DATE

Haloalkanes and Haloarenes

General Ideas

S + R ⟶ Product (P)

↑ Types of ↑

Substrate Reagent

Types of reagent

(1) Electrophilic reagent (electrophile) →

→ Electrophiles are electron loving species.

→ Electrophiles are electron deficient species and atto ck at the electron rich centre.

a) All positively charged species are electrophile

eg:- $\overset{\oplus}{CH_3}$, $\overset{\oplus}{NO_2}$, $-\overset{\oplus}{Cl}$, $\overset{\oplus}{Br}$, $\overset{\oplus}{H}$

Except:- $NH_4^{\oplus}$, $H_3O^{\oplus}$

(b) Compounds having Incomplete octet

eg:-

$\dot{C}H_3$, $AlCl_3$, BF_3 etc.

$BI_3 > BBr_3 > BCl_3 > BF_3$

← Back bonding

← electrophilic character increase

c) $SiCl_4 + 2Cl^- \longrightarrow SiCl_4$

$SiF_4 + 2F^- \longrightarrow SiF_4^{-2}$

$PCl_5 + Cl^- \longrightarrow PCl_6^-$

PAGE

classmate

Note:- All polarising functional group are electrophile or nucleophile.

a) $\overset{\delta+}{Cl}=\overset{\delta-}{O}$

$$H-\underset{\delta+}{C}(=\overset{\delta-}{O})-H$$

δ^- → nucleophile

δ^+ → electrophile.

e) $CH_3-\overset{\delta+}{C}\equiv\overset{\delta-}{N}$

↑ sp ↑ sp

(f) $\overset{\delta-}{O}=\overset{\delta+}{C}=\overset{\delta-}{O}$

Note:- All lewis acids are electrophile but all electrophile are not lewis acid.

for eg:-

$\overset{\oplus}{C}H_3$ is electrophile but not lewis acid.

2. Nucleophiles →

→ $e^{\ominus}$ rich species and attack at the electron deficient centre.

a) All -vely charged species are Nucleophiles.

eg:-

$\bar{H}$, $\bar{C}H_3$, $\bar{Cl}$, $\bar{N}O_2$, $\bar{Br}$, CN^- etc

b) compounds having lone pair of electrons are nucleophiles: eg:-

$H_2\ddot{O}$, $\ddot{N}H_3$, $\ddot{P}H_3$, $\ddot{P}Cl_3$, $R\ddot{N}H_2$

$R-\ddot{O}H$ etc

c) All organometallic compounds are nucleophile

Organometallic compounds:-

The compound in which metal is directly bonded with carbon are known as Organometallic compound.

e.g:- $\overset{\delta^-}{R}-\overset{\delta^+}{Mg}X$ ↑ Grignard reagent

$\overset{\delta^-}{R_2}\overset{\delta^+}{Cu}Cl$ Gilmann's reagent.

$\overset{\delta^-}{R_2}\overset{\delta^+}{Zn}$ → frand land reagent

d) All polarising functional group are electrophile and nucleophile.

e) Compounds having π-electron density are nucleophile.

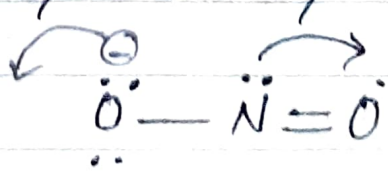
$CH_2=CH_2$, $CH\equiv C-H$,  etc.

Nucleophilicity:- Tendency of nucleophile to donate lone pair of electron.

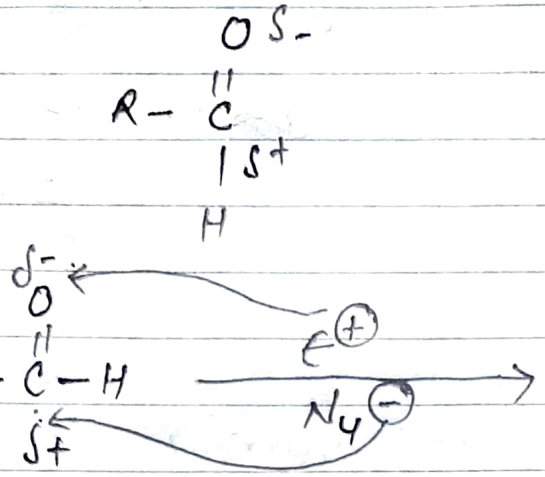
3. Ambident nucleophile →

Nucleophiles with more than one donar site:

$\overset{\ominus}{C}\equiv\overset{\ominus}{N}$ cyanide

 nitrite

Amphiphiles :- Those species which have both electrophile and nucleophile nature (both site)



b) R – C(=O) – X | OR | OCOR | OH etc.

