



HANSRAJ MODEL SCHOOL

PUNJABI BAGH, NEW DELHI

CLASS - X

SUBJECT - Chemistry

Topic- Chemical Reactions and Equations
Module 4

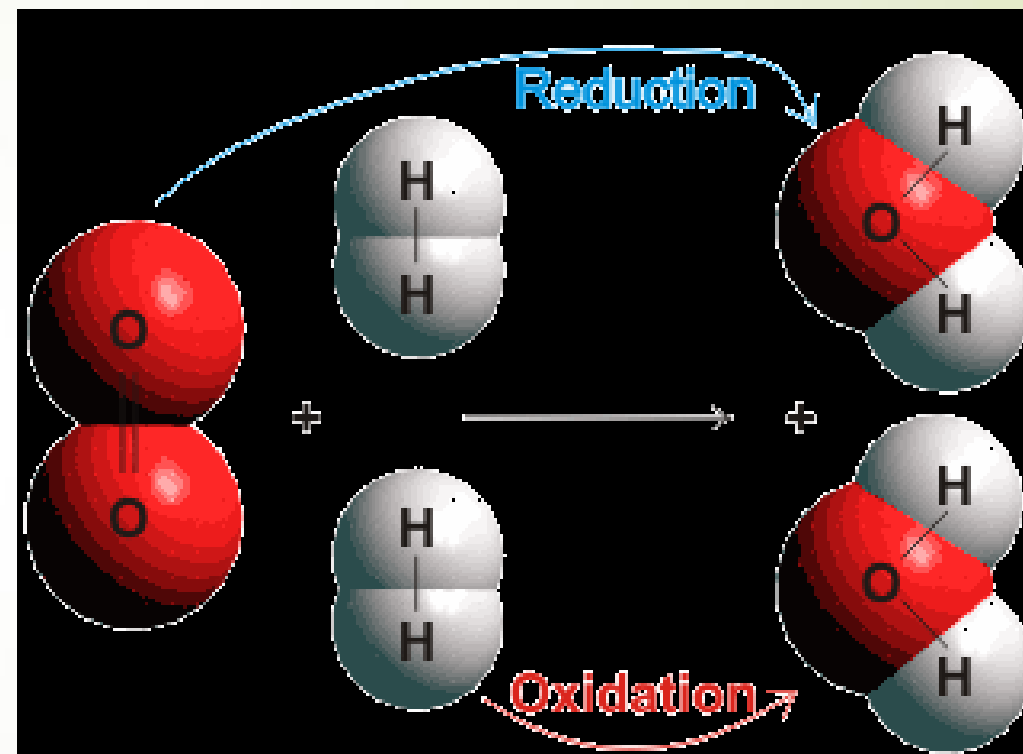
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REDOX REACTIONS



REDUCTION and OXIDATION

- Reduction is :
 - Addition of Hydrogen
 - Removal of Oxygen
- Oxidation is :
 - Addition of Oxygen
 - Removal of Hydrogen



- When in a reaction both oxidation and reduction take place simultaneously then the reaction is called as REDOX REACTION.

OXIDATION REACTIONS

- $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO} + \text{HEAT}$
- $2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO} + \text{HEAT}$
- $\text{C} + \text{O}_2 \rightarrow \text{CO}_2 + \text{HEAT}$
- $4\text{Na} + \text{O}_2 \rightarrow 2\text{Na}_2\text{O} + \text{HEAT}$
- $\text{S} + \text{O}_2 \rightarrow \text{SO}_2 + \text{HEAT}$
- $4\text{P} + 5\text{O}_2 \rightarrow 2\text{P}_2\text{O}_5 + \text{HEAT}$
- In all of the above oxygen is being added.
- So these are oxidation reactions.
- As heat is being evolved in all of the above reactions, so they are also exothermic in nature.

