

Ch - Chemical reaction and equation

① Chemical Reaction

Whenever there is a change in state, change in colour, evolution of gas, change in temperature leading to formation of new substance or product with new properties, then a chemical reaction has taken place.

Ex :- (i) Formation of curd from milk

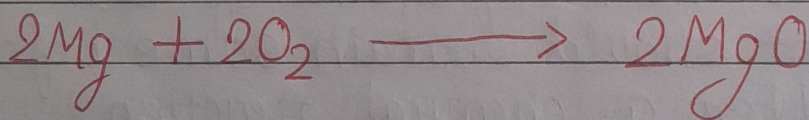
(ii) Fermentation of grapes or ripening of fruits or wine production

(iii) Digestion.

(iv) Respiration

• Chemical equation

It is a symbolic representation of a chemical reaction. Ex - Burning of Magnesium in air.



Magnesium ribbon burns in air with a dazzling white flame to form white powder of magnesium oxide. Magnesium ribbon is often coated with a thin layer of Magnesium oxide which can hinder the burning process. Therefore, cleaning the ribbon with sand paper removes this oxide layer allowing the Magnesium to react more readily with oxygen.

- Reactant

The substance that undergo chemical change in a reaction are the reactants.

- Product

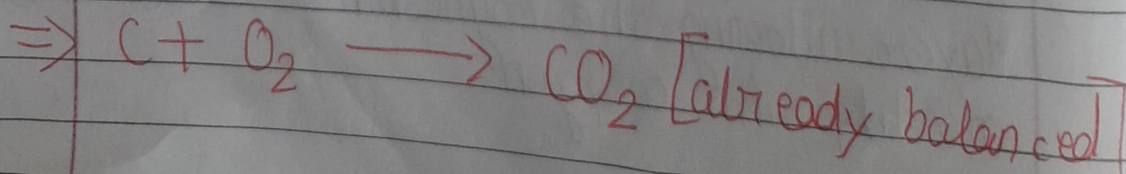
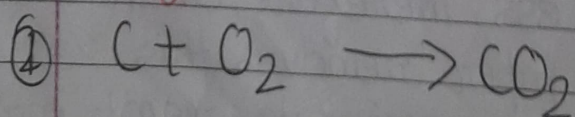
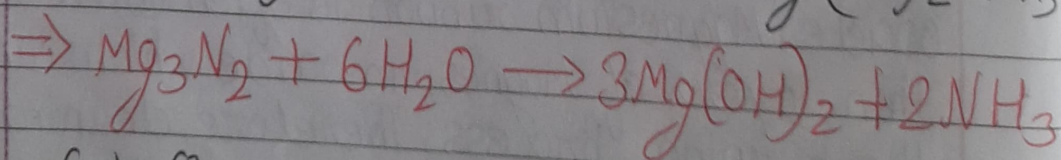
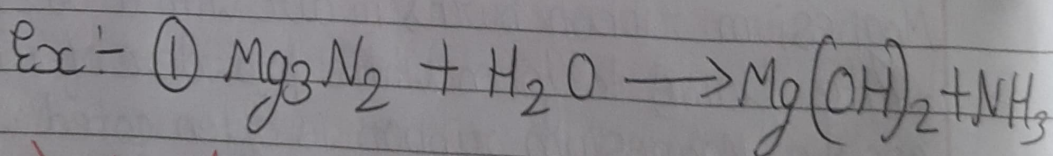
The new substance formed in a reaction is the product.

