# UDAAN

## 2025

Bharat Mata Ki Jai ♡

# CHEMICAL REACTIONS AND EQUATIONS

## Important NCERT Exemplar and Competency Focused Questions

CHEMISTRY | Lecture - 09


BY: SUNIL BHAIYA

# Topics

*to be covered*

1. Some Important NCERT Exemplar Questions
2. Competency Focused Questions – CBSE and Self-created

# Knowledge Ride On


Some Important NCERT Exemplar Questions

# Knowledge Ride On


Competency Focused Questions → (Official + Self-created)

**Knowledge Ride On**

Insaniyat Ka Gyaan

# RIDDLE WALLAH

K °C °F

°C and °F to K:

***Dekhna humhari photo chapegi!***

K °C °F

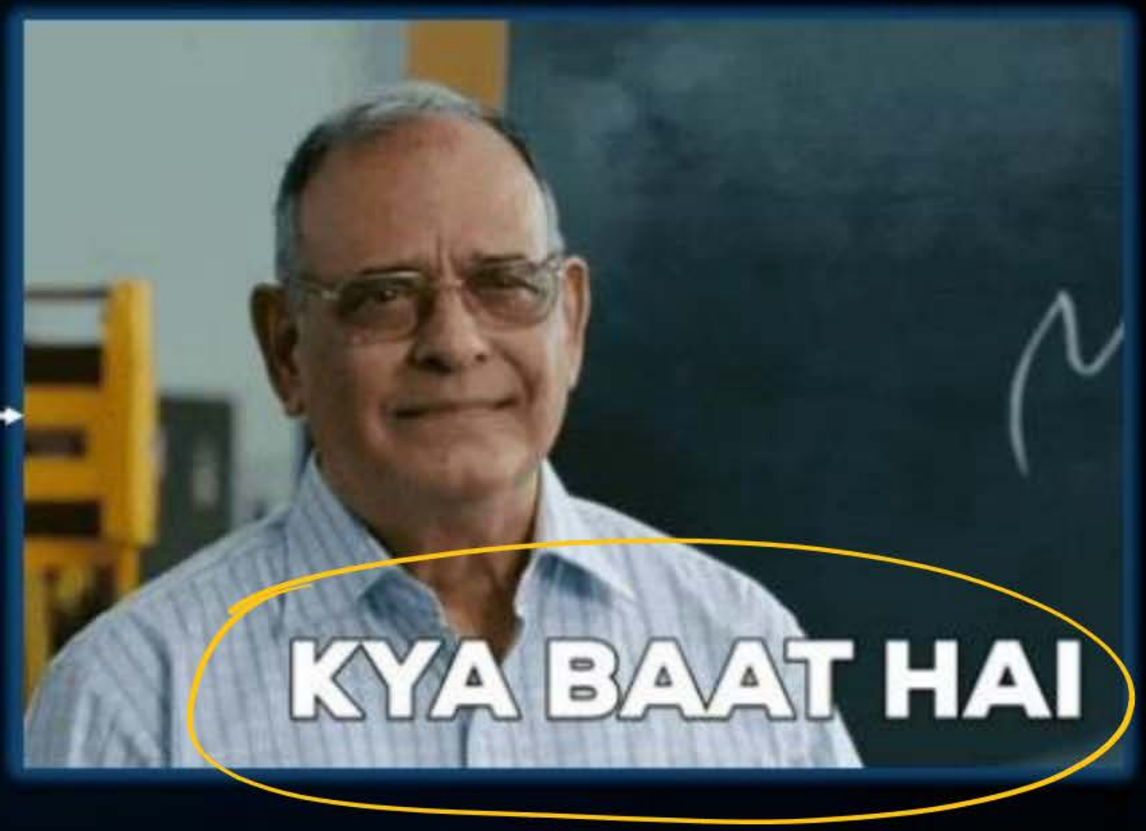
K to °C and °F :

