Ch 1 Chemical Eqns and Reactions

$2Mg_{(s)} + O_{2(g)} \xrightarrow{\Delta} 2MgO_{(s)}$ [White dazzling flame]

$Zn_{(s)} + 2HCl_{(aq)} \longrightarrow ZnCl_{2(aq)} + H_{2(g)}$

(Similar reactions with almost all acids)

$CO_2 + CO_{(g)} + 2H_{2(g)} \xrightarrow{340\ atm} CH_3OH_{(l)}$

$6CO_2 + 12H_2O \xrightarrow[Sun]{chlor} C_6H_{12}O_{6(aq)} + 6H_2O_{(l)} + 6O_{2(aq)}$

Combination (DIY)

$CaO + H_2O \longrightarrow Ca(OH)_{2(aq)} + heat$

$C_{(s)} + O_{2(g)} \xrightarrow{\Delta} CO_{2(g)}$

exo Δ

$CH_{4(g)} + 2O_{2(g)} \longrightarrow CO_{2(g)} + 2H_2O_{(g)} + energy$

$C_6H_{12}O_{6(aq)} + 6O_{2(aq)} \longrightarrow 6CO_{2(aq)} + 6H_2O_{(l)} + energy.$

Decomposition Reaction

Sulphates $\xrightarrow{\Delta}$ Metal Oxide + SO_2 + SO_3 ?

eg. $2FeSO_{4(s)} \xrightarrow{\Delta} Fe_2O_{3(s)} + SO_{2(g)} + SO_{3(g)}$

Carbonates $\xrightarrow{\Delta}$ Metal oxide + CO_2

eg $CaCO_{3(s)} \xrightarrow{\Delta} CaO_{(s)} + CO_{2(g)}$

Nitrates $\xrightarrow{\Delta}$ Metal oxide + NO_2 + O_2

eg $2Pb(NO_3)_2 \xrightarrow{\Delta} 2PbO_{(s)} + 4NO_{2(g)} + O_{2(g)}$

$2H_2O_{(l)} \xrightarrow{\text{electricity}} 2H_{2(g)} + O_{2(g)}$ → Anode

↓ Cathode

$AgCl_{(s)} \longrightarrow Ag_{(s)} + Cl_{2(g)}$

$AgBr_{(s)} \longrightarrow Ag_{(s)} + Br_{2(g)}$

} Photolytic.

→ used in photography

Displacement Reaction.

Li
K
Na
Ca
Mg
Al
C
Zn
Fe
Sn
Pb
H
Cu
Ag
Au
Pt

Reativity decreases.

IMP

Double Displacement

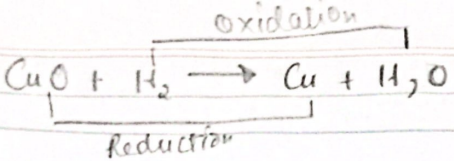
$BaCl_{2(aq)} + Na_2SO_{4(aq)} \longrightarrow BaSO_4\downarrow_{(s)} + 2NaCl_{(aq)}$

(white)

IMP Precipitation

$Pb(NO_3)_2 + KI \longrightarrow PbI_2\downarrow_{(s)} + KNO_{3(aq)}$

(Yellow)



Using OIL RIG GG

$Cu^{+2}O^{-2} + H_2^{0} \longrightarrow Cu^{0} + H_2^{+1}O^{-2}$

$CuO \longrightarrow +2 \; - - - \; 0$ [In Cu]

gain of $e^- \longrightarrow$ reduction

$H_2 \longrightarrow 0 \; - - - \; +1.$

loss of $e^- \longrightarrow$ oxidation

O	Oxidation	Reduction
I	is	Is
L	Loss	Gain

Corrosion reactions

$4Fe_{(s)} + H_2O_{(l)} + 3O_{2(g)} \rightarrow 2Fe_2O_3 \cdot xH_2O$

↳ Hydrated "Ferric Oxide"

$2Cu_{(s)} + CO_{2(g)} + O_{2(g)} + H_2O_{(l)} \rightarrow Cu(OH)_2 \cdot CuCO_3$

green coating

$2Ag_{(s)} + H_2S_{(g)} \longrightarrow Ag_2S_{(s)} + H_{2(g)}$

The ones in 4

Acids Bases and Salts:

Acid Reactions

w/ metal

metal + Acid → Salt + H_2 (pop sound)

$2Na_{(s)} + 2HCl_{(aq)} \rightarrow 2NaCl_{(aq)} + H_{2(g)}$

w/ CO_3s or HCO_3s

→ Salt + H_2O + CO_2

eg.

