# UDAAN

## 2025

Bharat Mata Ki Jai ♡

## ACIDS, BASES AND SALTS

### Salts and Their Types – Part III

CHEMISTRY | Lecture - 08


BY: SUNIL BHAIYA

# Topics

*to be covered*

1. Uses of Products and By-products of Chlor-alkali Process
2. Bleaching Powder: Manufacturing and Uses
3. Baking Soda and Soda Ash: Manufacturing and Uses


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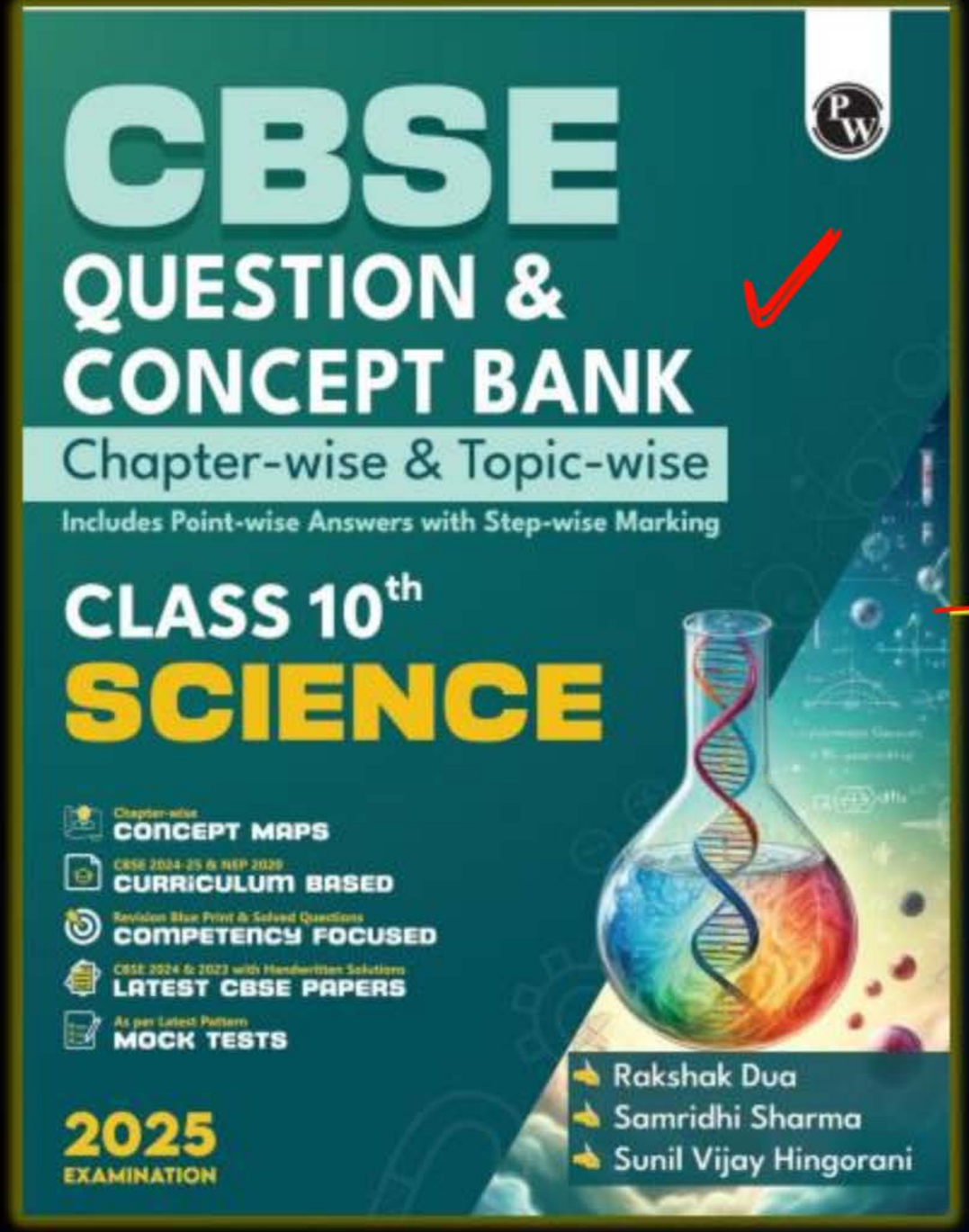


