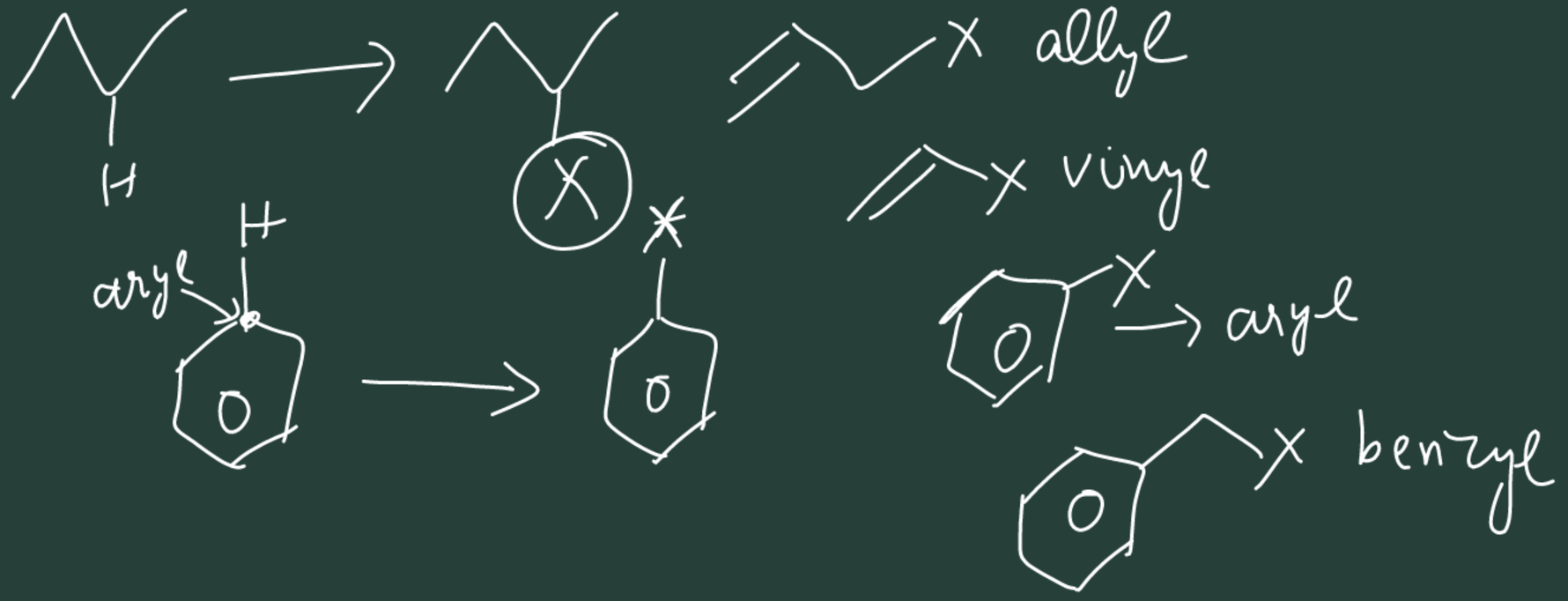
Haloalkanes and Haloarenes



Haloalkanes

- Substitution
  - S_N2
  - S_N1
  - S_Ni
  - NGP
- Elimination → E1, E2, E1cB
- Rxn with metals → Wurtz Rxn, Fittig Rxn

Wurtz Fittig

Basic Organic Chemistry

= specie under observation

Basic of Rxn ⑤ Detailed description of flow of e⁻s in a rxn is K/a Mechanism of rxn

