3] Displacement Reaction.

① $CuSO_4 + Zn \longrightarrow ZnSO_4 + Cu\downarrow + Heat$.

Zn is more reactive than Cu.

② $CuSO_4 + Pb \longrightarrow PbSO_4 + Cu$

Lead — Lead Sulphate

Lead is more reactive than Cu.

③ $CuSO_4 + Fe \longrightarrow FeSO_4 + Cu$

Fe is more reactive than Cu

④ $2Ag + 2HCl \longrightarrow 2AgCl + H_2\uparrow$ (Ph)

Ag is more reactive than H.

	R	P
Ag	1	1

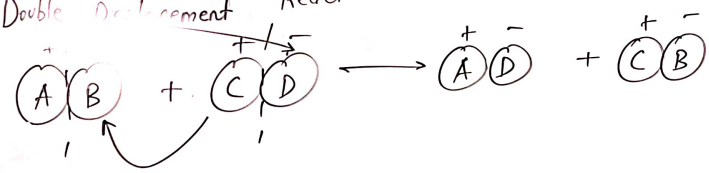
	R	P
Cl	1	1

	R	P
H	1 ↓ 1×2=2	2

	R	P
Cl	2	↓ 1×2=2

	R	P
Ag	1 ↓ 1×2=2	2

4] Double Displacement Reaction.



① $AgNO_3 + NaCl \longrightarrow AgCl\downarrow + NaNO_3$

② $K_2CrO_4 + BaSO_4 \longrightarrow BaCrO_4\downarrow + K_2SO_4 + Heat$

potassium chromate — barium sulphate

③ $BaCl_2 + ZnSO_4 \longrightarrow BaSO_4\downarrow + ZnCl_2$

Compound: Cation (+) | Anion (−)

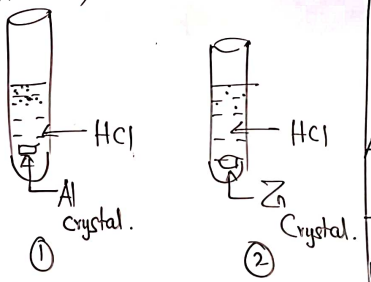
K^{+1} CrO_4^{-2} (chromate ion (anion))

Rate of Chemical Action

Factors Affecting the Rate of Reactions:

1. Nature of the reactants.
2. Size of the particles of the reactants.
3. Concentration of the reactants.
4. Temperature of the Reaction.
5. Catalyst.

1) Nature of the Reactants. (Reactivity)



$Zn + 2HCl \longrightarrow ZnCl_2 + H_2\uparrow$

	R	P
Zn	1	1
Cl	1	2
	↓	
	1x②	=2
H	2	2

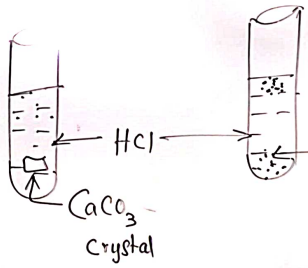
$Zn\ Cl$ (+2, −1) → 2 1 ; $Al\ Cl$ (+3, −1) → 3 1

① $2Al + 6HCl \longrightarrow 2AlCl_3 + 3H_2\uparrow$

	R	P
Al	1	1
Cl	1	3
	↓	
	1x③	=3
H	3	2
	↓	
	3x②	=6

	R	P
H	6	2
	↓	
	2x③	=6
Cl	6	3
	↓	
	3x②	=6
Al	1	2
	↓	
	1x②	=2

2] Size of the particles of reactants.



$$CaCO_3 + 2HCl \longrightarrow CaCl_2 + H_2O + CO_2\uparrow$$

	R	P
Ca	1	1

	R	P
C	1	1

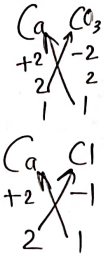
	R	P
Cl	1	2

$1 \times 2 = 2$

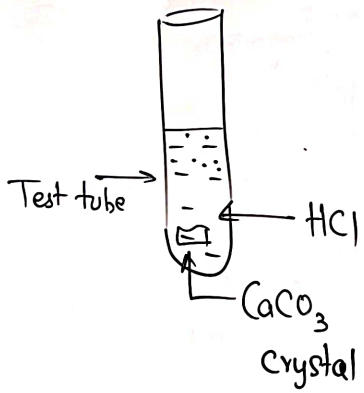
	R	P
O	3	3

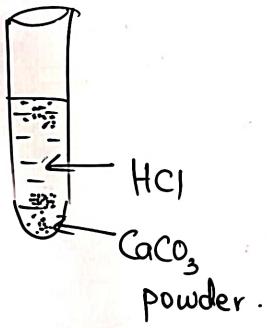
$1 + 2$

	R	P
H	2	2



2] Size of the particle of reactants.