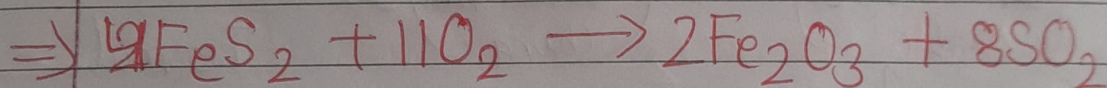
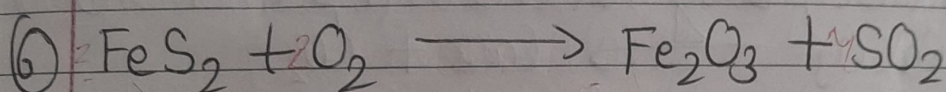
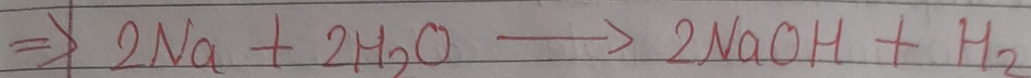
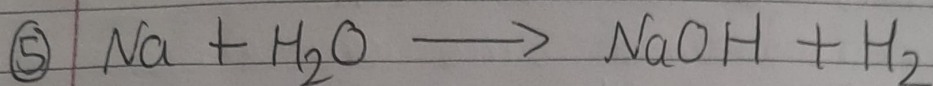
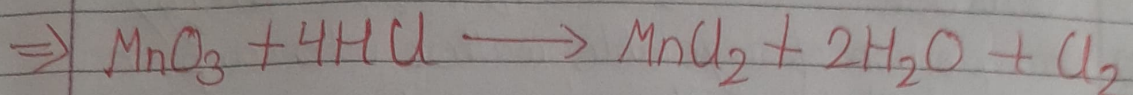
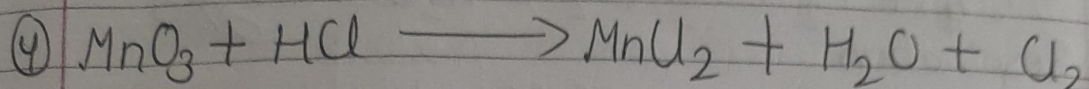
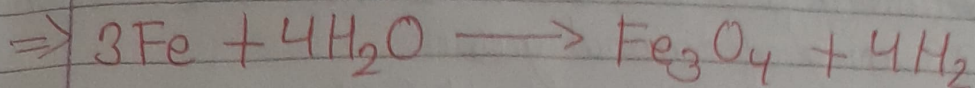
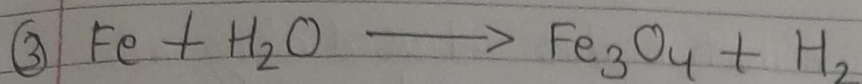
→ This reaction is exothermic in nature as a lot of heat is released during the reaction.

③ Balancing equations

If the no. of atoms of each element are same on both side of reaction then it is called balanced equation.

We know mass can neither be created nor be destroyed in a chemical reaction. Therefore, the no. of atoms of each element should remain same before and after a chemical reaction.

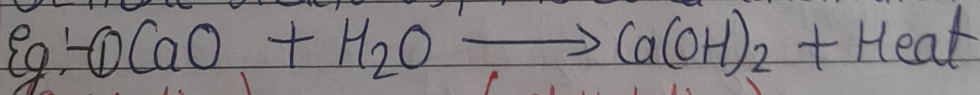




① Types of chemical Reaction

1. Combination reaction

A reaction in which a single product is formed from two or more reactants, it is called combination reaction.

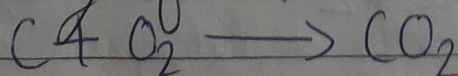


(Quick lime)
chuna

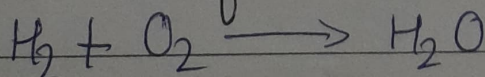
(Slaked lime)

Ca(OH)_2 is used for whitewashing.

② Burning of coal

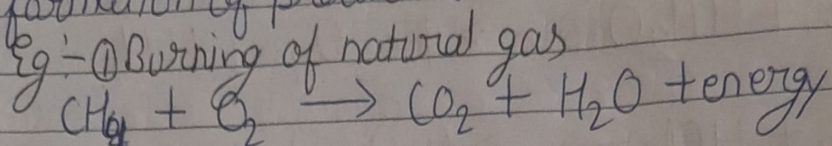


③ Formation of water

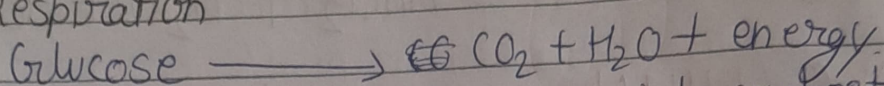


- Reaction in which heat is released along with formation of product are called exothermic reaction.

Eg: ① Burning of natural gas



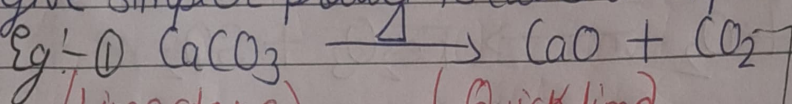
- ② Respiration



- ③ Decomposition of vegetable matter into compost is also called exothermic reaction.