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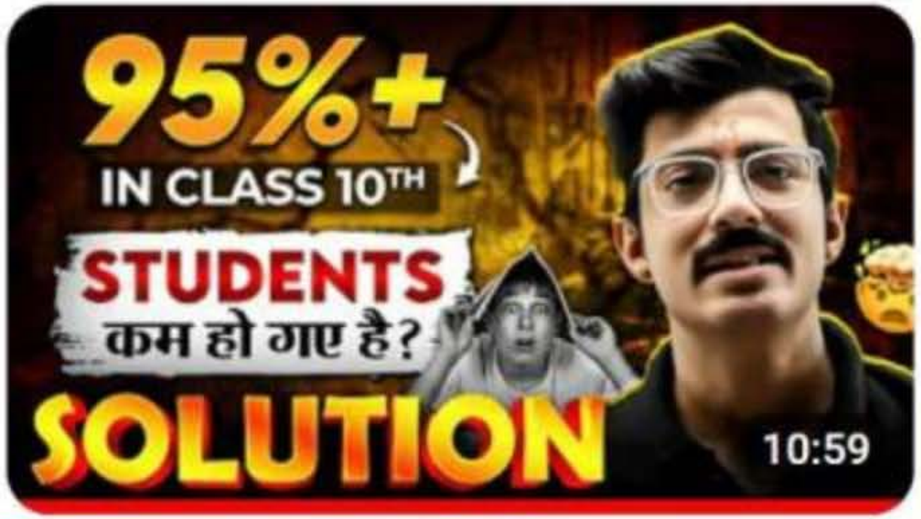


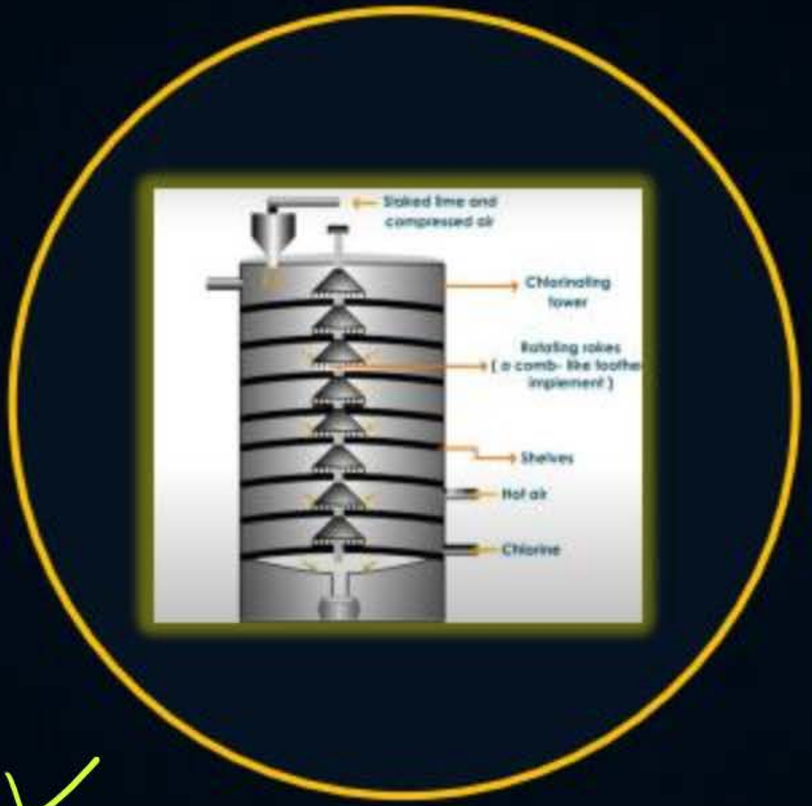

Class 10th में 95%+ लाने वाले बच्चे घटे ?
😱 Reason and Solution ✅

# Knowledge Ride On

(Revision of Chlor-alkali process)

Uses of Products and By-products of Chlor-alkali Process

# Knowledge Ride On




Bleaching Powder: Manufacturing and Uses

# Knowledge Ride On

Baking Soda and Soda Ash:
Manufacturing and Uses

# Knowledge Ride On

Insaniyat Ka Gyaan

# RIDDLE WALLAH

Can you identify the below element?