$2HCl_{(aq)} + Na_2CO_{3(aq)} \rightarrow 2NaCl_{(aq)} + H_2O_{(l)} + CO_{2(g)}$

$HCl_{(aq)} + NaHCO_{3(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(l)} + CO_{2(g)}$

Lime water reaction :-

$Ca(OH)_{2(aq)} + CO_{2(g)} \rightarrow CaCO_{3(aq)}\downarrow + H_2O_{(l)}$ (milky)

on excess CO_2

~~Ca(OH)~~ $CaCO_3 + H_2O + CO_2 \rightarrow Ca(HCO_3)_{2(aq)}$ (clear sol.)

Acid w/ base [Neutralisation]

→ Salt + Water

$HCl_{(aq)} + NH_4OH_{(aq)} \rightarrow H_2O_{(l)} + NH_4Cl_{(aq)}$

$H_2SO_4 + Ca(OH)_2 \rightarrow 2H_2O_{(l)} + CaSO_{4(aq)}$

Acid w/ Metallic oxides

→ Salt + water

$Al_2O_3 + 3H_2SO_4 \rightarrow Al_2(SO_4)_{3(aq)} + 3H_2O_{(l)}$

Note Al & Zn forms amphoteric oxides

$Al_2O_3 + NaOH \rightarrow NaAlO_2 + H_2O_{(l)}$

$ZnO + HCl \longrightarrow ZnCl_2 + H_2O$

$ZnO + NaOH \longrightarrow NaZnO_2 + H_2O$

Bases and acids in water

Acid $\longrightarrow H_3O^+ +$ Anion

Base $\longrightarrow OH^- +$ Cation

eg. $HCl \xrightarrow{H_2O} H_3O^+ + Cl^-$

$NaOH \xrightarrow{H_2O} OH^- + Na^+$

IMP Note :- acid to be poured drop by drop into water

Chlor - Alkali Process

$2NaCl + 2H_2O \xrightarrow{\text{electricity}} 2NaOH + Cl_2 + H_2$

Brine [Anode] [Cathode]

Bleach

$Ca(OH)_{2(s)} + Cl_2 \longrightarrow CaOCl_2 + H_2O$

[dry]

Making of baking soda / Solvay's Ammonia - Soda process

$NaCl + H_2O + NH_3 + CO_2 \longrightarrow NH_4Cl + NaHCO_3 \downarrow$ (s)

Ammonified brine — Comes from a Calcinated Kiln — Sublimable

Making of washing soda

$2NaHCO_3 \xrightarrow{\Delta} Na_2CO_3 + H_2O + CO_2$

$Na_2CO_3 + 10H_2O \longrightarrow Na_2CO_3 \cdot 10H_2O$ [Recrystallisation]

Making of Baking powder.

$NaHCO_3$ + H^+ ion from a mild acid $\longrightarrow$ Na salt of acid + H_2O + CO_2.

POP

$CaSO_4 \cdot 2H_2O \xrightarrow[100°C]{373K} CaSO_4 \cdot \frac{1}{2}H_2O + 1\frac{1}{2}H_2O\uparrow$

[Gypsum] [POP]

POP + water $\longrightarrow$ Gypsum

Dun CHAPTER 2-

CH 3. METALS AND NON-METALS.

Metal + O_2 $\longrightarrow$ Metal Oxide

$2Cu + O_2 \longrightarrow CuO$ (Black)

$4Al + 3O_2 \longrightarrow 2Al_2O_3$ → amphoteric oxide

$2Zn + O_2 \longrightarrow ZnO$

Al_2O_3 is also used for anodizing

Check pg 42 yellow box [Kinda IMP]

Metals at the top of reactivity [Na, K, Ca]

Cold water ↓

$2Na + 2H_2O \longrightarrow 2NaOH + H_2 + \Delta$ } fire.

$2K + 2H_2O \longrightarrow 2KOH + H_2 + \Delta$ } fire.

$Ca + 2H_2O \longrightarrow Ca(OH)_2 + H_{2(g)}$ ↓ makes it flour.

Hot water Mg

$Mg + 2H_2O \longrightarrow Mg(OH)_2 + H_2$.

Steam Mg

$Mg + H_2O_{(g)} \longrightarrow MgO + H_2$

Steam Fe, Al, Zn.

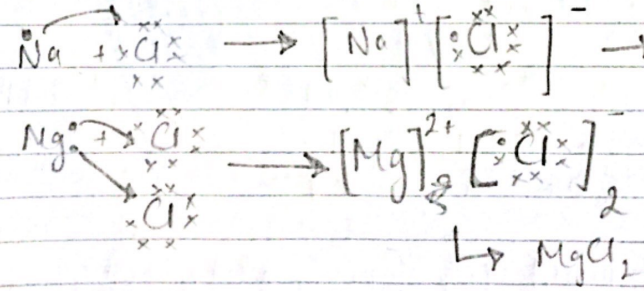
Fe + steam $\longrightarrow Fe_2O_3 + H_2$.

Same for others.

Pb, Cu, Ag, Au do not react with steam also :/ the

Metals w/ acid → Ref. prev. chp.

Metals + Non-metals → Ionic compounds



PLS SPARE ME

(if something's wrong)