2. Decomposition reaction

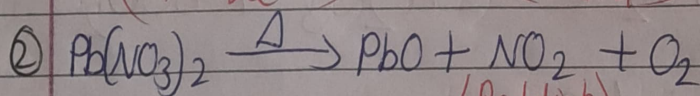
A reaction in which a single reactant breakdown to give simpler product is called decomposition reaction



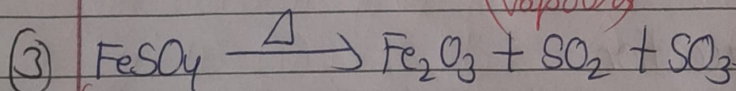
(Limestone marble)

(Quicklime chuna)

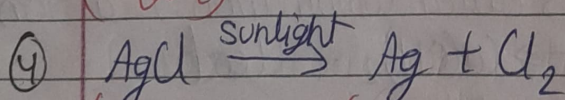
Thermal decomposition reaction (require heat)



(Reddish brown vapours)



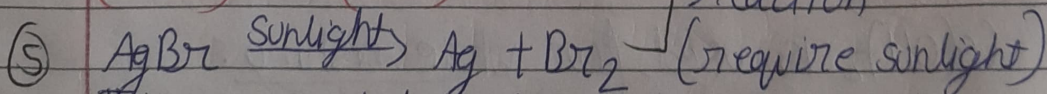
(green colour)



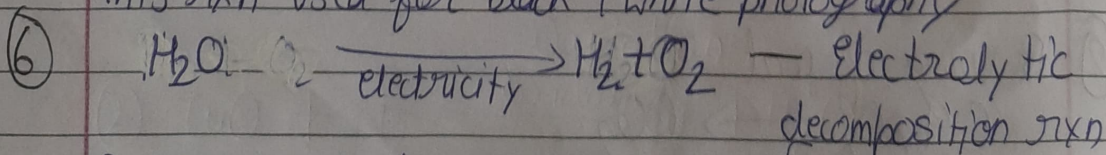
(silver colour)

(grey colour)

Photolytic decomposition reaction



This rxn used for black & white photography

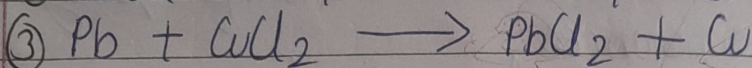
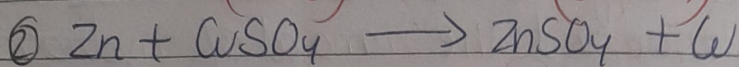
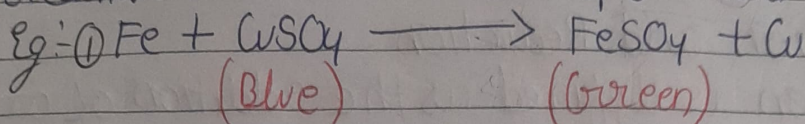


- Reaction in which energy is absorbed (require electricity) is called endothermic reaction.

We have seen that decomposition reaction requires energy either in the form of heat, light or electricity for breaking down the reaction.

3. Displacement reaction

The reaction in which more reactive element displace less reactive element is called displacement reaction.



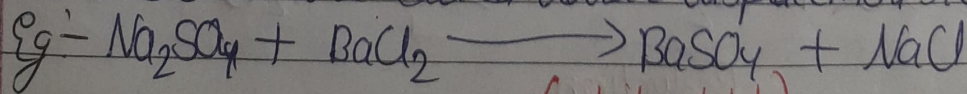
- Reactivity series

It is an calculated and structurally analytical progression of a series of metal arranged by their reactivity from highest to lowest.

Please - Potassium (K)	In the - Iron (Fe)
Stop - Sodium (Na)	Library - Lead (Pb)
calling - Calcium (Ca)	Hydrogen - Hydrogen (H)
Me - Magnesium (Mg)	Call - Copper (Cu)
A - Aluminium (Al)	Me - Manganese (Mn)
Cute - Carbon (C)	Something - Silver (Ag)
Zebra - Zinc (Zn)	Good - Gold (Au)
	Please - Platinum (Pt)

4. Double displacement reaction

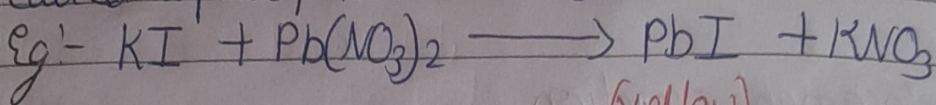
A reaction in which there is an exchange of Ion b/w the reactant are called double displacement reaction.



(white ppt molecules)

- Precipitation reaction

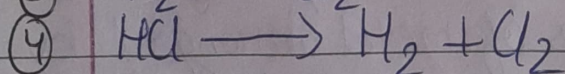
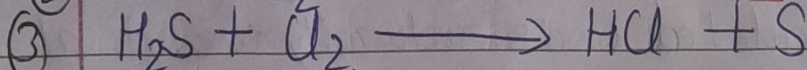
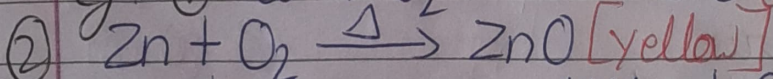
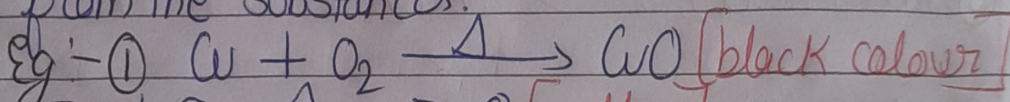
Any reaction that produces a precipitate can be called a precipitation reaction.