Aunty

+

Money

= Antimony (Sb)

Sb: Sunil Bhaiya

# RIDDLE WALLAH

Can you identify the below element?

+

= Antimony (Sb)

*Udaanians Be Like* - - - - →

# Concept Polish (गृहकार्य)

QUESTION

What is iodised salt? Why it is used?

(NaI / KI is added to refined common salt)

(fulfill demand of iodine in body)

Lack of Iodine

(A) Goiter (swollen glands in neck region)

(B) Cretenism (mentally retarded kid)

Pregnant ladies should intake iodine through iodised salt / sea food to fulfill demand of iodine

(Revision of chlor-alkali process) also called electrolysis of aq. NaCl

chlor → Chlorine ($Cl_2$)

alkali → NaOH

(I) Main product: NaOH [near the cathode]

By-product: $H_2$ & $Cl_2$

$H_2$ → at cathode

$Cl_2$ → at anode

Cl → Nascent chlorine → highly reactive

H → Nascent hydrogen → reactive

(II) (a) $NaCl(aq) \longrightarrow Na^{1+}(aq) + Cl^{1-}(aq)$

Brine Soltn

(b) $Cl^{1-}$ [Chloride ion] ⟶ moves to anode [+vely charged electrode] & loses electron(s)

OXIDATION of $Cl^{1-}$

$Cl^{1-} \rightarrow Cl + e^-$

$Cl^{1-} \rightarrow Cl + e^-$

$2Cl^{1-} \longrightarrow Cl_2 + 2e^-$

moves to cathode

REDUCTION → gain of electron(s)

(c) $Na^{1+}$ (Sodium ion) ⟶ moves towards cathode (-vely charged electrode) after passing through membrane

$H_2O \rightleftharpoons H^+ + OH^-$

$H^+$ attracted towards cathode

$H^+ + e^- \rightarrow H$

$H^+ + e^- \rightarrow H$

$2H^+ + 2e^- \rightarrow H_2$

(d) Remaining ions

$Na^{1+}$ & $OH^-$ → near the cathode

# Electrolysis of aq. NaCl

$$2NaCl(aq) + 2H_2O(l) \longrightarrow 2NaOH(aq) + H_2(\uparrow) + Cl_2(\uparrow)$$

# Uses of Products and By-products of Chlor-alkali Process

# Uses of Products and By-products Obtained from Chlor-alkali Process

## Uses of Caustic Soda (NaOH)

(a) It is used to manufacture soaps and detergents.

(b) It is used for degreasing metals. → (removing grease | oil from metals)

(c) It is used as a drain cleaner to open clogged drains. नाद नाली को खोलने के लिए।

(d) Used to make fibres.

## Uses of Hydrogen Gas (Liberated at cathode)

(a) Liquid hydrogen is used as a rocket fuel. → (because $H_2$ generates high heat on burning)

(b) It is used to manufacture ammonia for fertilisers.

(c) It is used to produce margarine. → (bread spread)

$$N_2(g) + 3H_2(g) \xrightarrow[Fe]{500\,^\circ C,\ 200\ atm} 2NH_3(g)$$

# Uses of Products and By-products Obtained from Chlor-alkali Process

greenish-yellow gas

## Uses of Chlorine Gas (Liberated at anode)

(a) It is used to manufacture pesticides (used to kill pests) and PVC. → (polyvinyl chloride)

(b) It is used to manufacture CFCs → Chlorofluorocarbon for refrigerators.

(c) It is used as a disinfectant in the swimming pools.

(Used to kill germs on non-living surface)

(Used as refrigerant to have lower temp.)

KYA BOLTI PUBLIC

जो रो लगाएगा Dhoka देके जाएगा।

(Dhoka नहीं देना)

# Bleaching Powder: Manufacturing and Uses

# Bleaching Powder

Common Name

| | |
|---|---|
| Chemical Formula: | $CaOCl_2$ [actual formula is complex] |
| ~~Common~~ Chemical Name: | Calcium oxychloride (yellowish-white powder) |
| Manufactured by: | Hasenclever method or Beckmann's method |

| | |
|---|---|
| Principle of Manufacture | The chlorine gas obtained as a by-product from the chlor-alkali process when reacts with dry slaked lime [$Ca(OH)_2$] produces bleaching powder. (main product) + Water-vapour (by-product) |