***Meri kyun nahi?***

Kelvin (K) के पास degree nahi hai

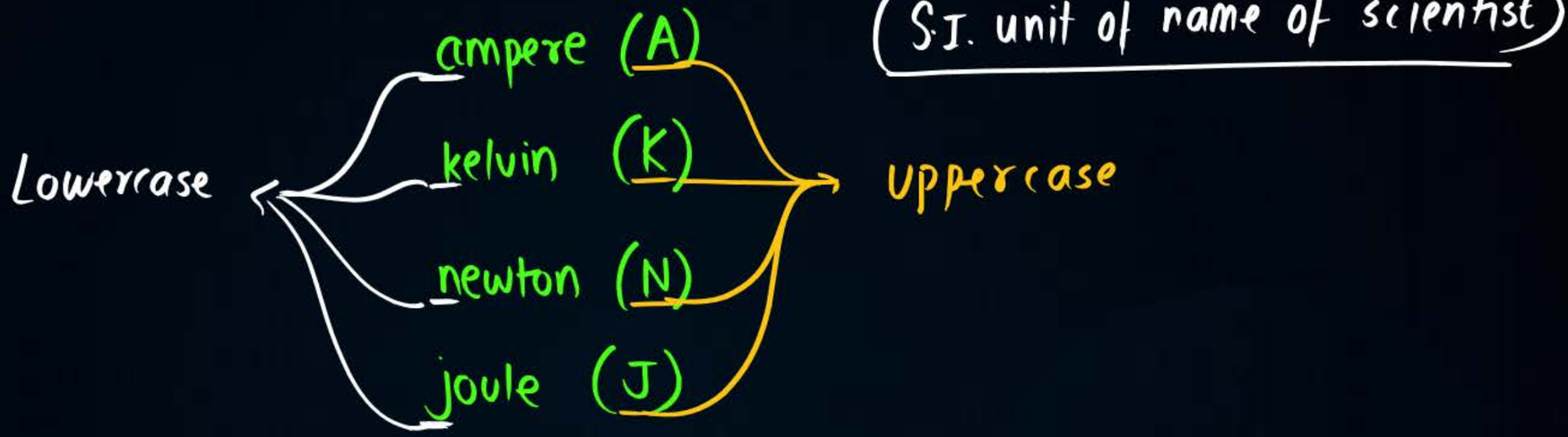
RIDDLE WALLAH

Pyaare Bacche Be Like



# NIST Rules to Write Units

(S.I. unit of name of scientist)



# Some Important NCERT Exemplar Problems

**Question**

Identify the reducing agent in the following reactions.

(a) $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$

(b) $H_2O + F_2 \rightarrow HF + HOF$

(c) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

(d) $2H_2 + O_2 \rightarrow 2H_2O$

Reductant → undergoes OXIDATION

(a) $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$

Addition of hydrogen - Reduction → OXIDISING AGENT

Removal of hydrogen, Addition of oxygen - OXIDATION → Reducing agent

(a) Reductant: $NH_3$ ; Oxidant: $O_2$

(b) Reductant: $H_2O$ ; Oxidant: $F_2$

(b) $H_2O + F_2 \rightarrow HF + HOF$

$H_2O$ → Reductant / Reducing agent

addition of hydrogen - Reduction - Oxidant

Addition of oxygen - OXIDATION → REDUCTANT

(c) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

Removal of oxygen - REDUCTION - OXIDANT / Oxidising agent

Reductant / Reducing agent

CO

Addition of hydrogen - Reduction - Oxidising Agent

(d) $2H_2 + O_2 \rightarrow 2H_2O$

Addition of oxygen - Oxidation - Reducing agent

$H_2$

**Question**

Identify the reducing agent in the following reactions.

(a) $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$

(b) $H_2O + F_2 \rightarrow HF + HOF$

(c) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

(d) $2H_2 + O_2 \rightarrow 2H_2O$

(a) Ammonia ($NH_3$)

(b) Water ($H_2O$) as $F_2$ is getting reduced to HF

(c) Carbon monoxide (CO)

(d) Hydrogen

**Hint**—Reducing agents are those substances which have th ability of adding hydrogen or removing oxygen from the othe

(a) Identify the reducing agent in the following reactions : 3

(i) $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$

(ii) $H_2O + F_2 \rightarrow HF + HOF$

(iii) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

(iv) $2H_2 + O_2 \rightarrow 2H_2O$

(b) Define a redox reaction in terms of gain or loss of oxygen.

CBSE 2023

**Question**

$CH_3COO^{1-}$ (acetate ion)
↳ polyatomic ion

(PbCl₂ is poorly soluble in water)

Write a balanced chemical equation for each of the following reactions and also classify them.

(a) Lead acetate solution is treated with dilute hydrochloric acid to form lead chloride and acetic acid solution.

(b) A piece of sodium metal is added to absolute ethanol (CH-OH → $CH_3CH_2OH$ / $C_2H_5OH$) to form sodium ethoxide and hydrogen gas.