Smaller the size of particles, higher is the rate of the reaction.

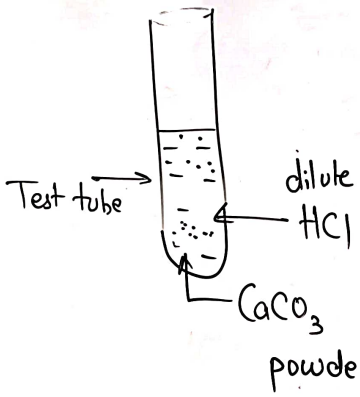
$CaCO_3 + 2HCl \longrightarrow CaCl_2 + H_2O + CO_2\uparrow$

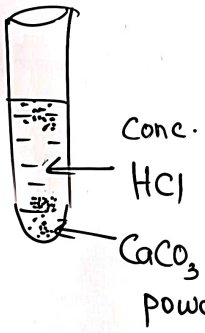
R	P	R	P	R	P
Ca 1	1	C 1	1	O 3	3 ↓ 1+2

R	P
Cl	1 2 ↓ 1×②=2

R	P
H	2 2.

3] Concentration of reactants.





Higher the concentration of reactants, higher is the rate of reaction.

$$CaCO_3 + 2HCl \longrightarrow CaCl_2 + H_2O + CO_2\uparrow$$

	R	P
Ca	1	1

	R	P
C	1	1

	R	P
O	3	3 ↓ 1+2

	R	P
Cl	1	2 ↓ 1×②=2

	R	P
H	2	2.

4] Temperature of the Reaction.

Eg. $Fe + S \xrightarrow{\Delta} FeS$

iron — Sulphur — iron Sulphide.

	R	P	R	P	R	P
	K 1	1	Cl 1	1	O 3 ↓	2
					3×② = 6	

5] Catalyst.

$2KClO_3 \xrightarrow[MnO_2]{\Delta} 2KCl + 3O_2$

potassium chlorate

MnO_2 = manganese dioxide

R	P	R	P
O 6	2	K 2	1
	↓		↓
	2×③ = 6		1×② = 2

REDOX Reaction.

OIL

RIG

REDOX

Reduction

① Addition of Hydrogen

② Removal of Oxygen.

③ Gain of electron.

Oxidation

① Addition of Oxygen.

② Removal of Hydrogen.

③ Loss of electron.

1] Oxidation

① Addition of Oxygen

1) $2Mg + O_2 \longrightarrow 2MgO$

	R	P
Mg	1	1

	R	P
O	2	1

$1 \times ② = 2$

	R	P
Mg	1	2

$1 \times ② = 2$

2) $C + O_2 \longrightarrow CO_2$

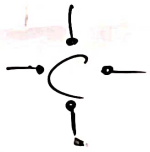
1] Oxidation

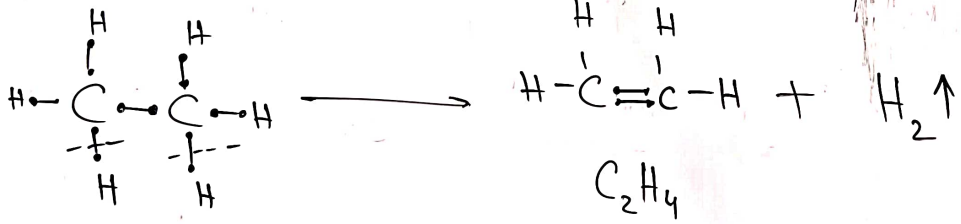
2) Removal of Hydrogen.

$C = 6 = (2, 4)$

① $MgH_2 \longrightarrow Mg + H_2\uparrow$

magnesium hydride.



② 

C_2H_6

ethane.

