

Chemical Reactions & Characteristics

A substance undergo two type of changes

Physical
Change



No new substance
is formed



e.g. Ice, liquid water,
and water vapour
(H_2O)

★★ chemically same, only
change in state

Chemical
Change



New substances formed
with different properties



It involves a chemical
reaction.



e.g. Cooking of food
★★ (ingredients go through
chemical change)



In a chemical Reaction

Reactants & Products are
involved; they participate
in a chemical reaction

Chemical Reaction

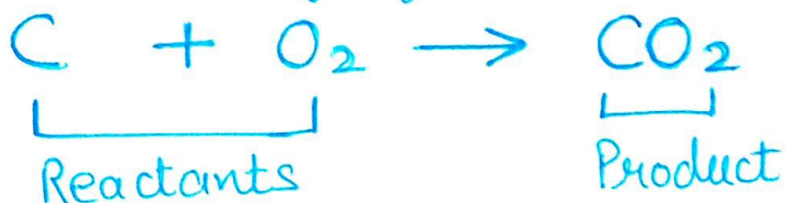


(Reactants)

(Products)

} different forms of
a reaction

e.g. Example - Burning of coke in air/oxygen



Characteristics of Chemical Reactions:

* Formation of a precipitate



Solid substance formed on
mixing of two solutions

e.g. lead nitrate + Potassium Iodide

lead Iodide + Potassium nitrate
(yellow precipitate)

★ Evolution of a Gas

e.g. Reaction of zinc with dil. H_2SO_4 evolves H_2 gas (hydrogen gas)



Presence can be checked by bringing a lighted candle near the flask (during experimentation)



Gas is found to burn with a popping sound (H_2 test)

★ Change in Colour

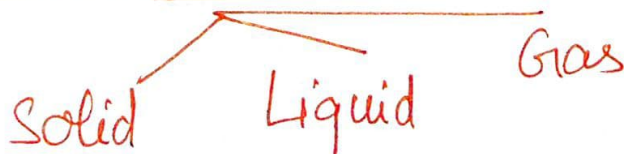


colour change is observed at the product side

eg. In the formation of lead iodide (yellow precipitate) formed

★ Also, rust reaction (Reaction of iron articles with moisture / air)

★ Change in state



eg. Solid Wax (Candle) on burning forms water vapour (gaseous) and CO_2 (gas)

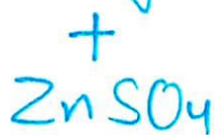
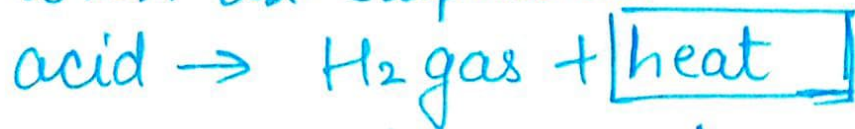
★ Change in temperature

Rise or Fall

↓
Evolution of heat

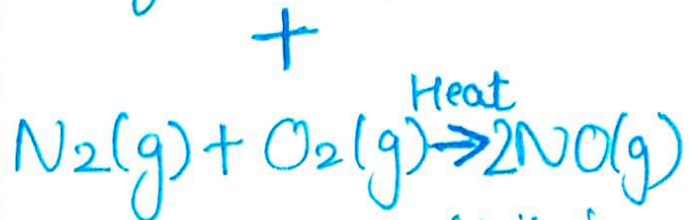
↓
Absorption of heat

eg. Zinc on reaction with dil. sulphuric acid



↓
Exothermic Reaction

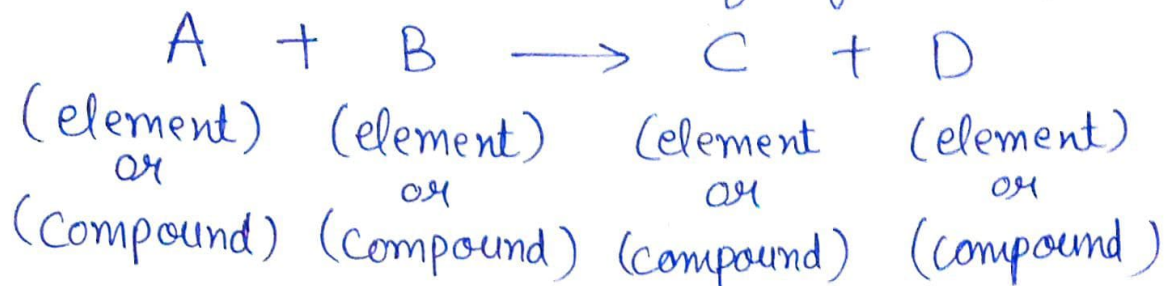
eg. Cooking of food (Heat is absorbed for the preparation)



