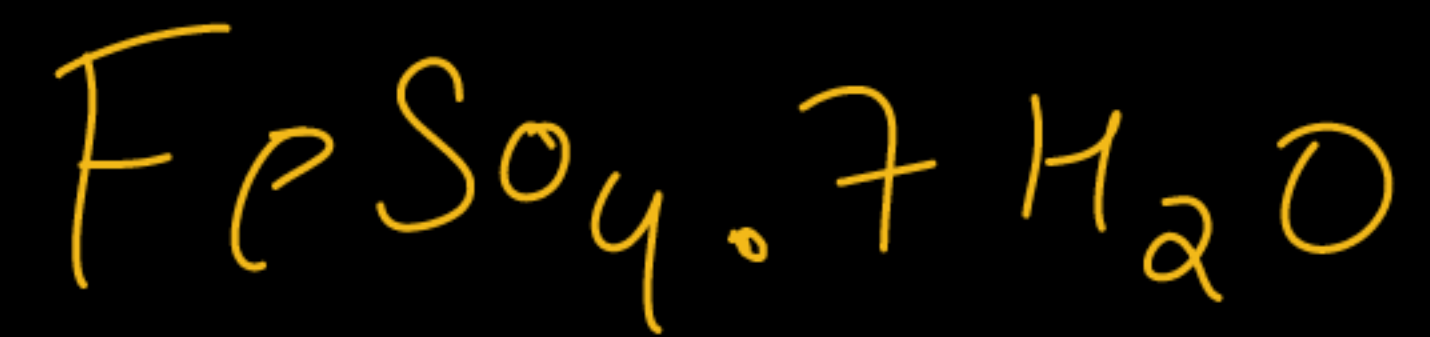


CLASS X - SCIENCE 

# CHEMICAL REACTION AND EQUATIONS-II

PRASHANT KIRAD



# PK HITS

- Balancing (MCQs)
- Type of Reaction and Example (Specially Decomposition)
- Color Change Activities
- Redox



# DISPLACEMENT REACTION

A chemical reaction in which a more active or reactive element displaces a less active or reactive element from its compound.

## SINGLE-DISPLACEMENT REACTION:



It happened because  
reactivity of  $A > B$





# REACTIVITY SERIES

Katrina  
Ne  
Car  
Mangi  
Alto  
Zen  
Freerji  
Phim Bhi  
Hays  
Kya →  
Mili  
Silver  
Audi

K	Potassium
Na	Sodium
Ca	Calcium
Mg	Magnesium
Al	Aluminium
Zn	Zinc
Fe	Iron
Pb	Lead
H	Hydrogen
Cu	Copper
Hg	Mercury
Ag	Silver
Au	Gold

Most reactive

Reactivity decreases

Least reactive

# NCERT ACTIVITY



**Aim:** To observe the displacement of copper from copper sulphate solution by iron.

## Procedure:

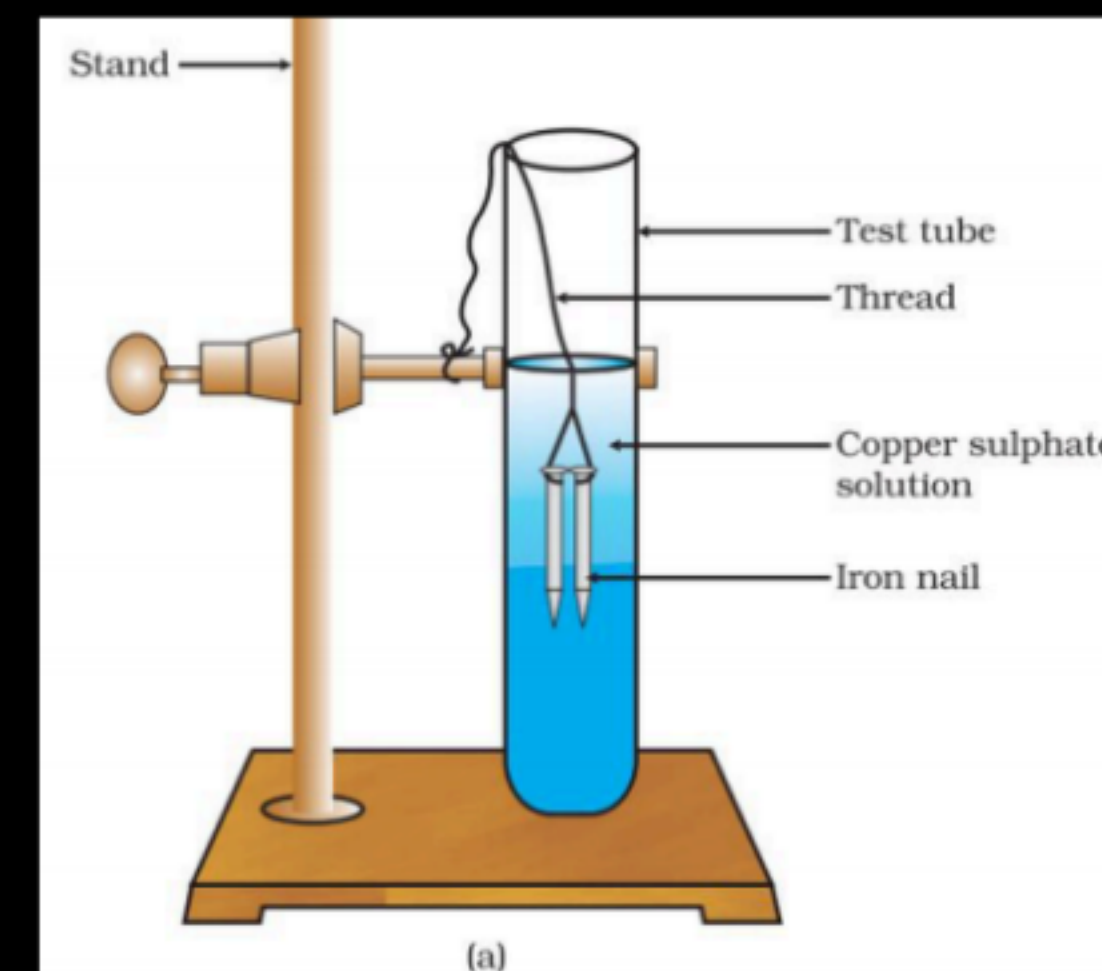
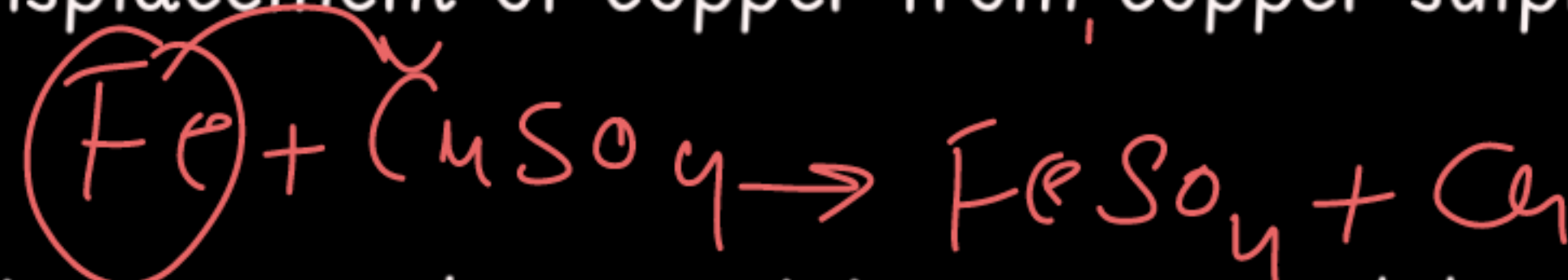
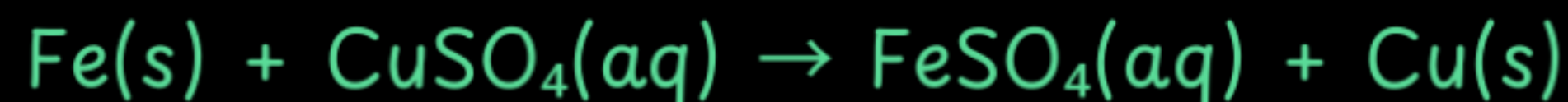
- Place an iron nail in a test tube containing copper sulphate solution (Test Tube B).
- Keep another test tube with copper sulphate solution as a control (Test Tube A).
- Leave it undisturbed for 20 minutes.