Types of reactions → C^+, $C^\cdot$, $C^\ominus$
→ carbene, nitrene, benzyne

Substrate + reagent → Reaction → Product

↓

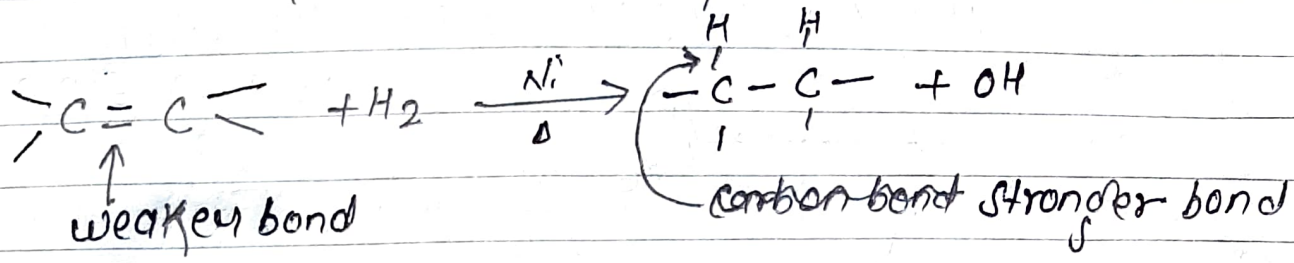
Organic compounds

a) Alkenes.
b) Alkyne.
c) alcohol
d) alkyl halides.
e) aldehydes & ketones.
f) Amines.

Reaction → T.S. → Products
(partially bonded)

(4) Addition reactions :→

→ π-bond broken → π-bond formed.

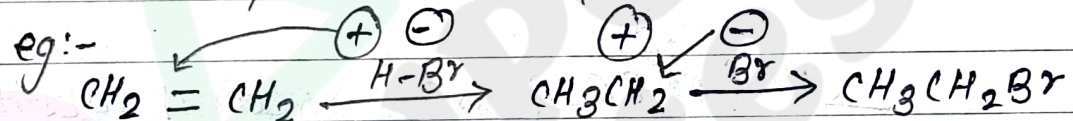
→ 

→ Those reaction Pn which we add the reagent by breaking the π-bonds and forming new π-bonds.

Addition reactions

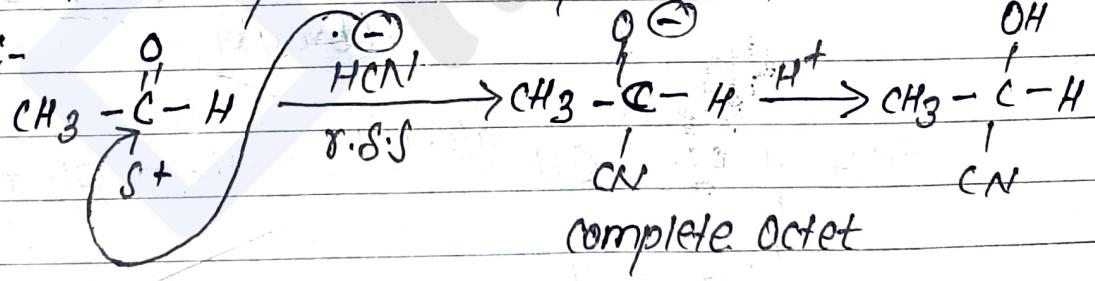
EAR (electrophilic addition reaction)

eg:-

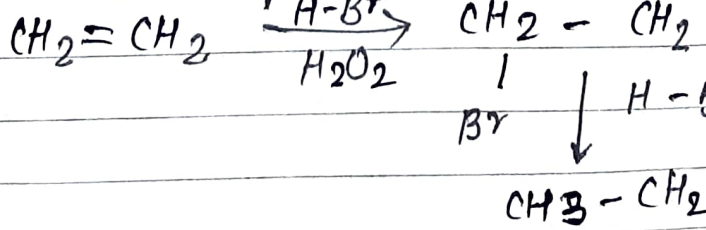


NAR (Nucleophilic addition reaction)

eg:-



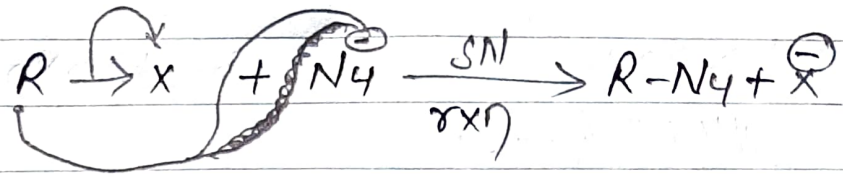
Radical addition reaction (RAR) →



(II) substitution Reaction → when we replace an atom or group with other by breaking and forming of a σ bond.

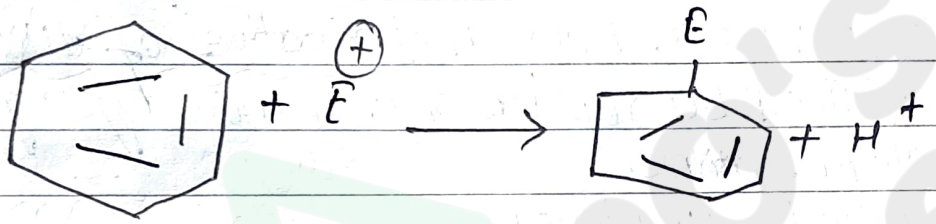
→ NSR (S_N) Rxn; Nucleophile substitution reaction.

eg:-



→ ESR or SE rxn :- electrophilic substitution reaction.