① Flow of e⁻s happens. Old bond break, New bond forms

② Sufficient Energy (E_a) & Proper orientation

③ Electrostatic attⁿ & orbital interaction brings Molecules together

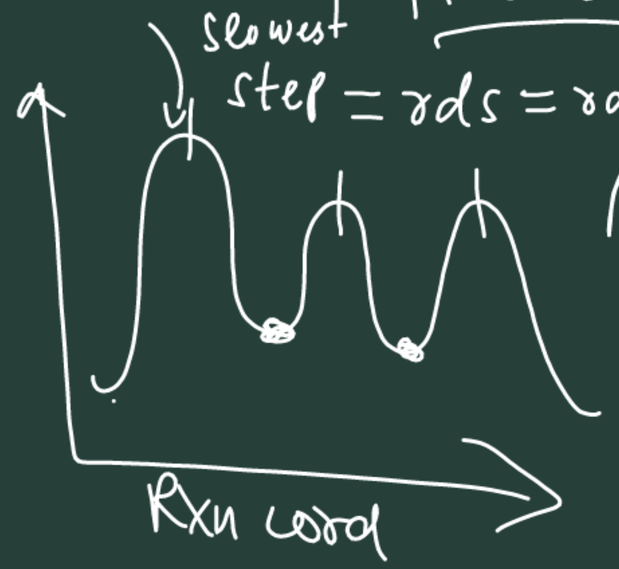
④ Almost all rxn in O.C are rxn b/w E^+ and $\ddot{N}u$