## Observation:

- The iron nail develops a brownish coating of copper.
- The blue colour of the copper sulphate solution fades to light green in Test Tube B, while it remains unchanged in Test Tube A.

**Conclusion:** Iron displaces copper from copper sulphate solution.

## Reaction:





## METAL-METAL DISPLACEMENT REACTION

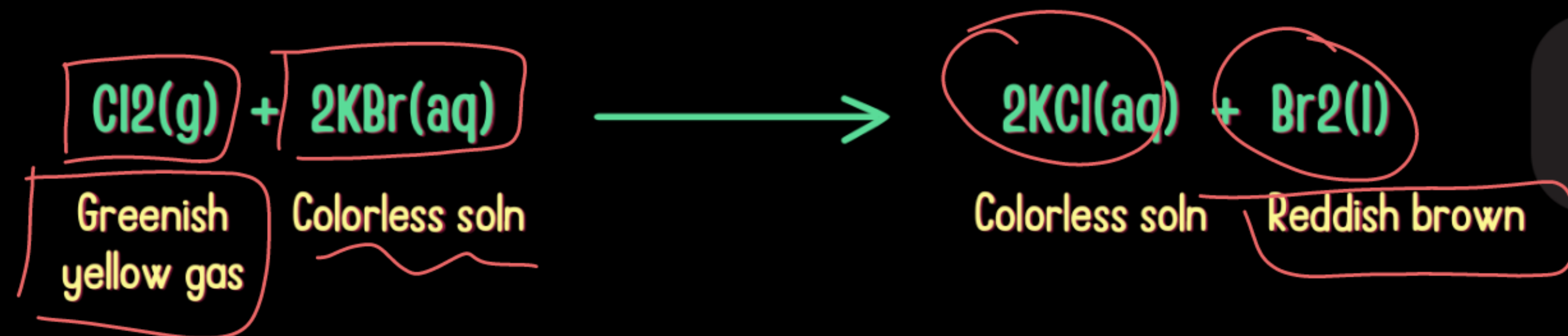


When iron is added to a copper sulphate solution, it displaces copper metal as iron is more reactive than copper.



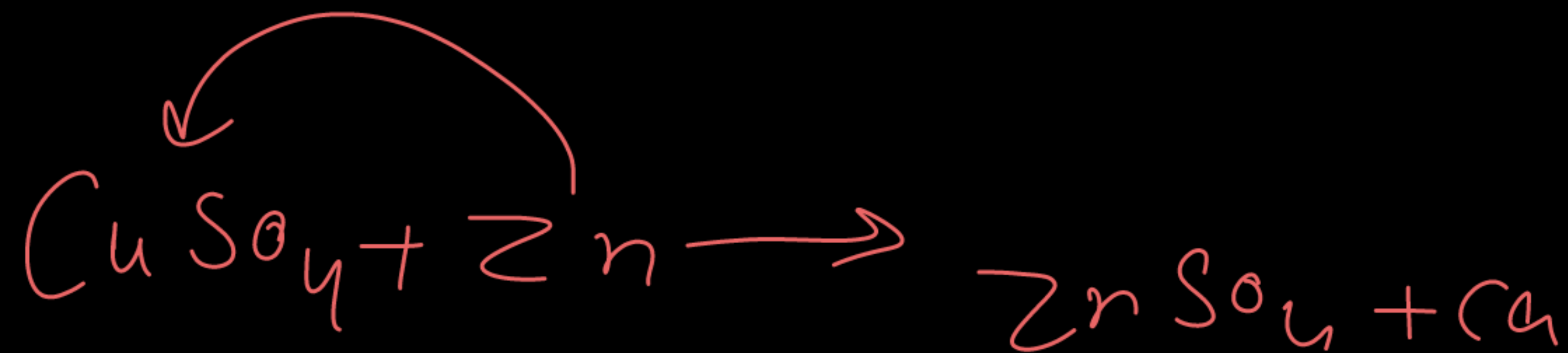
When lead is added to a copper chloride solution, it displaces the copper metal as lead is more reactive than chlorine.

## NONMETAL-NONMETAL DISPLACEMENT REACTION



Reactivity of NON-METALS:  
F<sub>2</sub> > Cl<sub>2</sub> > Br<sub>2</sub> > I<sub>2</sub>





Are all displacement reaction  
Exothermic or Endothermic.

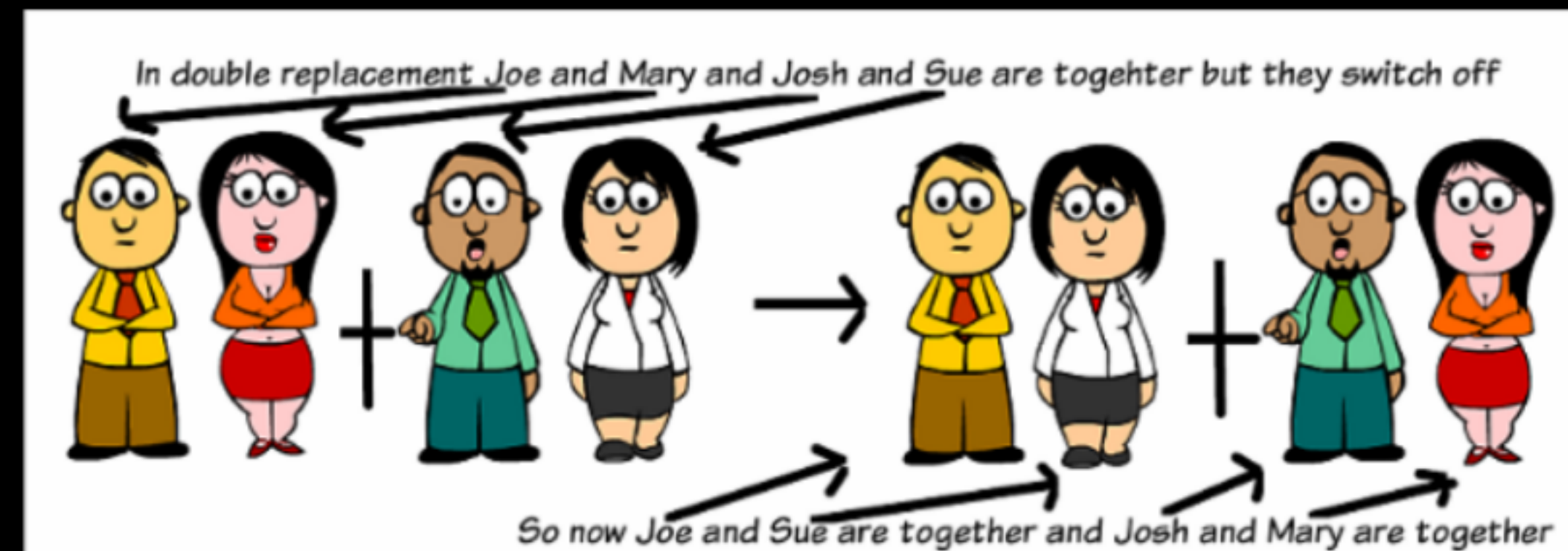


All displacement reactions are  
exothermic because heat is  
released."

