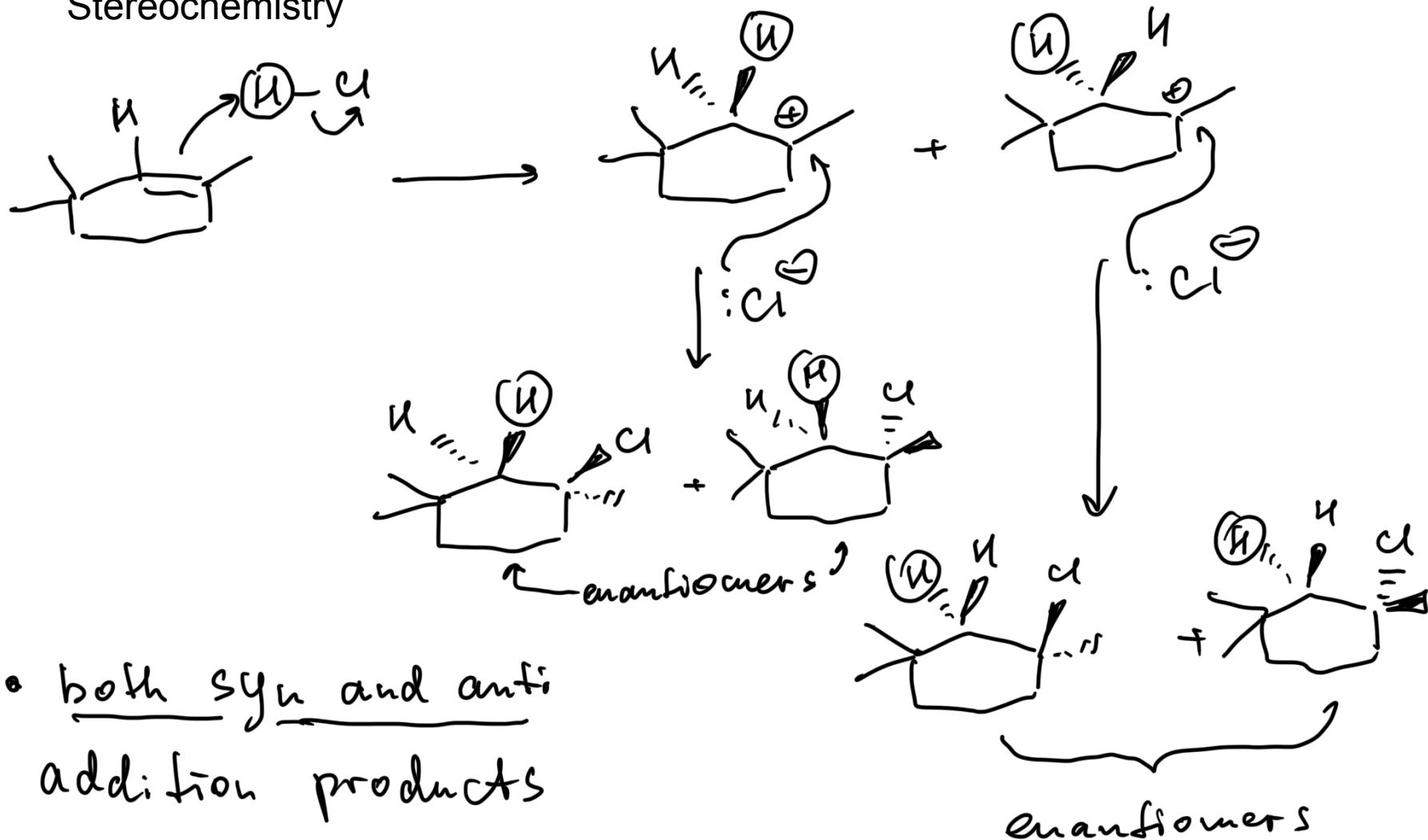
Markovnikov's rule

- addition of HX results in H being attached to less substituted carbon