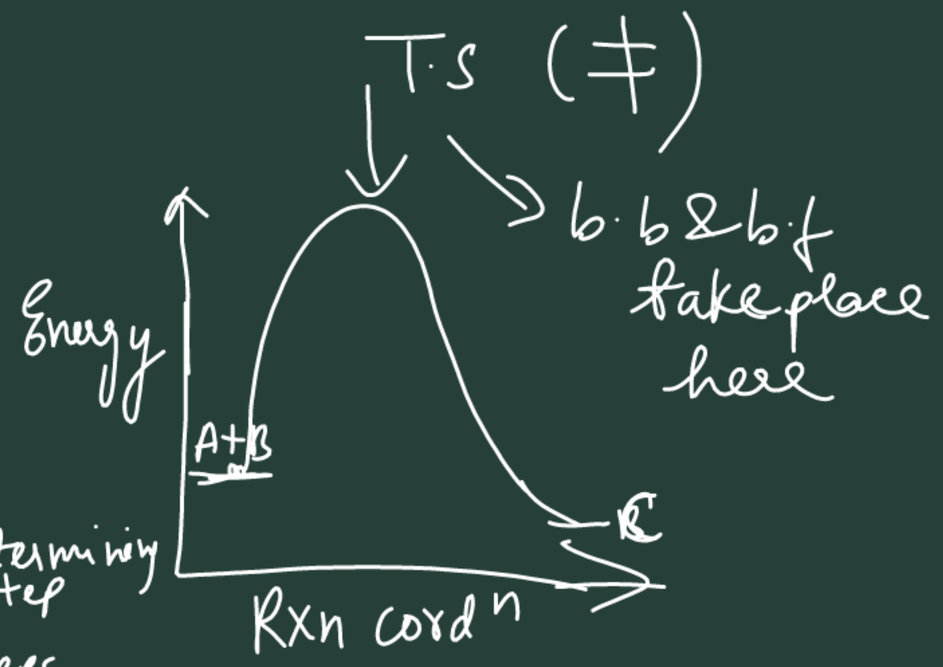
Elementary Rxn $A + B \rightarrow C$

Multistep Rxn $A + B \rightarrow C \rightarrow D$

+D

↑ intermediate





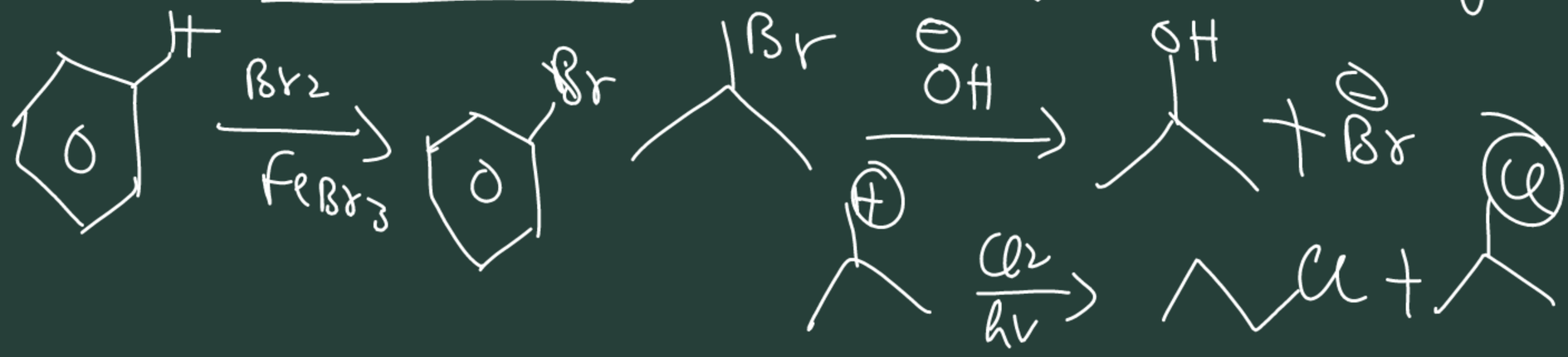