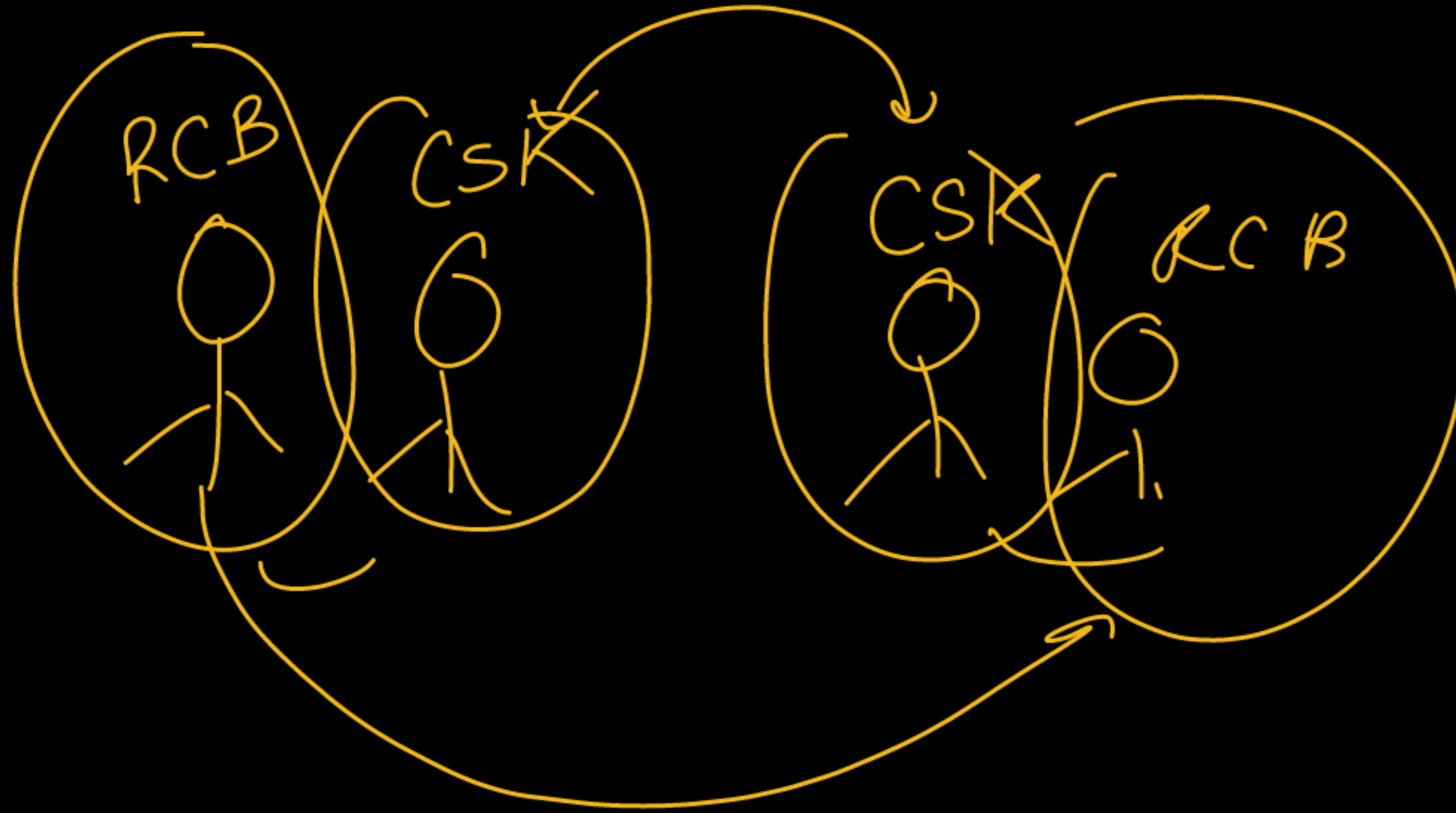


# DOUBLE-DISPLACEMENT REACTION

A chemical reaction in which two compounds exchange their ions (cations and anions) to form two new compounds.







# NCERT ACTIVITY



अभ्यास

**Aim:** To observe the reaction between sodium sulphate and barium chloride solutions.

## Procedure:

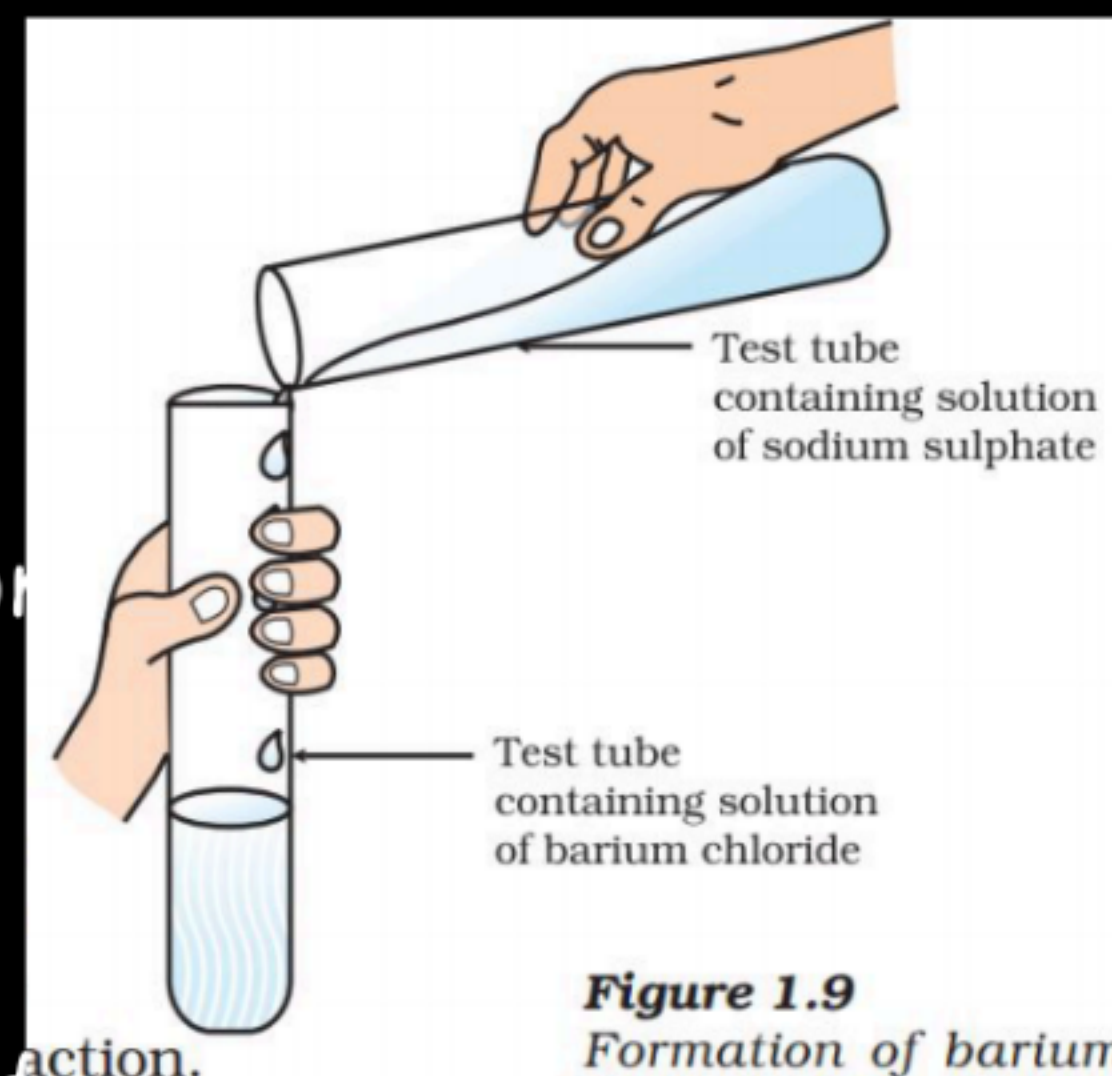
- Take about 3 mL of sodium sulphate solution in a test tube.
- In another test tube, take about 3 mL of barium chloride solution.
- Mix the two solutions together.