Pb $CH_3COO$

Charge 2+ 1-

Valency 2 1

$Pb(CH_3COO)_2$

(a) $\underset{C}{Pb}\underset{A}{(CH_3COO)_2}(aq) + 2\,dil.\underset{C}{H}\underset{A}{Cl}(aq) \longrightarrow PbCl_2(s) + 2CH_3COOH(aq)$

white insoluble solid

Double displacement → Precipitation Rxn

(b) $2Na(s) + 2CH_3CH_2OH(aq) \longrightarrow 2CH_3CH_2O^-Na^+(aq) + H_2(\uparrow)$

Reactivity of Na > H

Metal - nonmetal displacement rxn

## Question

Write a balanced chemical equation for each of the following reactions and also classify them.

(a) Lead acetate solution is treated with dilute hydrochloric acid to form lead chloride and acetic acid solution.

(b) A piece of sodium metal is added to absolute ethanol to form sodium ethoxide and hydrogen gas.

Official Soln

(a) $Pb(CH_3COO)_2 + 2HCl \longrightarrow PbCl_2 + CH_3COOH$; Double displacement reaction

(b) $2Na + 2C_2H_5OH \longrightarrow 2C_2H_5ONa + H_2$; Displacement reaction

**Question**

Write a balanced chemical equation for each of the following reactions and also classify them. → $Fe^{3+}$ → $Fe_2O_3$

(c) Iron (III) oxide on heating with carbon monoxide gas reacts to form solid iron and liberates carbon dioxide gas.

(d) Hydrogen sulphide gas reacts with oxygen gas to form solid sulphur and liquid water.

→ (NCERT Textbook (Exercise) but different)

addition of oxygen - Oxidation - REDUCTANT

(c) $Fe_2O_3(s) + 3CO(g) \xrightarrow{\Delta} 2Fe(s) + 3CO_2(\uparrow)$

Removal of oxygen - Reduction - OXIDANT

Redox Rxn

(d) $2H_2S(g) + O_2(g) \longrightarrow 2S(s) + 2H_2O(\ell)$

Removal of hydrogen → OXIDATION → Reductant

addition of hydrogen - Reduction → Oxidant

**Question**

Write a balanced chemical equation for each of the following reactions and also classify them.

(c) Iron (III) oxide on heating with carbon monoxide gas reacts to form solid iron and liberates carbon dioxide gas.

(d) Hydrogen sulphide gas reacts with oxygen gas to form solid sulphur and liquid water.

(c) $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$; Redox reaction ✓

(d) $2H_2S + O_2 \longrightarrow 2S + 2H_2O$; Redox reaction ✓

**Question**

Balance the following chemical equations and identify the type of chemical reaction.

(a) $Mg(s) + Cl_2(g) \rightarrow MgCl_2(s)$

Mg: Element; $Cl_2$: Element; $MgCl_2$: Compound

→ Element - element
⊕ Combination Rx^n

(b) $2HgO(s) \xrightarrow{\text{Heat}} 2Hg(l) + 1O_2(g)$

HgO: Compound; Hg: element; $O_2$: element

⊕ Thermal decomposition rx^n
⊕ Endothermic Rx^n

(c) $2Na(s) + S(s) \xrightarrow{\text{Fuse}} Na_2S(s)$

Na: element; S: element; $Na_2S$: compound

⊕ Element - element combination rx^n

**Question**

(Ti → Titanium)

$CaSiO_3$ → Calcium silicate

$H_2O_2$ → Hydrogen peroxide

$SiO_2$ → Silicon dioxide

Balance the following chemical equations and identify the type of chemical reaction.

(Reactivity of Mg > Ti)

(d) $TiCl_4(l) + 2Mg(s) \rightarrow Ti(s) + 2MgCl_2(s)$

- Metal - metal displacement rxn
- Redox Rxn

(e) $CaO(s) + SiO_2(s) \rightarrow CaSiO_3(s)$

CaO: Compound; $SiO_2$: Compound; $CaSiO_3$: Compound

- Compound - compound combination rxn

(f) $2H_2O_2(l) \xrightarrow{UV} 2H_2O(l) + O_2(g)$

$O_2$: element

- Photolytic Decomposition Rxn
- Endothermic Rxn

U.V. → Ultraviolet light → component of sunlight

**Question**

Balance the following chemical equations and identify the type of chemical reaction.