No of steps = No of T.S = 3

No of intermediates = T.S − 1 = 2

Types of Rxn

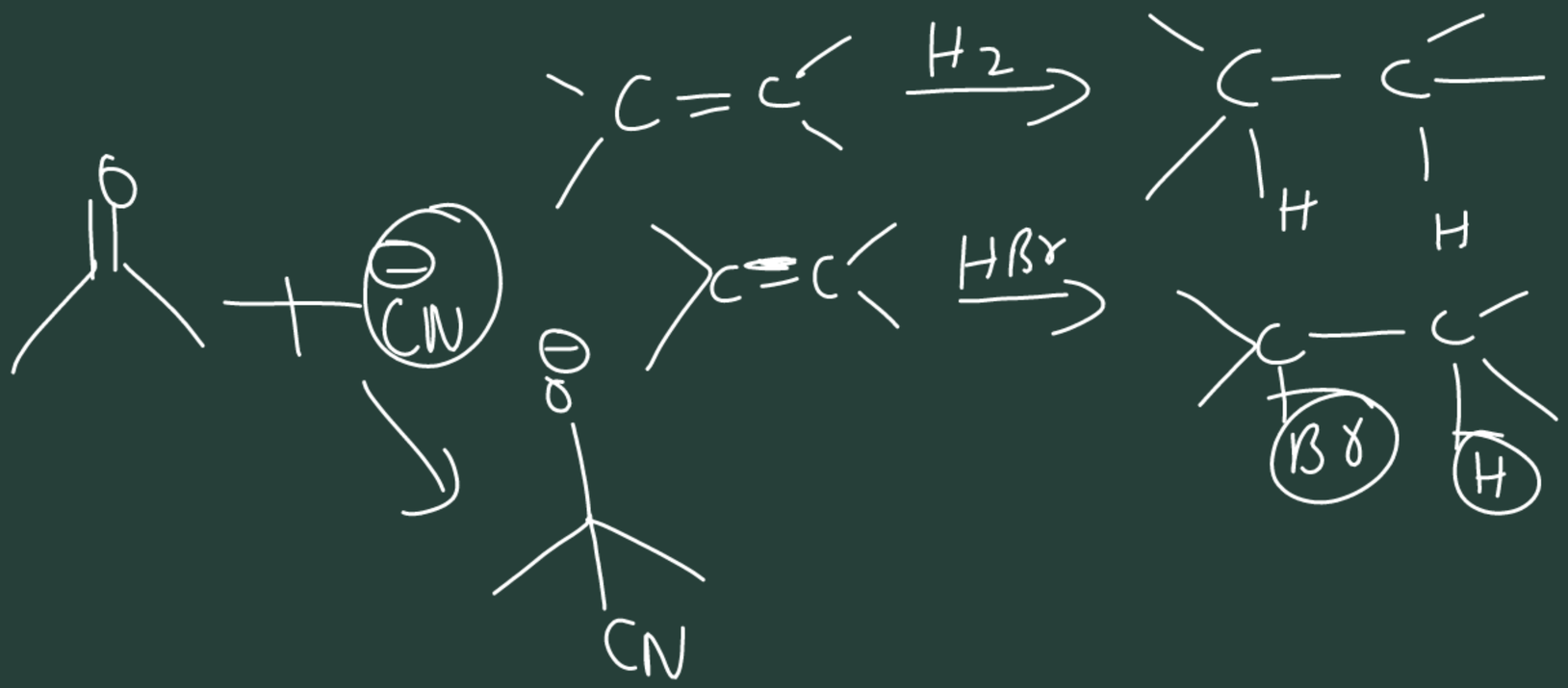
1) Substitution
2) Addition
3) Elimination
4) Rearrangement