## Observation:

- A white precipitate of barium sulphate ( $\text{BaSO}_4$ ) forms.
- This precipitate is insoluble in water and settles at the bottom of the test tube.

**Reaction:**  $\text{Na}_2\text{SO}_4(\text{aq}) + \text{BaCl}_2(\text{aq}) \rightarrow \text{BaSO}_4(\text{s}) + 2\text{NaCl}(\text{aq})$

**Conclusion:** Sodium sulphate and barium chloride undergo a double-displacement reaction, forming an insoluble white precipitate of barium sulphate, confirming the presence of sulphate ions in the original solution.



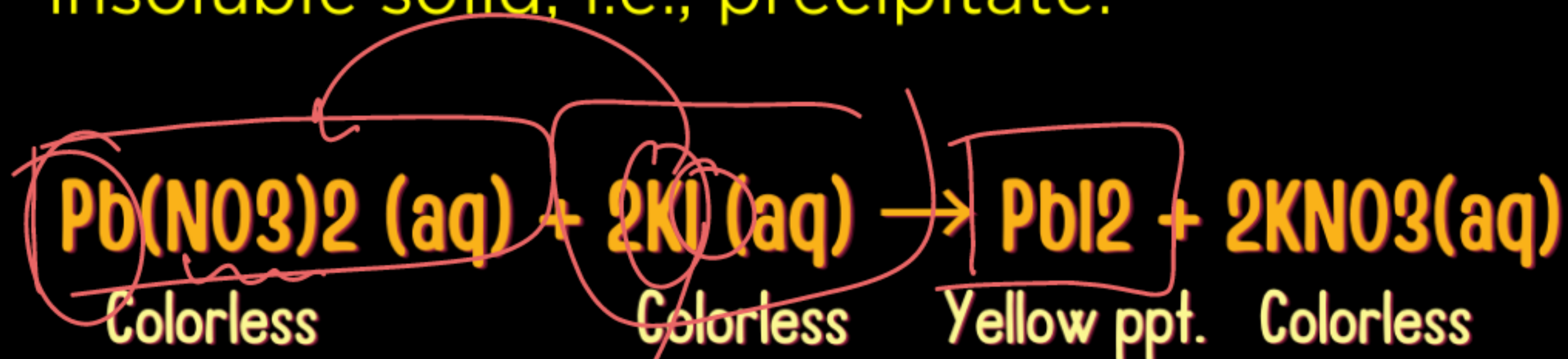
**Figure 1.9**  
Formation of barium sulphate precipitate.



# TYPES OF DOUBLE-DISPLACEMENT REACTION

## Precipitation reaction

The reaction in which aqueous solutions of two ionic compounds or a gas and an aqueous solution of ionic compound react to form an insoluble solid, i.e., precipitate.



Pecipitates	Colors
BaSO <sub>4</sub> (s)	White
PbI <sub>2</sub> (s)	Yellow
CaCO <sub>3</sub> (s)	White
AgCl(s)	White
CuS(s)	Black

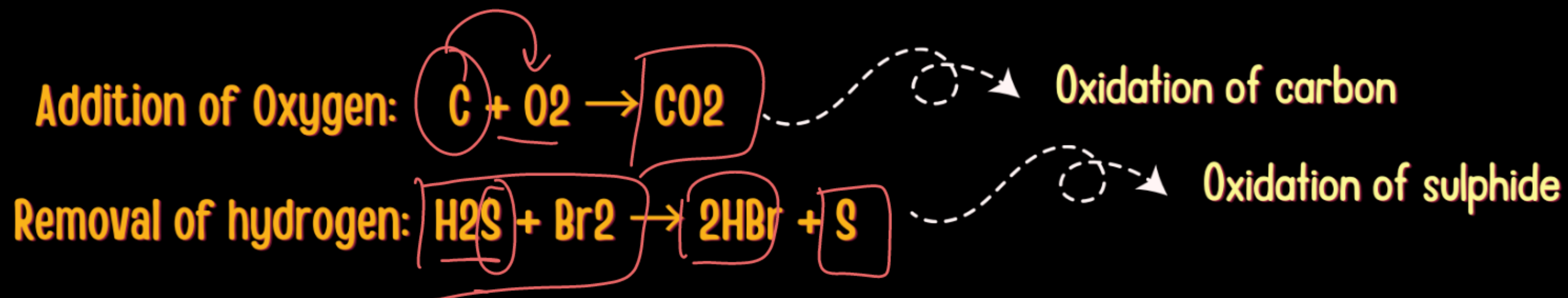


# OXIDATION



अभय

Oxidation refers to the addition of oxygen or the removal of hydrogen from a substance. In electronic terms, it involves the loss of electrons.



**Oxidising agent is a substance which brings about oxidation.**  
**In the above examples  $\text{O}_2$  and  $\text{Br}_2$  are oxidising agents.**

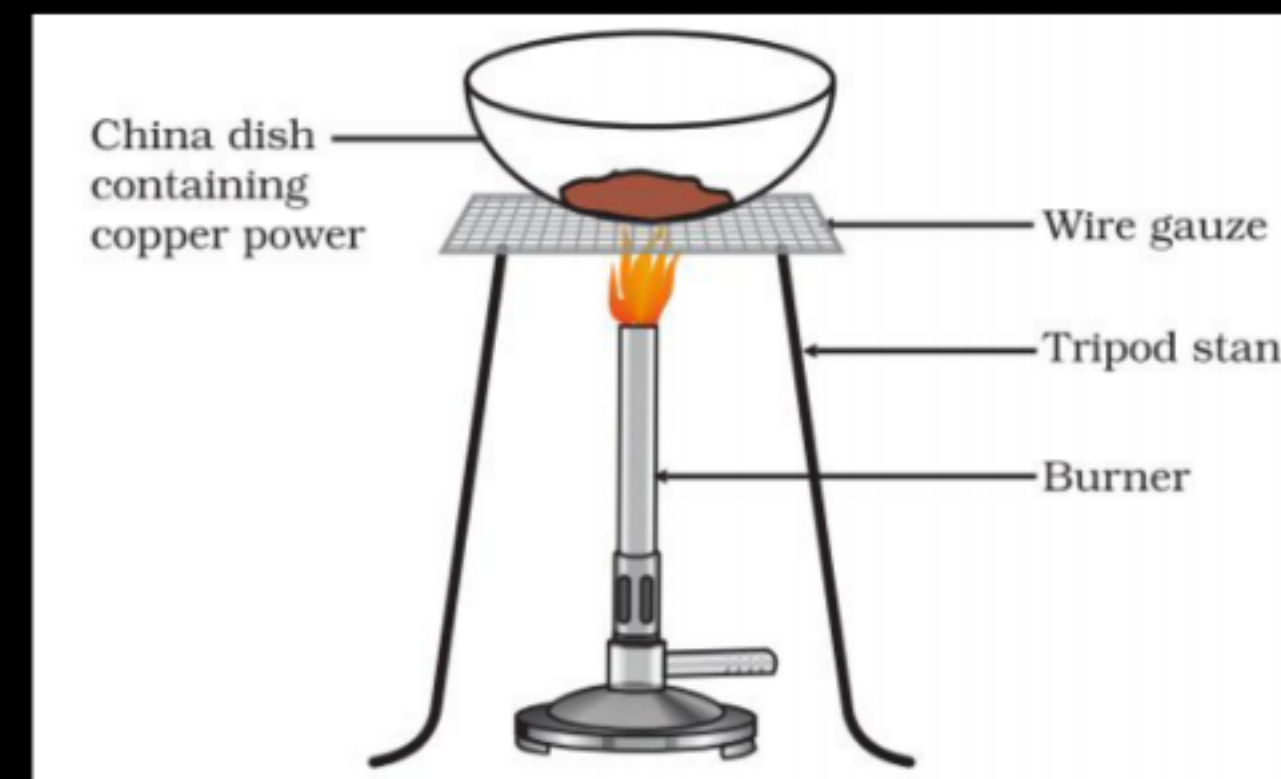
# NCERT ACTIVITY



**Aim:** To observe the reaction of copper powder with oxygen when heated.

**Observation:**

- Initially, the copper powder is reddish-brown in color.
- Upon heating, the copper powder turns black due to its reaction with oxygen in the air, forming copper oxide (CuO).