(Nitric oxide)
↓
Absorption of heat

Balancing Chemical Equations

A chemical Equation is of type -



A balanced chemical equation ^{is} of type -



Here, x, y, u and v represents number of atoms required to balance both the sides of a chemical equation.

★★

Chemical Equation

Balanced equation



★ No. of atoms on both sides are equal

Unbalanced equation
or
Skeletal equation

★ No. of atoms on both sides are not equal
or balanced.

Importance of a balanced chemical equation

- ★ It satisfies the law of conservation of mass.
- ★ It gives mass-mass relationship i.e. relative masses of the reactants reacting and masses of the products formed.
- ★ It also gives the mass-volume relationship i.e. relative masses of the reactants and products and volumes of the gaseous reactants or products.
- ★ It gives the idea of number of moles of the reactants and products taking part in the reaction.
- ★ By adding physical state of the reactants and products, also the concentration of the substances (acid) used makes our balanced equations more informative.

Types of Chemical Reactions

There are different types of chemical reactions

Chemical Combination Reaction



(two or more reactants combine to form a product)

Decomposition Reaction



(a reactant breaks down to give simpler products)

Displacement Reaction

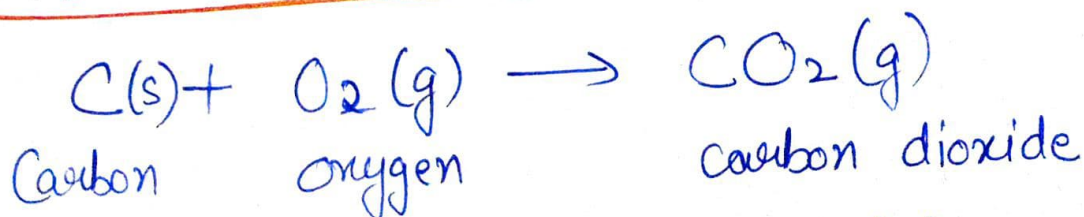


(double displacement reaction)



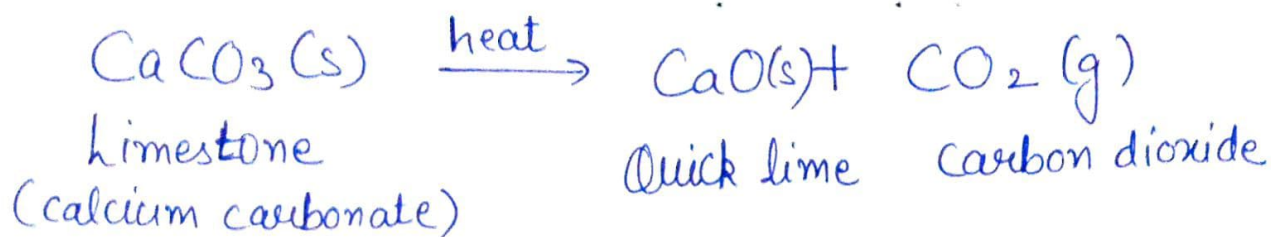
(simple displacement reaction)