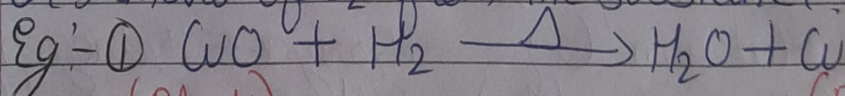
(yellow ppt)

- ② Oxidation and Reduction

Oxidation is defined as the addition of oxygen to the substance and the removal of hydrogen from the substances.



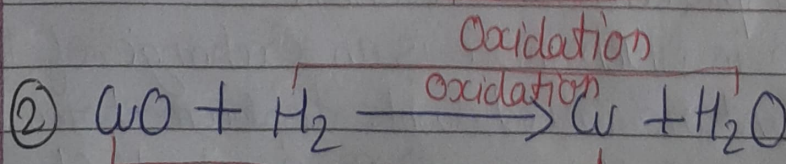
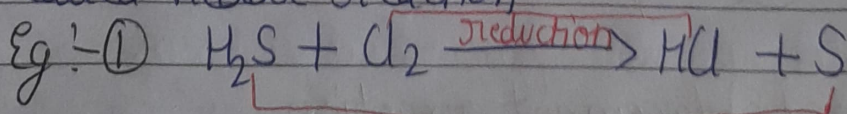
Reduction is defined as the addition of H_2 to substance or removal of O_2 from the substance.



(Black)

(Brown)

Redox reaction is that in which one reactant get oxidised while the other get reduced is called Redox reaction.

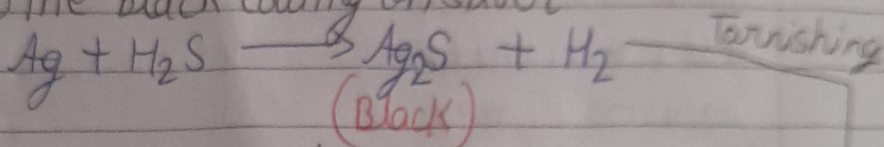


Reduction.

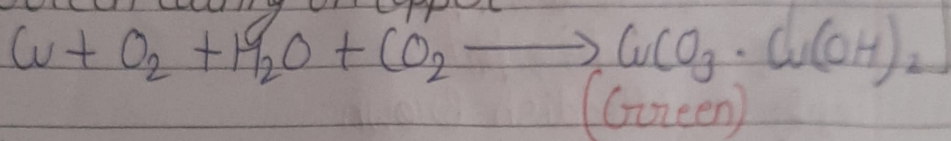
- Example of oxidation reaction in everyday life

① Corrosion - When a metal is attacked by substance around it such as moisture, acids etc. it is said to be corroded and this process is called corrosion. The process of corrosion in iron is known as rusting and the corrosion in silver, copper, brass, aluminium is called tarnishing.

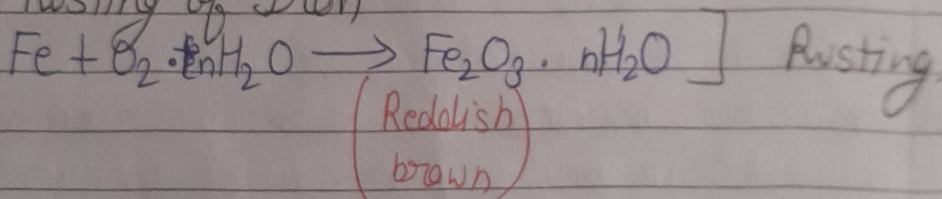
Eg:- ① The black coating on silver



② Green coating on copper



③ Rusting of Iron



② Rancidity - It is the process in which food items like fats and oils are oxidised. When fats and oil are oxidised they become rancid and their smell and taste change.

Solutions:-

- Antioxidants: They are added to food containing fats and oil. Eg. vitamin C, vitamin E etc.
- Keeping food oil low temperature; increase the shelf life of the food.
- Keeping food in air tight container slows down oxidation.
- Flushing with N_2 during packaging prevents oxidation, removes and extend shelf life because N_2 is an inert dry gas.

• Colours of Compound

 CuSO_4 — Blue FeSO_4 — Pale green Cu — Brownish BaSO_4 — white ppt MgO — white ash PbI_2 — Yellow ppt NO_2 — Brown fumes CuO — Black AgCl — white Ag — grey AgI — Yellow ppt CaCO_3 — white ppt Fe_2O_3 — Reddish Brown