**Reaction:**  $2\text{Cu (s)} + \text{O}_2 \text{(g)} \rightarrow 2\text{CuO (s)}$   $\rightarrow$  BLACK

**Conclusion:**

The reaction demonstrates an oxidation process where copper is oxidized to form copper oxide. This is an exothermic reaction, producing heat and causing a visible color change.



# REDUCTION



A chemical reaction which involves addition of hydrogen or removal of oxygen or gain of electrons is called as reduction

Addition of hydrogen:  $N_2 + 3H_2 \rightarrow 2NH_3$

Reduction of nitrogen

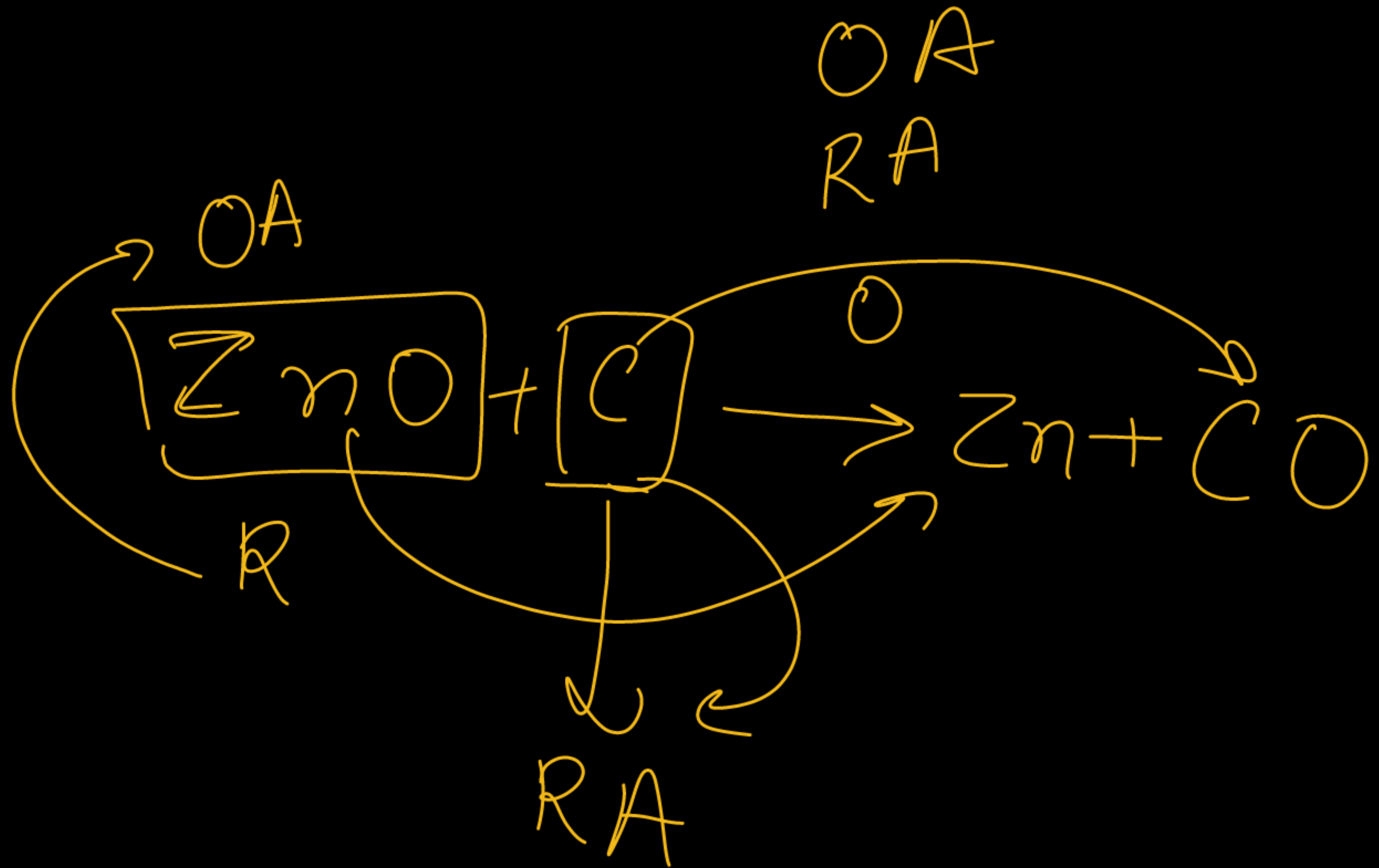
Removal of oxygen:  $ZnO + C \rightarrow Zn + CO$