★ Combination Reaction

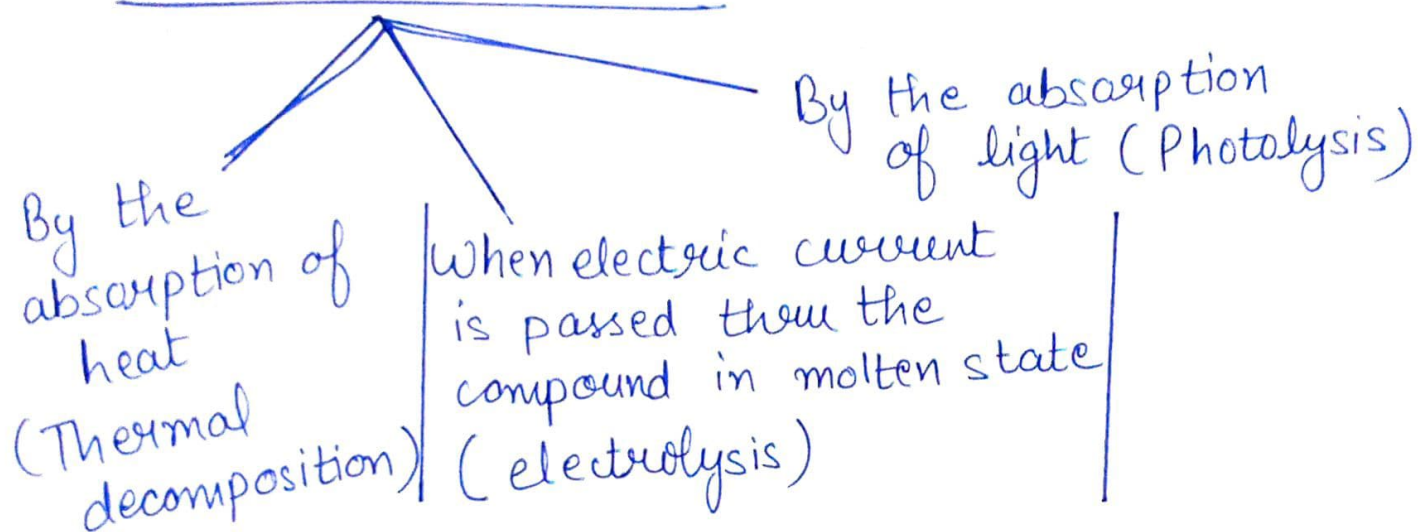


★ These type of reactions occur between two elements / element and compound / compound and compound.

★ Decomposition Reaction

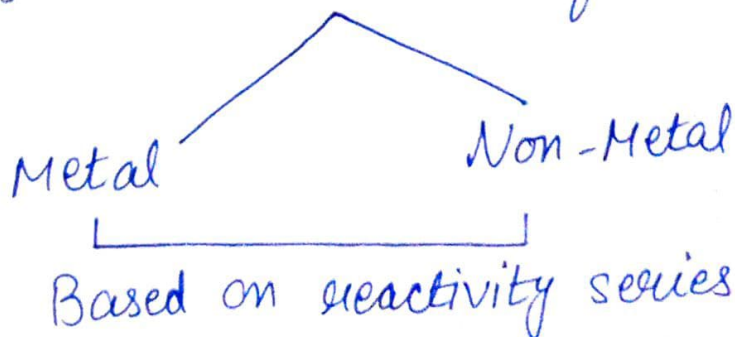


★ Decomposition Reaction (are endothermic reactions)

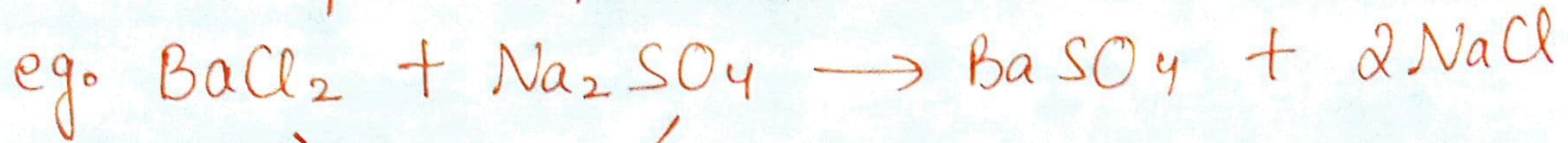


★ Displacement Reactions

↓
Reactions in which more reactive element displaces a less reactive element from its compound