(a) $Mg(s) + Cl_2(g) \rightarrow MgCl_2(s)$

(b) $HgO(s) \xrightarrow{Heat} Hg(l) + O_2(g)$

(c) $Na(s) + S(s) \xrightarrow{Fuse} Na_2S(s)$

(d) $TiCl_4(l) + Mg(s) \rightarrow Ti(s) + MgCl_2(s)$

(e) $CaO(s) + SiO_2(s) \rightarrow CaSiO_3(s)$

(f) $H_2O_2(l) \xrightarrow{UV} H_2O(l) + O_2(g)$

(a) Balanced; Combination reaction

(b) $2HgO\ (s) \xrightarrow{Heat} 2Hg\ (l) + O_2\ (g)$; Decomposition reaction

(c) $2Na\ (s) + S\ (s) \xrightarrow{Fuse} Na_2S\ (s)$; Combination reaction

(d) $TiCl_4\ (l) + 2Mg\ (s) \longrightarrow Ti\ (s) + 2MgCl_2\ (s)$; Displacement reaction

(e) Balanced; Combination reaction

(f) $2H_2O_2\ (l) \xrightarrow{UV} 2H_2O\ (l) + O_2\ (g)$; Decomposition reaction

**Question**

Why do we store silver chloride/hydrogen peroxide/Silver bromide ($AgBr$) in dark coloured bottles?

$AgCl$ $H_2O_2$

**Question**

Why do we store silver chloride/hydrogen peroxide/ in dark coloured bottles?

Silver bromide ($AgBr$)

AgCl $H_2O_2$

***They block the flow of light inside the bottle.***

***This in turns prevents the photolytic decomposition of photosensitive materials like silver chloride/hydrogen peroxide.***

Silver bromide.

**Question**

$SO_4^{2-}$ (sulphate), $SO_3^{2-}$ (sulphite)

On adding a drop of barium chloride solution to an aqueous solution of sodium sulphite, white precipitate is obtained.

(a) Write a balanced chemical equation of the reaction involved.

(b) What other name can be given to this precipitation reaction?

(c) On adding dilute hydrochloric acid to the reaction mixture, white precipitate disappears. Why?

(a) $\underset{C\ A}{BaCl_2}(aq) + \underset{C\ A}{Na_2SO_3}(aq) \longrightarrow \underset{\text{Barium sulphite}}{BaSO_3}(\downarrow) + 2NaCl(aq)$

White insoluble solid

| | Na | $SO_3$ |
|---|---|---|
| Valency | 1 | 2 |

$Na_2SO_3$

(b) Double displacement rxn – Precipitation Rxn

(c) $\underset{C\ A}{BaSO_3} + \underset{C\ A}{HCl} \longrightarrow BaCl_2 + H_2SO_3$

$H_2SO_3 \rightarrow H_2O + SO_2$

| | H | $SO_3$ |
|---|---|---|
| Valency | 1 | 2 |

$H_2SO_3$

Final Rxn $BaSO_3(aq) + 2dil.HCl \longrightarrow BaCl_2(aq) + H_2O(l) + SO_2(\uparrow)$

## Question

On adding a drop of barium chloride solution to an aqueous solution of sodium sulphite, white precipitate is obtained.

(a) Write a balanced chemical equation of the reaction involved.

(b) What other name can be given to this precipitation reaction?

(c) On adding dilute hydrochloric acid to the reaction mixture, white precipitate disappears. Why?

(a) Balanced chemical equation

$$Na_2SO_3\,(aq) + BaCl_2\,(aq) \rightarrow BaSO_3\,(s) + 2\,NaCl\,(aq)$$

| Sodium sulphite | Barium chloride | Barium sulphite | Sodium chloride |
|---|---|---|---|

(b) This reaction is also known as double displacement reaction

(c) $BaSO_3$ is a salt of a weak acid ($H_2SO_3$), therefore dilute acid such as HCl decomposes barium sulphite to produce sulphur dioxide gas which has the smell of burning sulphur.

$$BaSO_3\,(s) + 2HCl\,(aq) \rightarrow BaCl_2 + H_2O + SO_2\,(g)$$

White ppt.