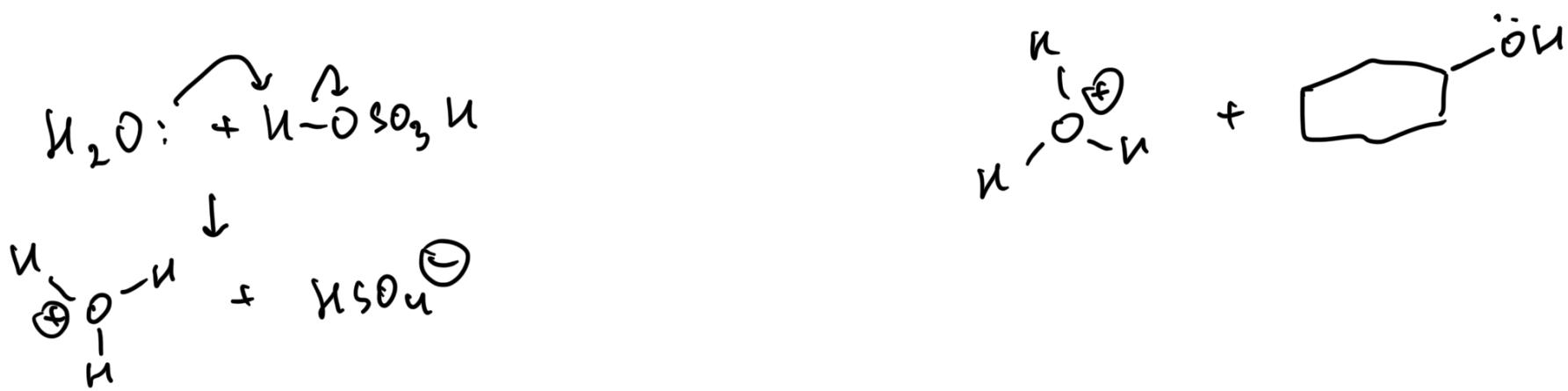
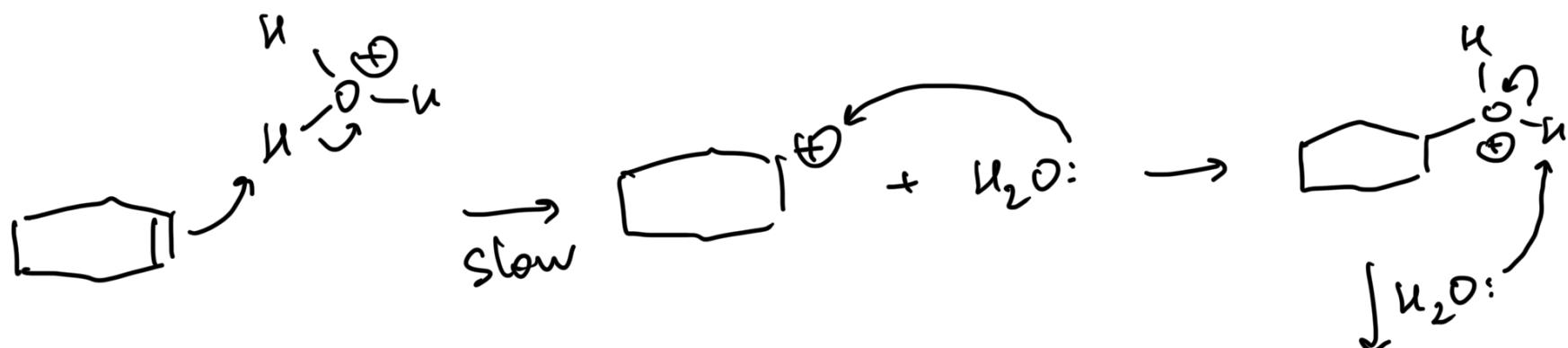
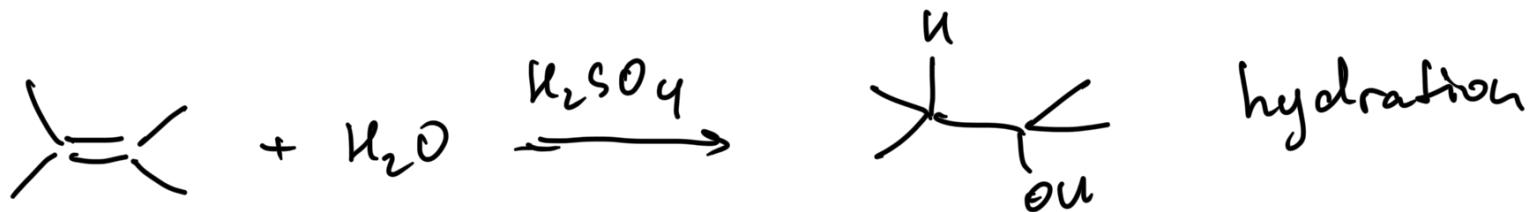
Reactions of alkenes: hydrohalogenation