OXIDATION REACTIONS

- Removal of Hydrogen
- $\text{H}_2\text{S} + \text{Cl}_2 \longrightarrow \text{S} + 2\text{HCl}$
- $2\text{NH}_3 \longrightarrow \text{N}_2 + 3\text{H}_2$
- $\text{H}_2\text{S} + \text{Br}_2 \longrightarrow \text{S} + 2\text{HBr}$
- $2\text{HBr} \longrightarrow \text{H}_2 + \text{Br}_2$
- $2\text{HI} \longrightarrow \text{H}_2 + \text{I}_2$
- $2\text{H}_2\text{O} \longrightarrow 2\text{H}_2 + \text{O}_2$
- The above are all oxidation reactions as HYDROGEN is being removed

REDUCTION REACTIONS

- In these reactions Hydrogen is added and oxygen is removed
- For eg:
- $\text{H}_2 + \text{I}_2 \rightarrow 2\text{HI}$
- $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$
- $\text{C} + 2\text{H}_2 \rightarrow \text{CH}_4$
- $\text{H}_2 + \text{Br}_2 \rightarrow 2\text{HBr}$
- $\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$
- Here, ZnO is reduced to Zn i.e removal of oxygen
- $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$
- $2\text{HgO} \rightarrow 2\text{Hg} + \text{O}_2$
- $2\text{Ag}_2\text{O} \rightarrow 4\text{Ag} + \text{O}_2$

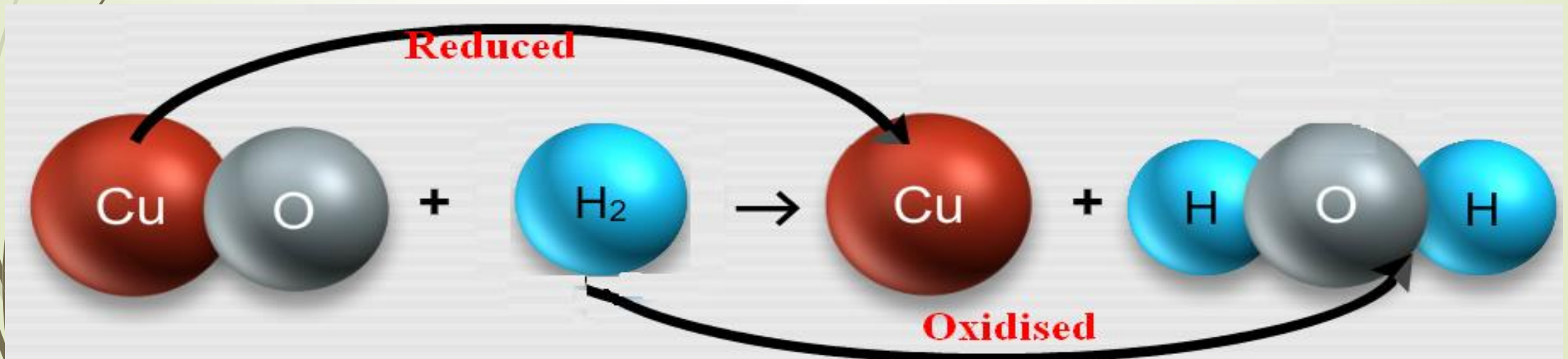
REDOX REACTIONS

► For example:

➤ On passing Hydrogen gas over Copper Oxide we

➤ $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$

➤ In this reaction Hydrogen is being oxidised to water and at the same time Copper oxide is being reduced to Copper.



RANCIDITY

- When food items containing fats and oils get oxidised they become unfit for consumption and start smelling foul. This phenomenon is termed as rancidity.
- Methods to prevent rancidity:
- Keep food in air tight containers
- Packets of chips are flushed with Nitrogen gas as Nitrogen is inert and prevents the oxidation of fats present in chips.





CORROSION OF METALS

- The process of 'eating away' of metals by air, water, acids and other chemicals is termed as corrosion.
- Corrosion is a wasteful process as a huge amount of money is required to prevent corrosion.
- Corrosion of metals causes many accidents for eg railway tracks and bridges made from iron may fall apart due to corrosion and cause death and destruction to property.

Corrosion of Silver

- Silver articles turn black after some time.
- This is because Silver combines with the Sulphur present in the air and forms a black coating of Silver Sulphide.
- $2\text{Ag} + \text{H}_2\text{S} \rightarrow \text{Ag}_2\text{S} + \text{H}_2$



Corrosion of Iron

- Iron articles combine with the moisture and oxygen present in the air and form a reddish brown coating called as rust.
- The process is called as rusting
- Chemically rust is $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$ or Hydrated Iron Oxide.



Corrosion of Copper

- Copper articles lose their shine after some time and become dull.
- This is because Copper combines with the Carbon di oxide and moisture in the air to form a green coating of basic Copper Carbonate.
- The formula for basic Copper Carbonate is $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$