$BaCl_2$ is soluble in water, hence white precipitate disappears

**Question**

$2\,PbO \cdot PbO_2 \rightarrow Pb_3O_4$

Identify the oxidising agent (oxidant) in the following reactions

OXIDANT

(a) $Pb_3O_4 + 8HCl \longrightarrow 3PbCl_2 + Cl_2 + 4H_2O$

Removal of hydrogen - Oxidation - Reductant

$Pb_3O_4$

Removal of oxygen - REDUCTION - OXIDANT

(b) $2Mg + O_2 \longrightarrow 2MgO$

Reduction - OXIDANT

$O_2$

Addition of oxygen - OXIDATION - Reductant

Vanadium pentoxide

(d) $V_2O_5 + 5Ca \longrightarrow 2V + 5CaO$

Addition of oxygen - Oxidation - Reductant

$V_2O_5$

Removal of oxygen - Reduction - OXIDANT

**Question**

Identify the oxidising agent (oxidant) in the following reactions

Oxidant

(e) $3Fe + 4H_2O \longrightarrow Fe_3O_4 + 4H_2$

Removal of oxygen - REDUCTION - Oxidant

$H_2O$

addition of oxygen - OXIDATION - Reductant

(f) $CuO + H_2 \longrightarrow Cu + H_2O$

Removal of oxygen - Reduction - Oxidant

CuO

Addition of oxygen - Oxidation - Reductant

**Question**

Identify the oxidising agent (oxidant) in the following reactions

(a) $Pb_3O_4 + 8HCl \longrightarrow 3PbCl_2 + Cl_2 + 4H_2O$

(b) $2Mg + O_2 \longrightarrow 2MgO$

(d) $V_2O_5 + 5Ca \longrightarrow 2V + 5CaO$

(e) $3Fe + 4H_2O \longrightarrow Fe_3O_4 + 4H_2$

(f) $CuO + H_2 \longrightarrow Cu + H_2O$

(a) $Pb_3O_4$

(b) $O_2$

(d) $V_2O_5$

(e) $H_2O$

(f) $CuO$

# KYA BOLTI PUBLIC

# Competency Focused Questions – CBSE and Self-Created

CBSE CFQ

**Which of the following is an example of simple displacement?**

↳ Displacement Rxn

1. the electrolysis of water → Decomposition Rxn
2. the burning of methane → $CH_4 + O_2 \longrightarrow CO_2 + H_2O$ → not a displacement rxn
3. the reaction of a metal with an acid
4. the reaction of two salt solutions to form a precipitate → double displacement rxn