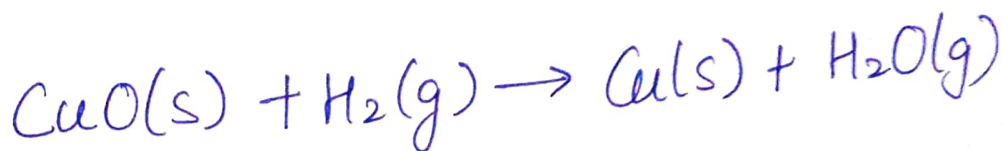
In double displacement reactions, mainly ionic compounds participate



anions exchange
their position (at the product
side)

★ Oxidation Reactions

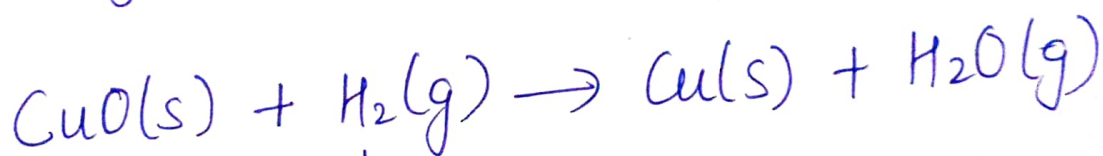
→ Adding of oxygen atoms / removal of hydrogen atoms



↓
oxidizing agent (reduce itself and oxidize another element)

★ Reduction Reactions

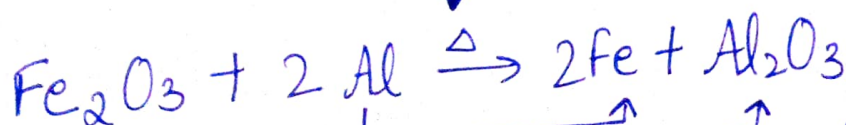
→ Lossing of oxygen / addition of hydrogen atoms



↓
Reducing (gained oxygen)
agent

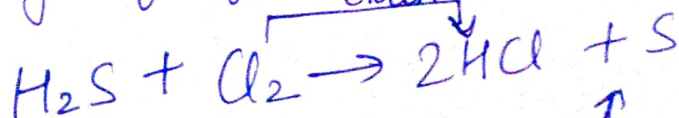
★ Redox ~~Oxyg~~ Reactions

(loss & gain of oxygen / gain and loss of hydrogen)



loss of oxygen

gain of oxygen

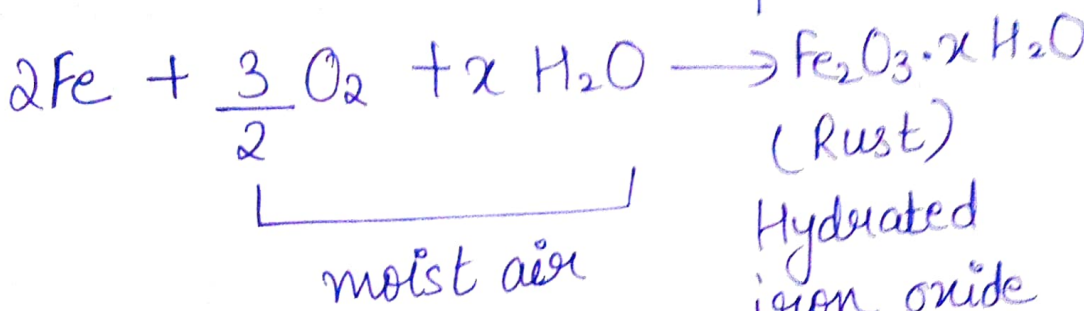


Loss of H₂ atom

Effect of oxidation

Corrosion

(exposure of metals.
ex, Iron, silver,
aluminium etc to
moist air)



(Rust)
Hydrated
iron oxide

Prevention Methods

- ★ Galvanisation
(coating of protective
layer of zinc)
- ★ Painting, oiling
and greasing

★ Aluminium is
highly resistant
to corrosion (only top layer
gets oxidised, underneath
layer remain protected/
unaffected)

Rancidity

(oxidation of oils &
fats in food
resulting into
bad smell)

Prevention -

- ★ Refrigeration
- ★ Vacuum
packing
- ★ Adding
anti-oxidants
- ★ They slow
down the
process of
oxidation