Substitution Rxn → One atom or group is replaced by another

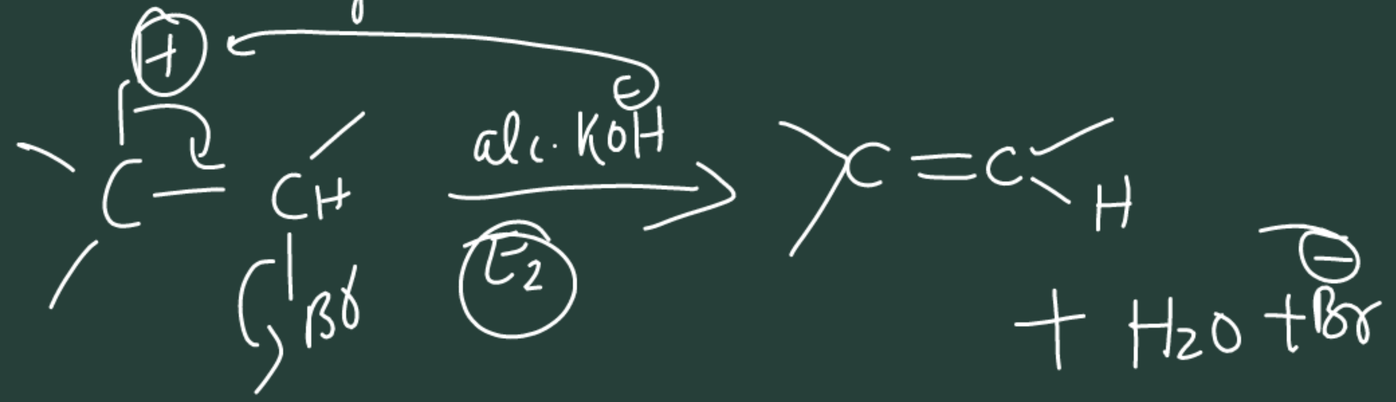


② Addition Rxn → When two reagent add up to give product

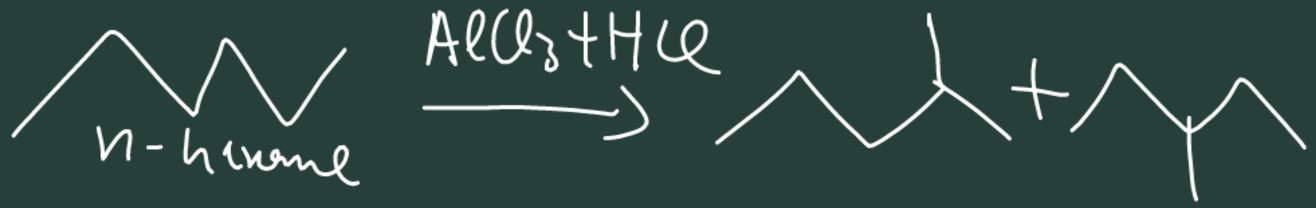
Generally shown by molecules containing π bonds.



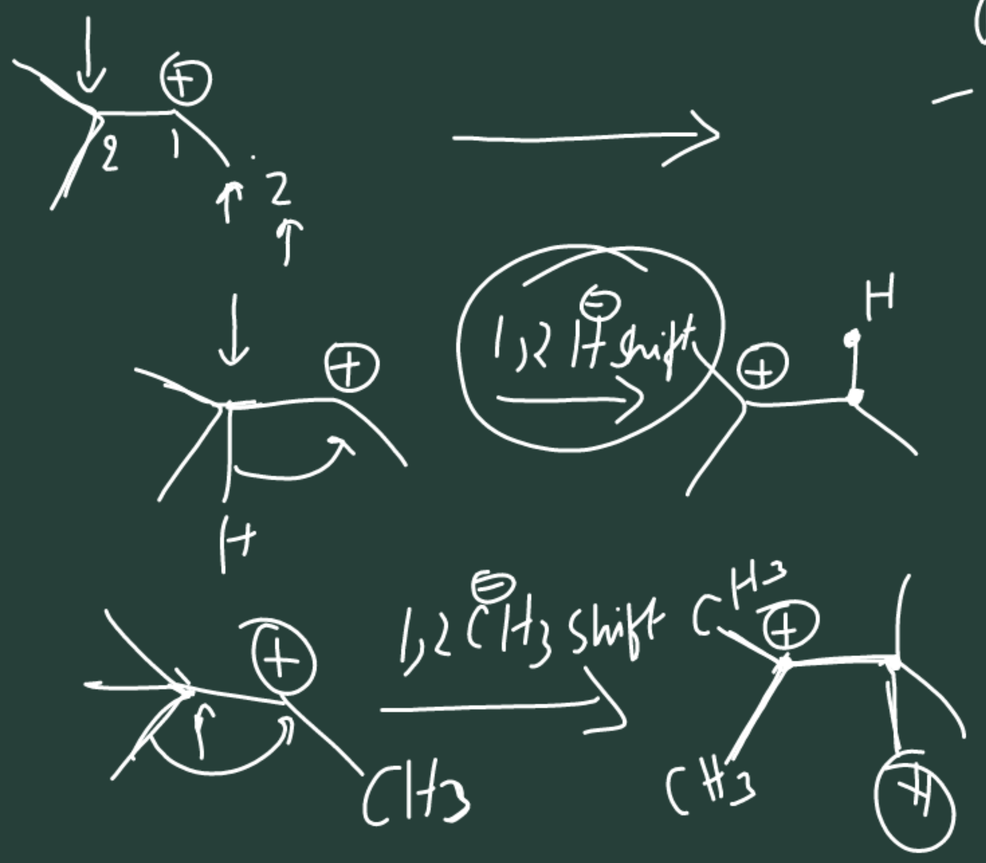
(3) Elimination Rxn → Reverse of add^{n} g ⇒ Two atoms or group eliminate from a reactant to give alkene or alkyne