Metal + dil. acid ⟶ Salt + hydrogen gas

$Zn(s) + 2\,dil.HCl(aq) \longrightarrow ZnCl_2(aq) + H_2(\uparrow)$

→ Metal - nonmetal displacement rxn

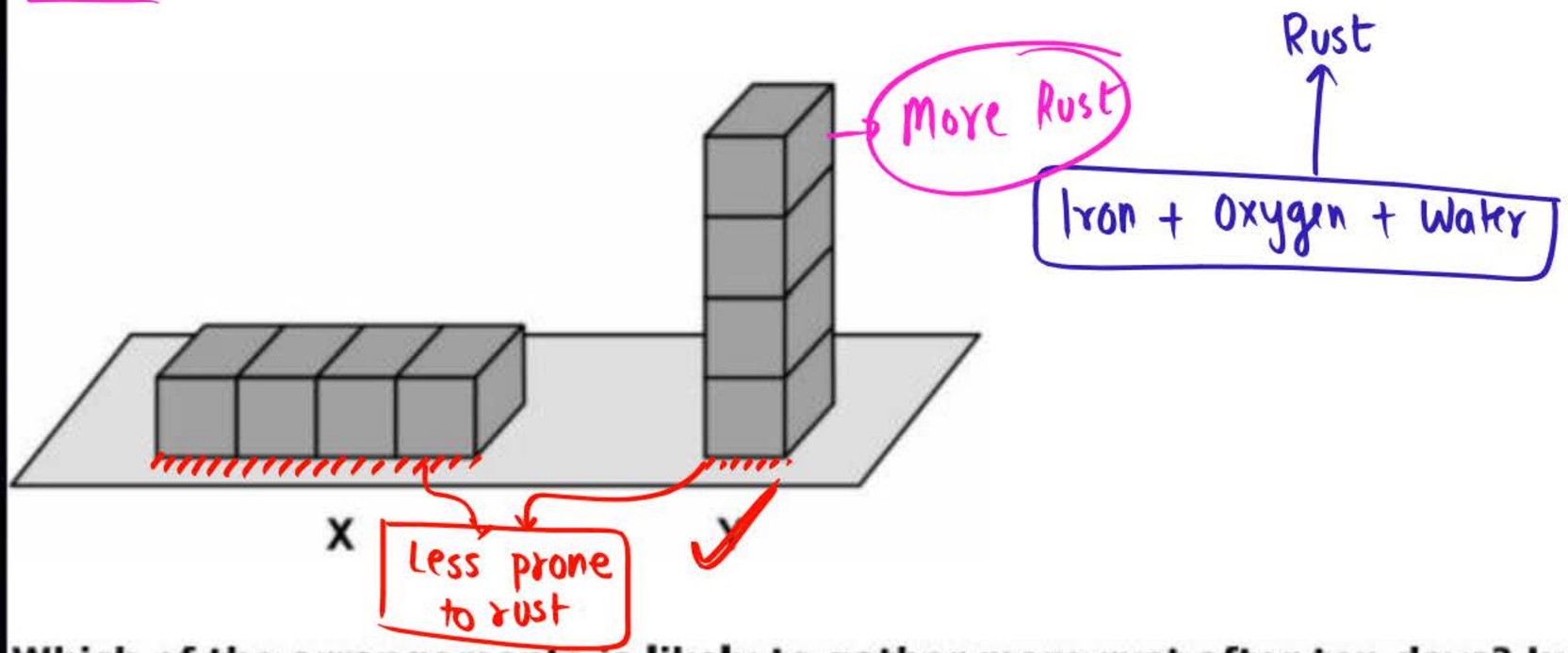
CBSE CFQ

**Which of the following is a NECESSARY condition for ALL chemical reactions?**

1. The reactants should be in the same state.
2. Energy should be supplied to the reactants.
3. The reactants should be at the same temperature.
4. There should be physical contact between the reactants.

CBSE CFQ

Eight identical, iron blocks are placed on the ground in the two arrangements X and Y as shown below. The block arrangements are kept moist by sprinkling water every few hours




Which of the arrangements is likely to gather more rust after ten days? Justify your answer.

CBSE CFQ

**Write the balanced chemical equation of any one reaction that CANNOT be classified as combination, decomposition, simple displacement or double displacement.**

Reductant

It can be a redox rxn.

Removal of hydrogen, Addition of oxygen - Oxidation

$CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(g) + \text{heat} + \text{light}$

$CH_4$ ↓ methane

$O_2$ ↓ (20.95% in air)

Addition of hydrogen - Reduction ↓ 'OXIDANT'

**Question**

A shiny brown coloured element (X) on heating in the presence of oxygen forms a black metal oxide (Y). This metal oxide (Y) on reacting with gas (Z) again converts to metal (X) along with the formation of steam.

1. Identify (X), (Y) and (Z).
2. Write balanced chemical equations for each case and also identify their types.

(a) X : Copper (Cu) , Y : CuO , Z : $H_2$

(b) $2Cu(s) + O_2(g) \longrightarrow 2CuO(s)$

Shiny brown — Black

(Black)

$CuO(s) + H_2(g) \longrightarrow Cu(s) + H_2O(g)$

(Y) — Shiny brown

**Question**

(NCERT Exemplar)

Give characteristic test to identify $CO_2$ and $SO_2$ gas.

| | $CO_2$ | $SO_2$ |
|---|---|---|
| (i) Smell Test | Odourless & colourless gas [Can't applied here] | pungent irritating odour [smell can be related when we burn a matchstick] |