C_2H_4

ethene

1] Oxidation

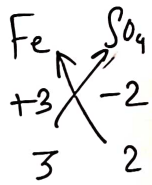
3) Loss of electron. (42)

$FeSO_4 \longrightarrow Fe_2(SO_4)_3$

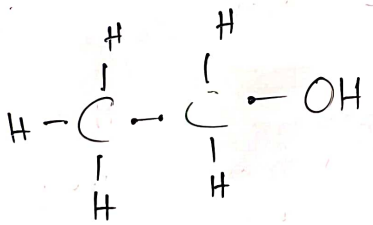
ferrous Sulphate → ferric Sulphate

$Fe^{2+} \longrightarrow Fe^{3+}$

Fe^{2+} is oxidized to form Fe^{3+}



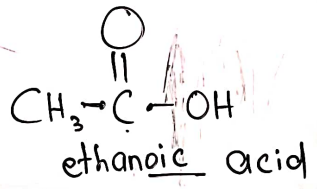
Oxidizing agent (Oxidant)



CH_3-CH_2-OH

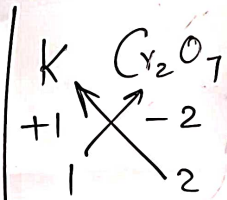
ethanol

$\xrightarrow[K_2Cr_2O_7/H_2SO_4]{[O]}$



ethanoic acid

$+H_2O$



$[O]$ = Nascent oxygen.

$K_2Cr_2O_7$ = potassium dichromate

$KMnO_4$ = Potassium permanganate

H_2O_2 = hydrogen peroxide

O_3 = Ozone

2] Reduction

1) Addition of Hydrogen.

Vegetable oil + H_2 $\xrightarrow[Ni.\ catalyst]{60^\circ C}$ Vanaspati ghee.

2) Removal of oxygen.

$CuO + H_2 \longrightarrow Cu + H_2O$.

Since oxygen is removed from CuO, thus Cu is reduced.

2] Reduction

3) Gain of electron.

$$Fe^{3+} \longrightarrow Fe^{2+}$$

Fe^{3+} reduces to form Fe^{2+} by gaining 1 electron.

Redox Reaction.

① $CuO + H_2 \longrightarrow Cu + H_2O$

Reduction: $CuO \rightarrow Cu$

Oxidation: $H_2 \rightarrow H_2O$

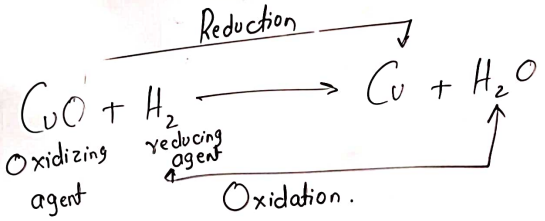
② $MnO_2 + 4HCl \longrightarrow MnCl_2 + 2H_2O + Cl_2$

Reduction: $MnO_2 \rightarrow MnCl_2$

Oxidation: $HCl \rightarrow Cl_2$

Wednesday
26-06-24

Life is like a ice-cream eat it before it melts



Wednesday
26-06-24

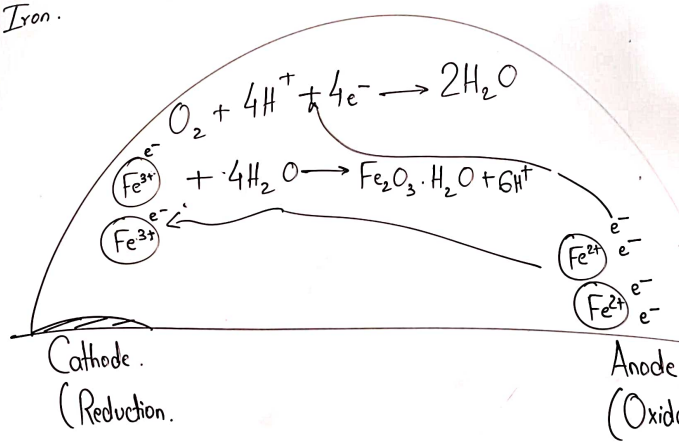
Life is like ice-cream eat it before it melts

+4-4 = 0

Rust of Iron.

H_2O

H^+ OH^-



(Loss of e^-)
Oxidation = Anode
Reduction = Cathode.
(Gain of e^-)