(4) Rearrangement rxn | Isomerisation

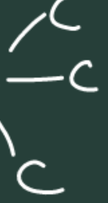
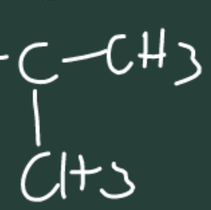


Rearrangement of Carbocation

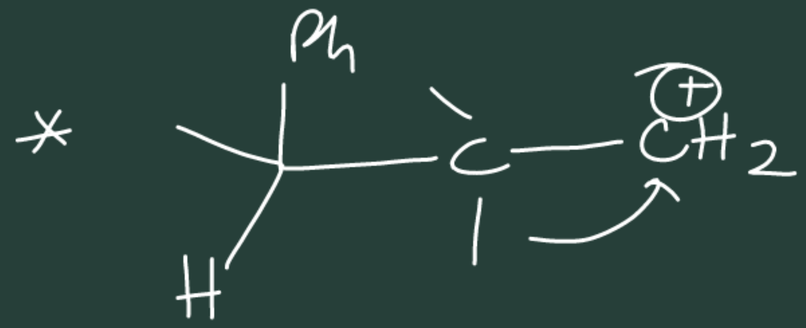


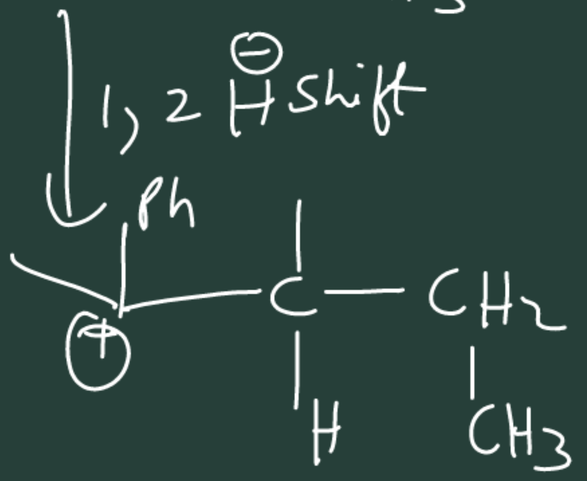
Shifting

Migratory aptitude

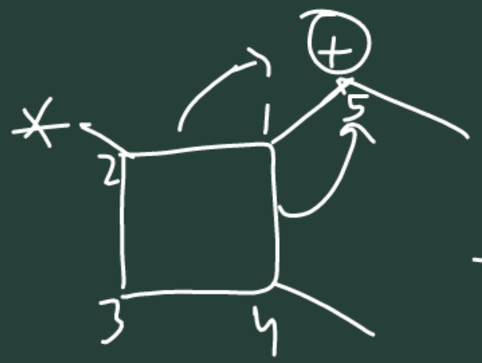
$-H >$  $>$  $>$  $> -CH_2-CH_3$

$> -CH_3$

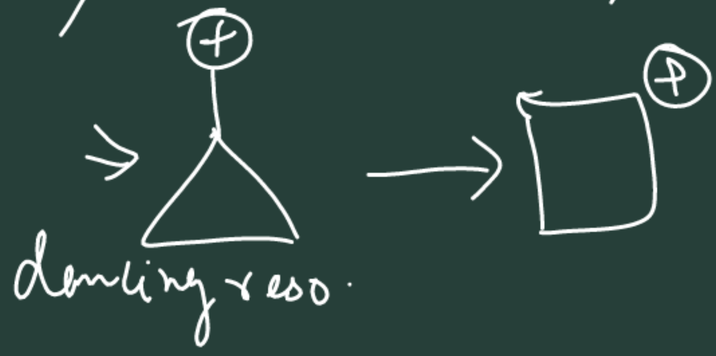




Ring expansion



3 → 4 → 5 → 6 → 7



Electrophiles And Nucleophiles

Electrophiles → e^- loving species

* e^- pair accept
* Lewis Acid ✓
* Must have vacant orbital of low energy (LUMO)

Cations

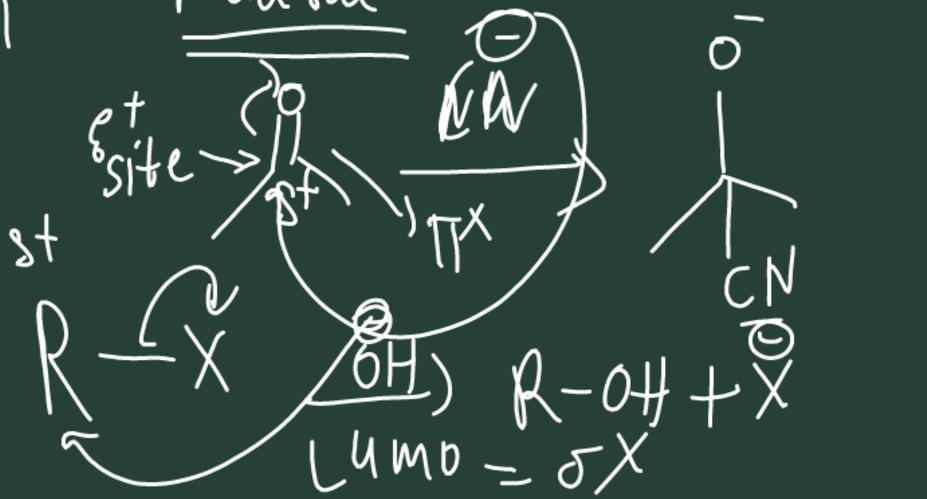
$R^{\oplus}$ → Carbonium ion / Carbocation

$NO_2^{\oplus}$ → Nitronium ion

$\overset{+}{N}O$ → Nitrosonium ion

$X^{\dagger}$ → Halonium ion

Neutral



Nucleophiles

* Nucleus loving
* donate pair of e⁻s / L.B
* Must have pair of e⁻ ~~with~~ with suffiient energy (HOMO)

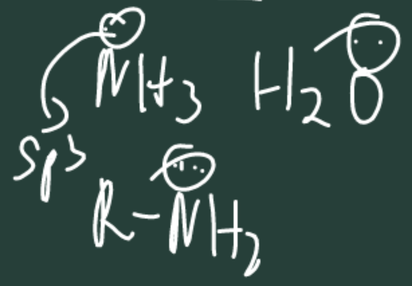
Negatively charged

HO^- → hydroxide ion

RO^- (CH_3O^-) → alkoxide ion

RH_3 → carbanions

Neutral



$C=C$, $C\equiv C$ (π bond b/w C–C)

↓ π bonding

Solvent

- Polar ($\mu \neq 0$)
  - Solvent in which H attached to O/N/F
    - Ether
    - Alcohol
    - water
  - Polar Protic Solvent
    - H_2O, CH_3-CH_2-OH
    - CH_3COOH
  - Polar Aprotic Solvent (Also Protic Nhi Hai)
    - $CH_3-\overset{\overset{O}{\|}}{S^{\delta+}}-CH_3$ (DMSO) — Dimethyl sulfoxide
    - $H-\overset{\overset{O}{\|}}{C}-N^{-}$ (DMF) — Me_2N- (Dimethyl formamide)
    - CH_3-O-CH_3
- Non polar ($\mu = 0$)
  - CCl_4, Benzene, Hexane