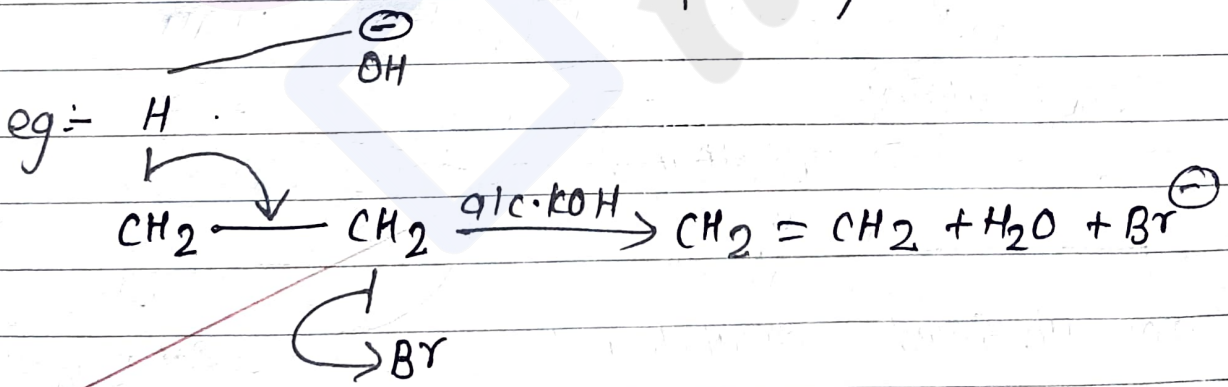
eg:-



→ RSR or ESER rxn → Radical substitution rxn eg:-

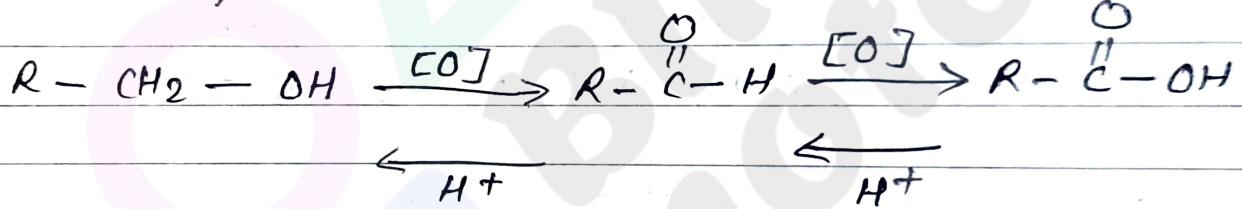
eg:- Hydrogenation of alkene

(III) elimination Reaction:- σ = bond ↔ π - bond
break formed



When we eliminate some group or atoms form molecule the reaction is called elimination reaction.

(IV) Oxidation and reduction reaction → Addition of H or removal of O.



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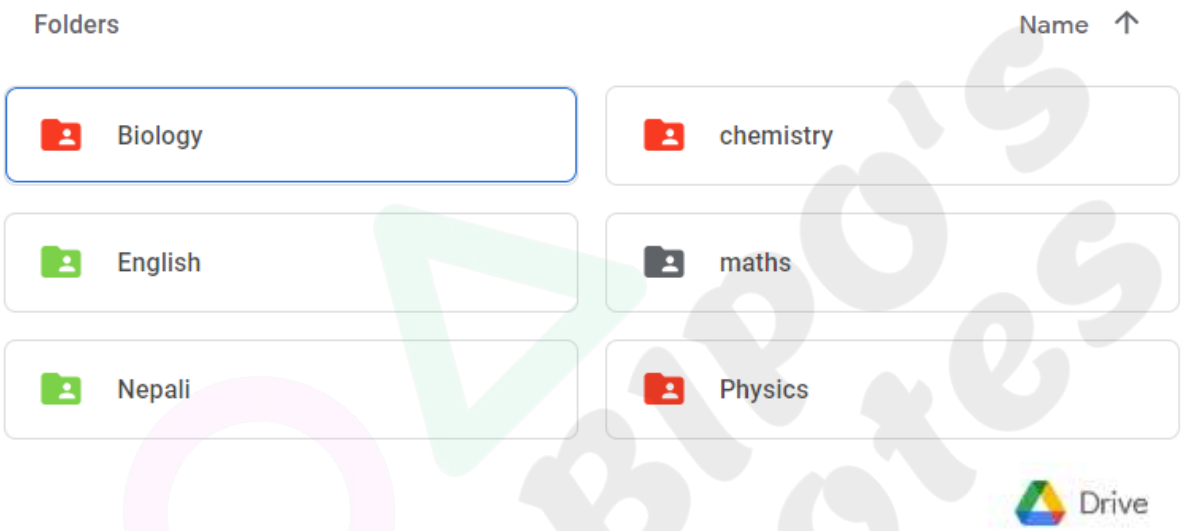
Class 12 complete notes and paper collection.



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