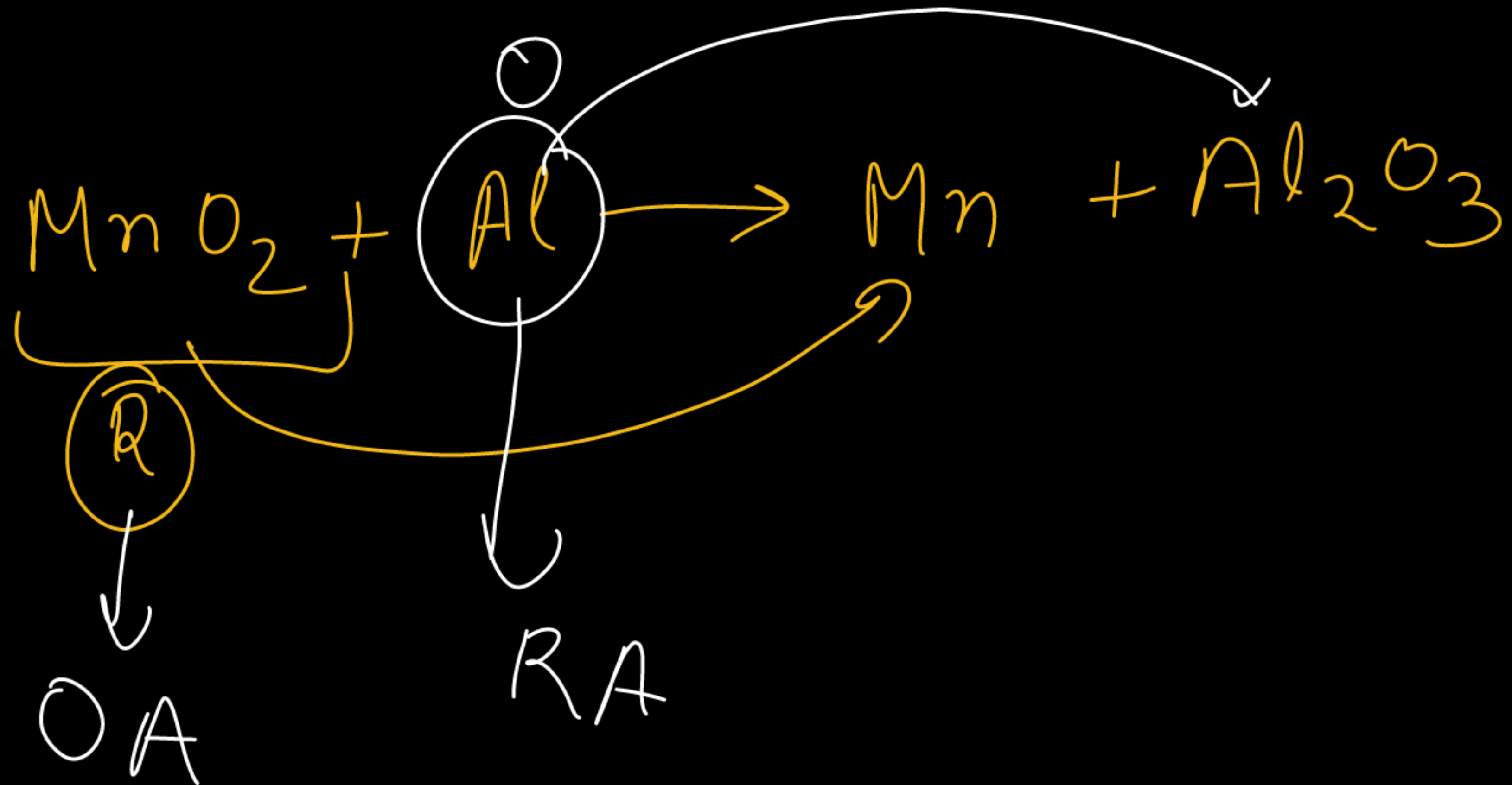
Reduction of zinc

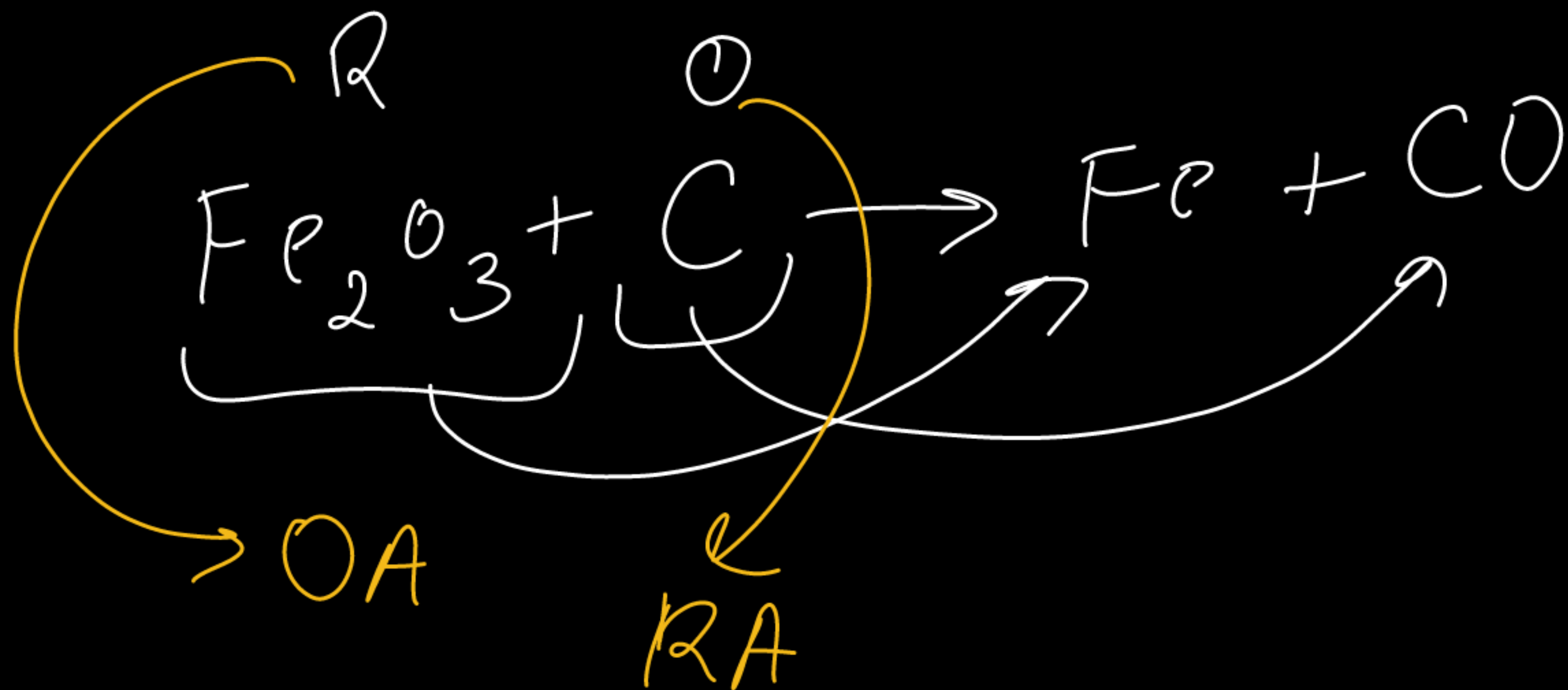
Reduction      Oxidised

**Reducing agent is a substance which brings about reduction. In the above examples  $H_2$  and  $C$  are reducing agents.**











# REDOX

A chemical reaction in which reduction and oxidation takes place simultaneously.

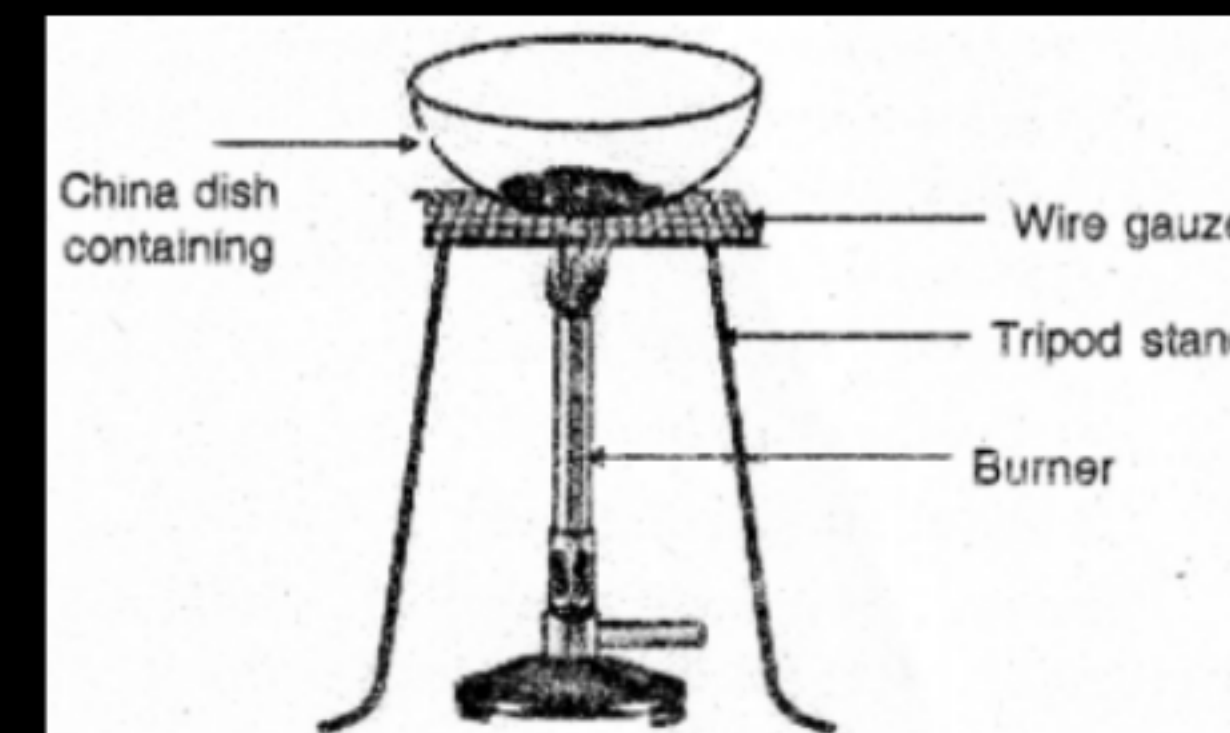
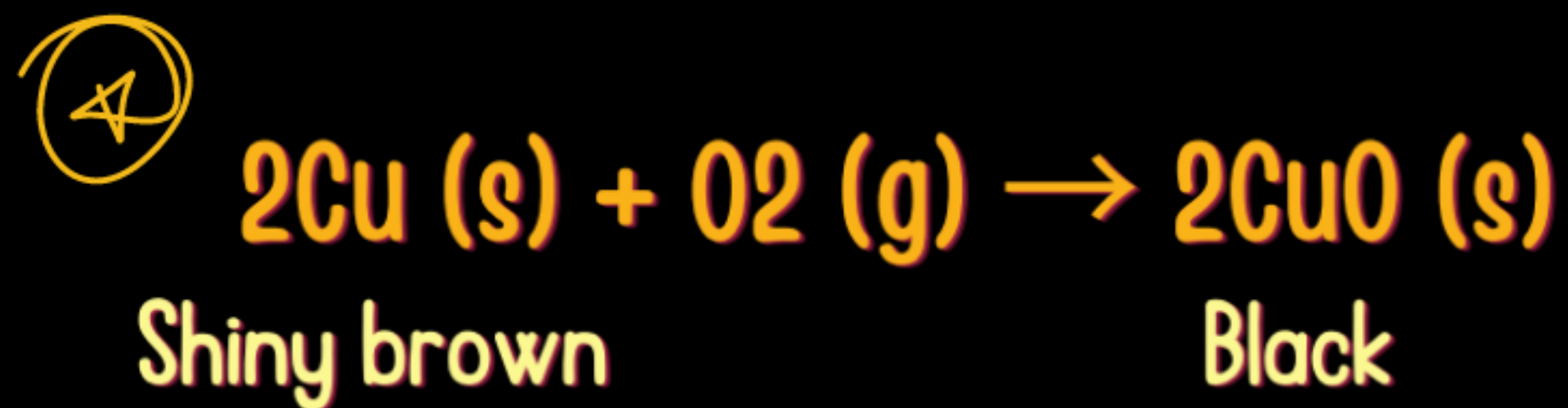
In a redox reaction substance getting oxidised is called a **Reducing agent**.