(ii) Chemical Test →

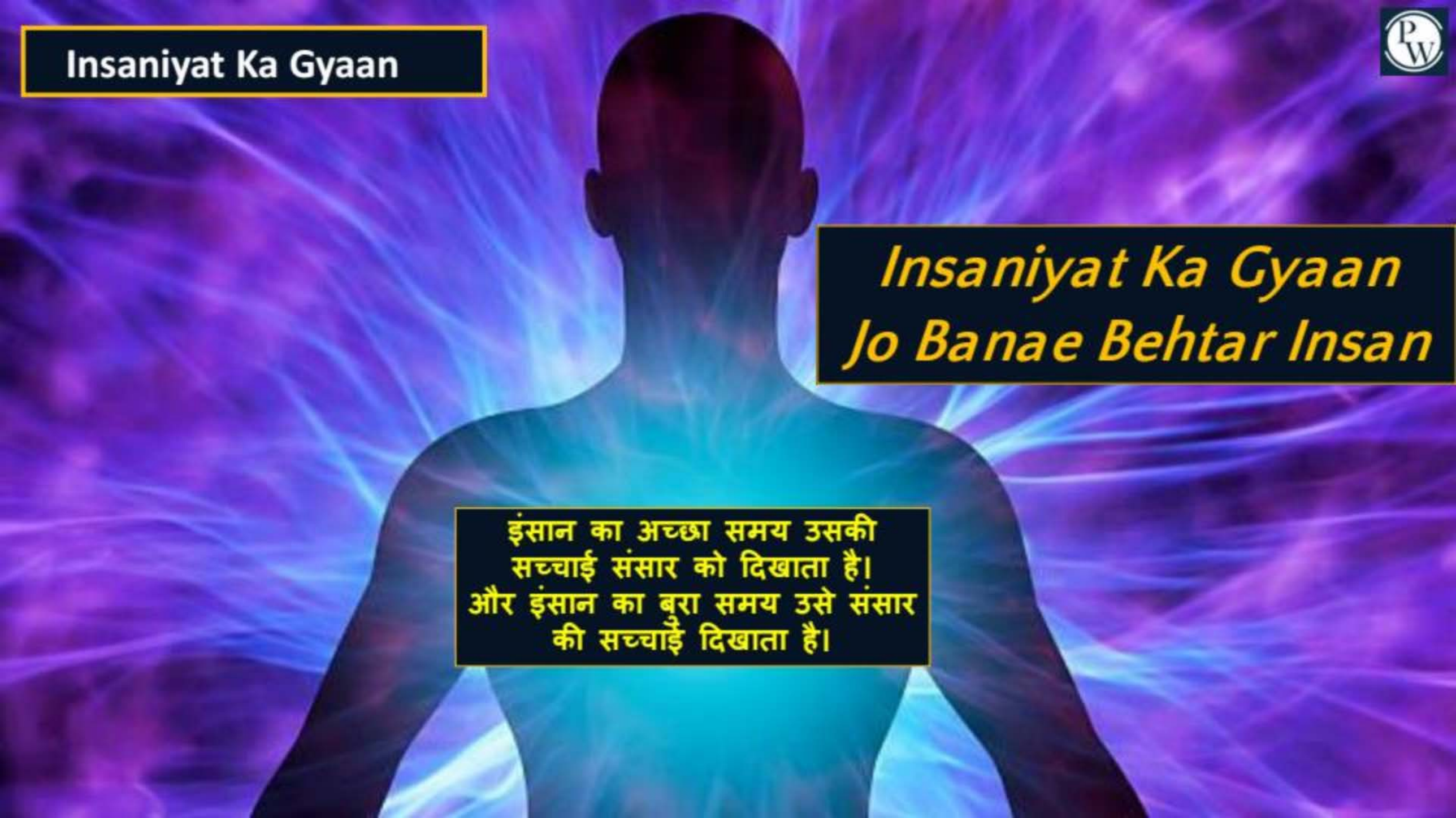
$Ca(OH)_2(aq) + CO_2(g) \rightarrow CaCO_3(s) + H_2O(l)$

milky/turbid due to this

ORANGE acidified $K_2Cr_2O_7$ (Potassium dichromate) $\xrightarrow[\text{gas}]{SO_2}$ Green due to formation of $Cr_2(SO_4)_3$

Chromium (III) Sulphate

KYA BOLTI PUBLIC


Insaniyat Ka Gyaan
Insaniyat Ka Gyaan
Jo Banae Behtar Insan
इंसान का अच्छा समय उसकी
सच्चाई संसार को दिखाता है।
और इंसान का बुरा समय उसे संसार
की सच्चाई दिखाता है।