Stereochemistry



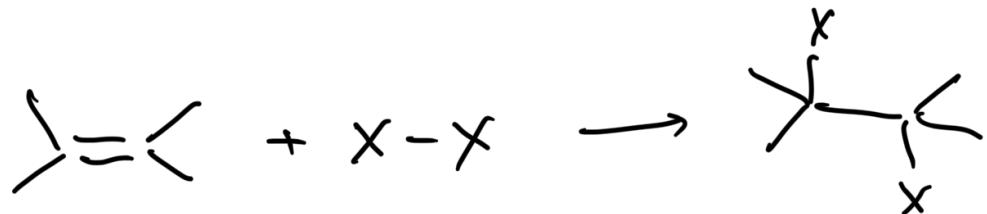
Reactions of alkenes: hydration

General considerations and mechanism

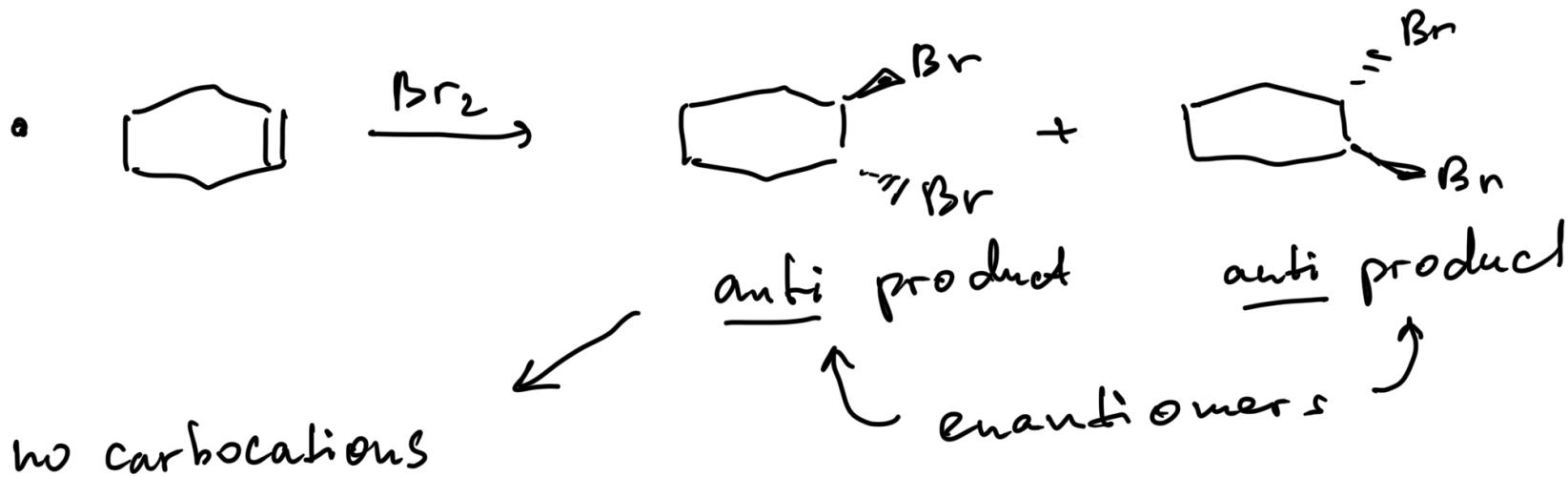


Reactions of alkenes: halogenation

General considerations. Anti addition

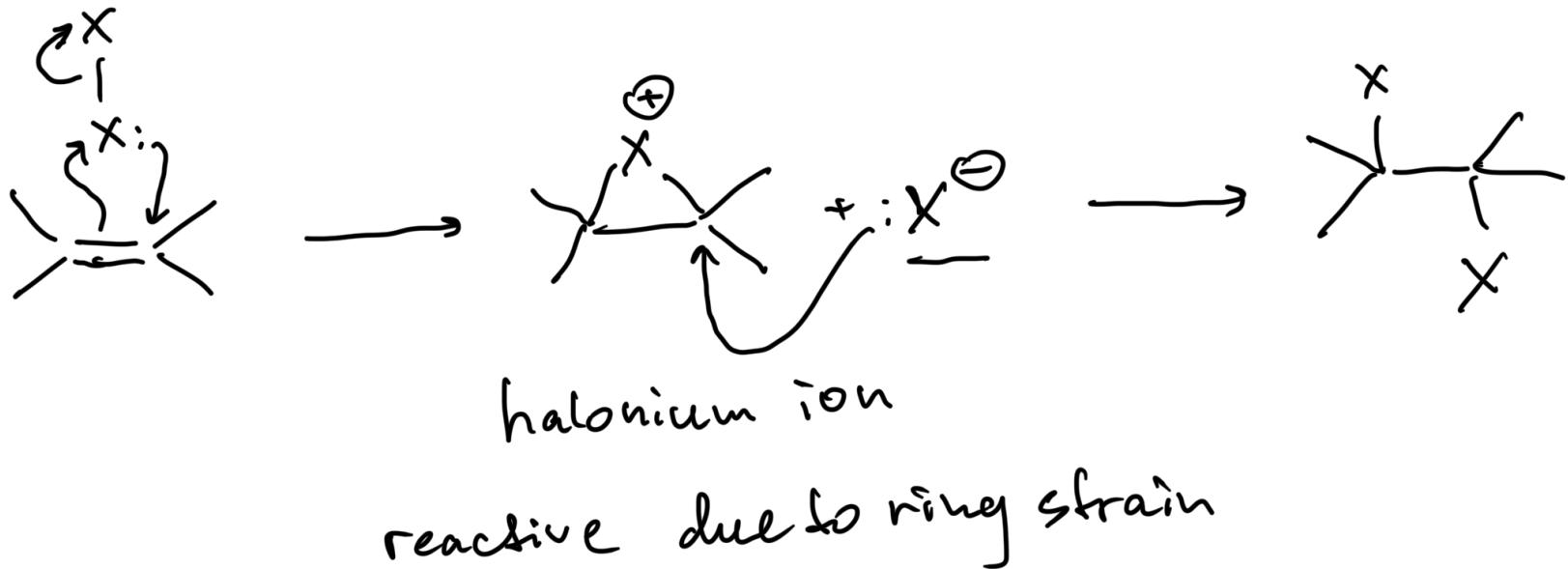


- no rearrangements are observed
↓
no carbocations



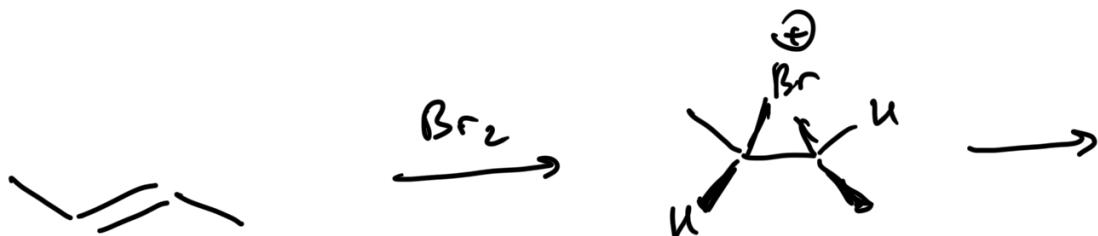
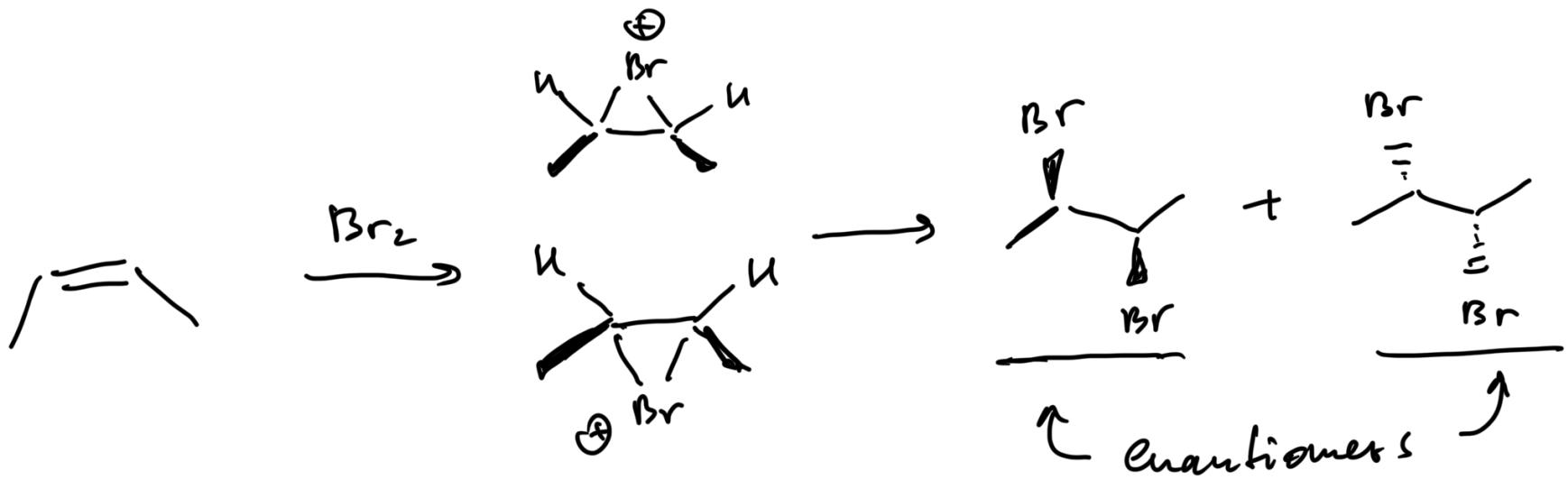
Reactions of alkenes: halogenation

Mechanism. Halonium ion intermediates



Reactions of alkenes: halogenation

Stereochemistry. Stereospecific reactions



Reactions of alkenes: halo hydrin formation

General considerations. Mechanism

Reactions of alkenes: halo hydrin formation

Stereochemistry and regioselectivity

Reactions of alkenes: halo hydrin formation

Stereochemistry and regioselectivity