And the substance getting reduced is called an **Oxidising agent**.

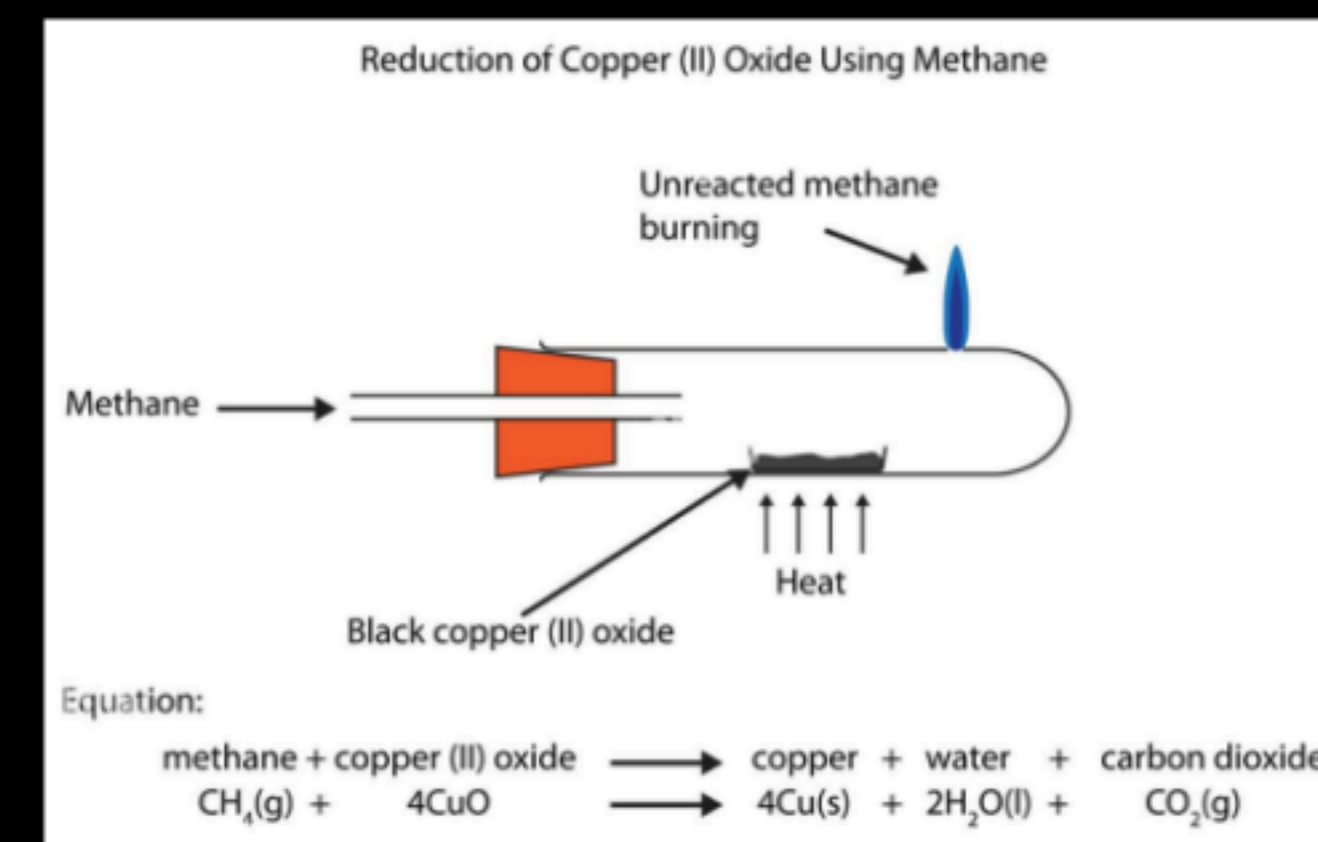
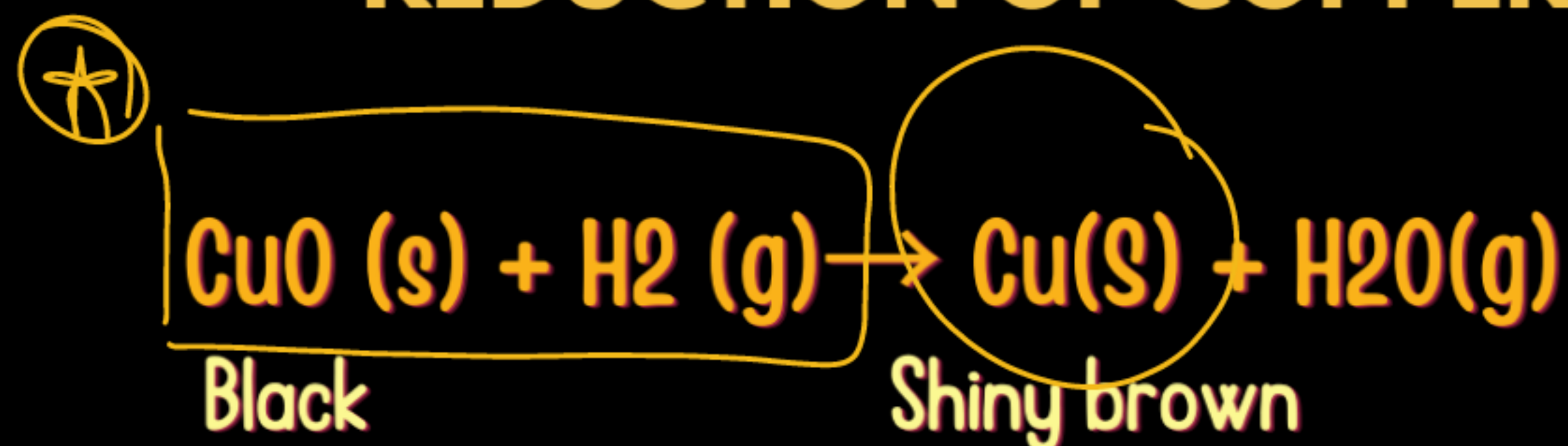




# OXIDATION OF COPPER TO COPPER OXIDE



# REDUCTION OF COPPER OXIDE TO COPPER







Q. In the reaction  $\text{CuO (s)} + \text{H}_2 \text{(g)} \rightarrow \text{Cu(s)} + \text{H}_2\text{O (g)}$

- (a) Name the oxidized substance.
- (b) Name the reduced substance.
- (c) Name the oxidizing agent.