SUNIL BHAIYA
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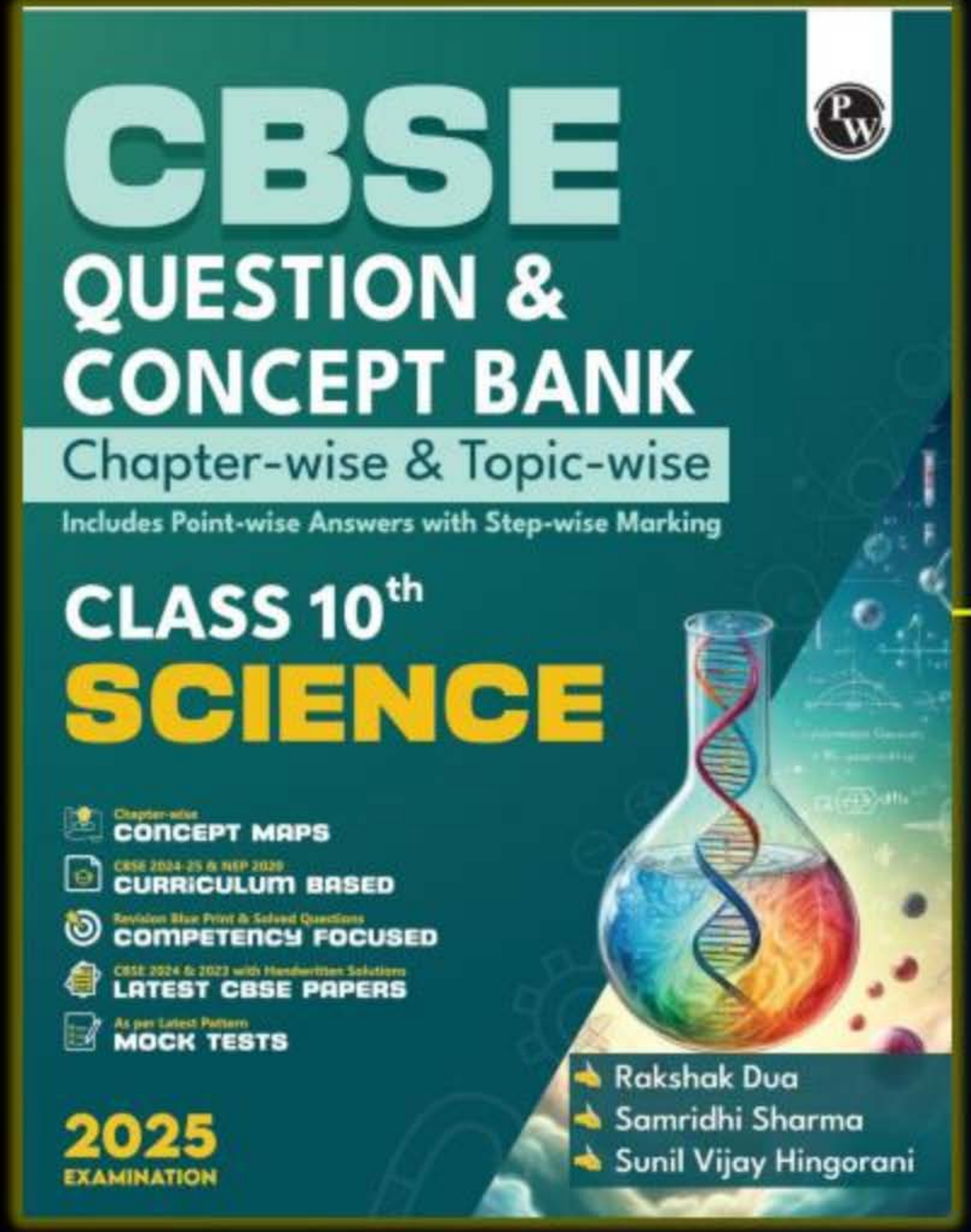
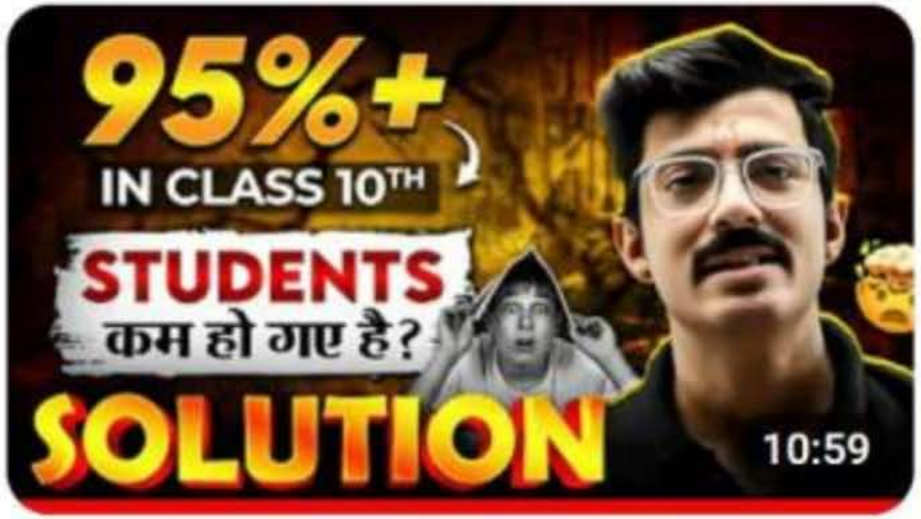



Detailed Review and Importance of the Book in One Video.

**Channel: PW Foundation YouTube**




Class 10th में 95%+ लाने वाले बच्चे घटे ?

😱 Reason and Solution ✅

SUNIL BHAIYA IS ALWAYS THERE FOR YOU.

#sbsathhai

#pwsathhai

# THANK YOU