**CORROSION:** When metal surfaces are attacked by substances like oxygen, moisture, or acids, the metal is said to undergo corrosion.

This process is *undesirable as it weakens the metal and diminishes its appearance.*

**RUSTING:** Iron reacts with air and water to form rust, a reddish-brown flaky substance. This oxidation process, known as rusting, occurs more easily on metal surfaces.

**TARNISHING:** When silver metal or silver ornaments are exposed to air, they become discolored or tarnished. This happens because silver reacts with hydrogen sulfide and oxygen present in the air, forming compounds that cause the tarnishing of the silver.





# CORROSION



(Black)





# PREVENTING CORROSION



Painting



Greasing or  
oiling



Alloying

Metals after corrosion  
prevention be like:





# RANCIDITY

Rancidity occurs when oil- or fat-containing food items are exposed to air for a long time, leading to oxidation. As a result, the food develops an unpleasant odor and taste.

## Different causes of Rancidity:

- Oxidative rancidity ( of oxygen)
- Microbes (e.g., bread mold, etc.)
- Hydrolytic ( of water)





# PREVENTING RANCIDITY

- (i) Addition of antioxidants:** Chemical substances known as antioxidants are added to fat- and oil-containing foods to inhibit their oxidation, preventing spoilage.
- (ii) Filling nitrogen gas:** In chip packets, oxygen is replaced with nitrogen to prevent oxidation. Since nitrogen is non-reactive, it helps retain the original taste and odor of the chips.
- (iii) Refrigeration of food items:** Storing food at low temperatures slows down oxidation, helping to preserve its taste and odor.



AFL

# ~~Prashant Points (PP)~~



अभय

1. A dilute ferrous sulphate solution was gradually added to the beaker containing acidified potassium permanganate solution. The light purple colour of the solution fades and finally disappears. Which of the following is the correct explanation for the observation ?



(a)  $\text{KMnO}_4$  is an oxidising agent, it oxidises  $\text{FeSO}_4$ .

(b)  $\text{FeSO}_4$  acts as an oxidising agent and oxidises  $\text{KMnO}_4$ .

(c) The colour disappears due to dilution; no reaction is involved.

(d)  $\text{KMnO}_4$  is an unstable compound and decomposes in presence of  $\text{FeSO}_4$  to a colourless compound.



# Prashant Points (PP)



**2. In a double displacement reaction such as the reaction between sodium sulphate solution and barium chloride solution :**

(A) exchange of atoms takes place

(B) exchange of ions takes place

(C) a precipitate is produced

(D) an insoluble salt is produced The correct option is

(a) (B) and (D)

(b) (A) and (C)

(c) only (B)

(d) (B), (C) and (D)

# Prashant Points (PP)



**3. Calcium oxide reacts vigorously with water to produce slaked lime.**

**$\text{CaO(s)} + \text{H}_2\text{O(l)} \rightarrow \text{Ca(OH)}_2\text{(aq)}$  . This reaction can be classified as**

(A) Combination reaction

(B) Exothermic reaction

(C) Endothermic reaction

(D) Oxidation reaction

Which of the following is a correct option?

(a) (A) and (C)

(b) (C) and (D)

(c) (A), (C) and (D)

(d) (A) and (B)

# Prashant Points (PP)



## 4. Oxidation is a process which involves

- (a) addition of oxygen
- (b) addition of hydrogen -
- (c) removal of oxygen
- (d) removal of hydrogen

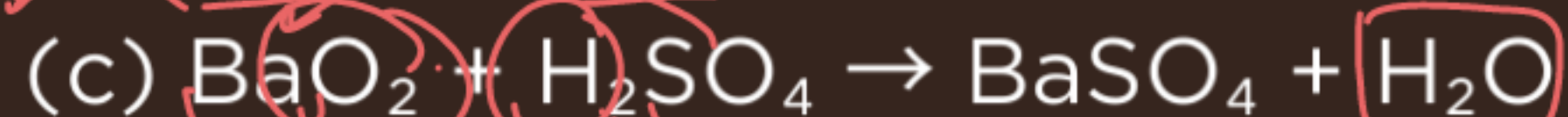
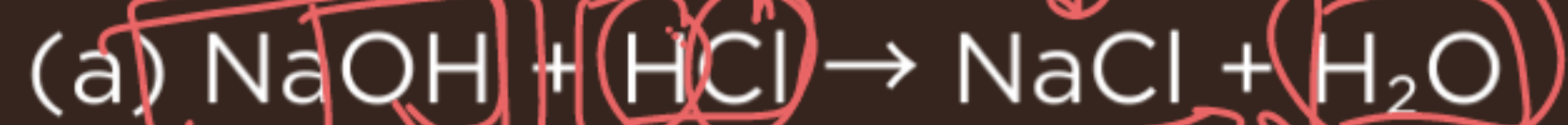




# Prashant Points (PP)



5. Which of the following is a redox reaction?



HW

## Prashant Points (PP)



अभय

9. A magnesium ribbon is burnt in oxygen to give a white compound X accompanied by light emission. If the burning ribbon is now placed in an atmosphere of nitrogen, it continues to burn and forms a compound Y.

(a) Write the chemical formulae of X and Y.

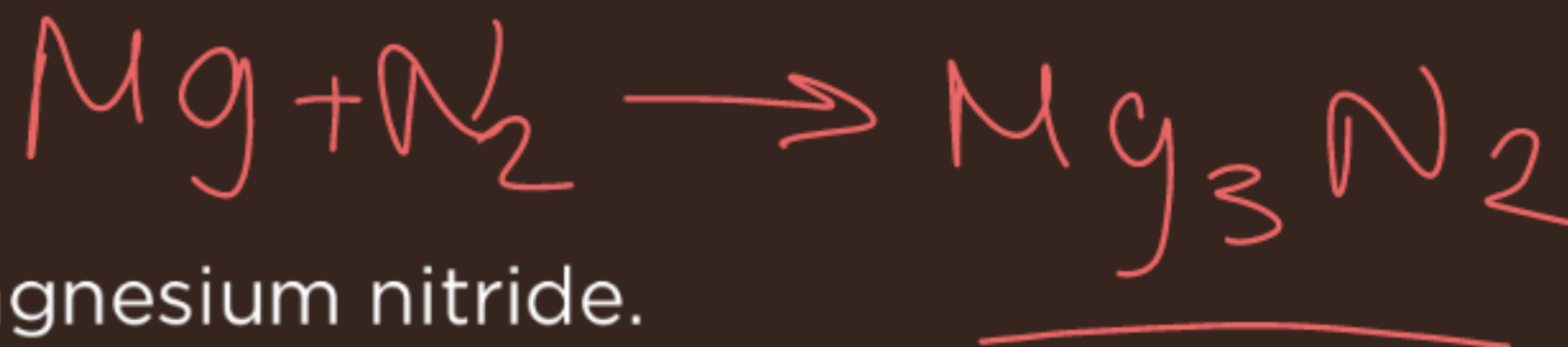
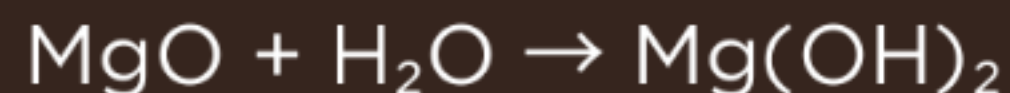
(b) Write a balanced chemical equation when X is dissolved in water.

Answer:

Here, X is magnesium oxide, and Y is magnesium nitride.

(a) The chemical formula of X is  $\text{MgO}$ , and that of Y is  $\text{Mg}_3\text{N}_2$ .

(b) When X is dissolved in water, the following reaction occurs:





In the chemistry of life, be the **reactant**  
that starts amazing **transformations!**

*-Reactants*