# Beckmann's Plant – Out-of-Syllabus

$$Ca(OH)_2(s) + Cl_2(g) \rightarrow CaOCl_2(s) + H_2O(g)$$

dry slaked lime — Chlorine gas — Bleaching powder — Water-vapour

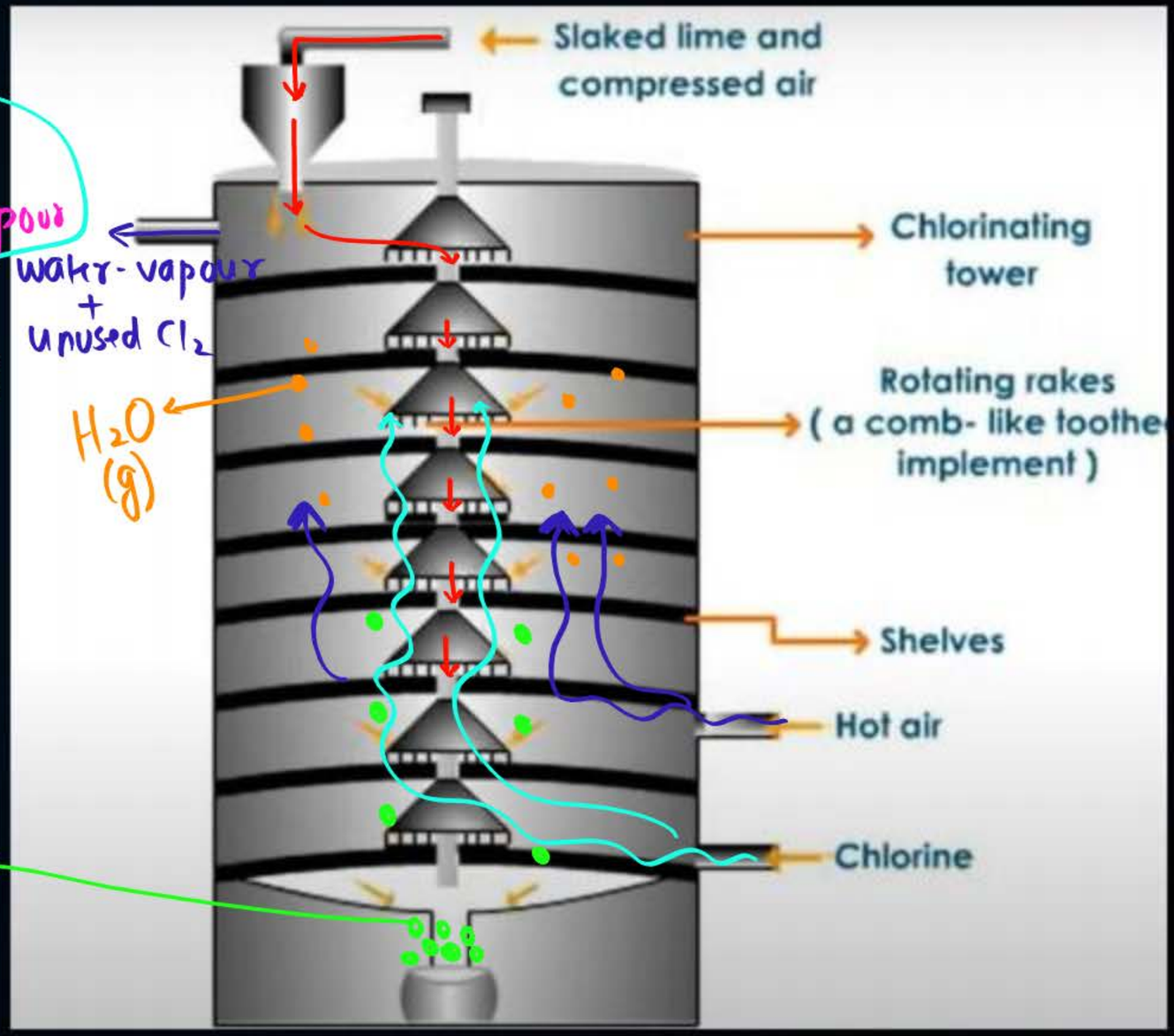
Water-vapour + unused $Cl_2$

$H_2O$ (g)

by-product

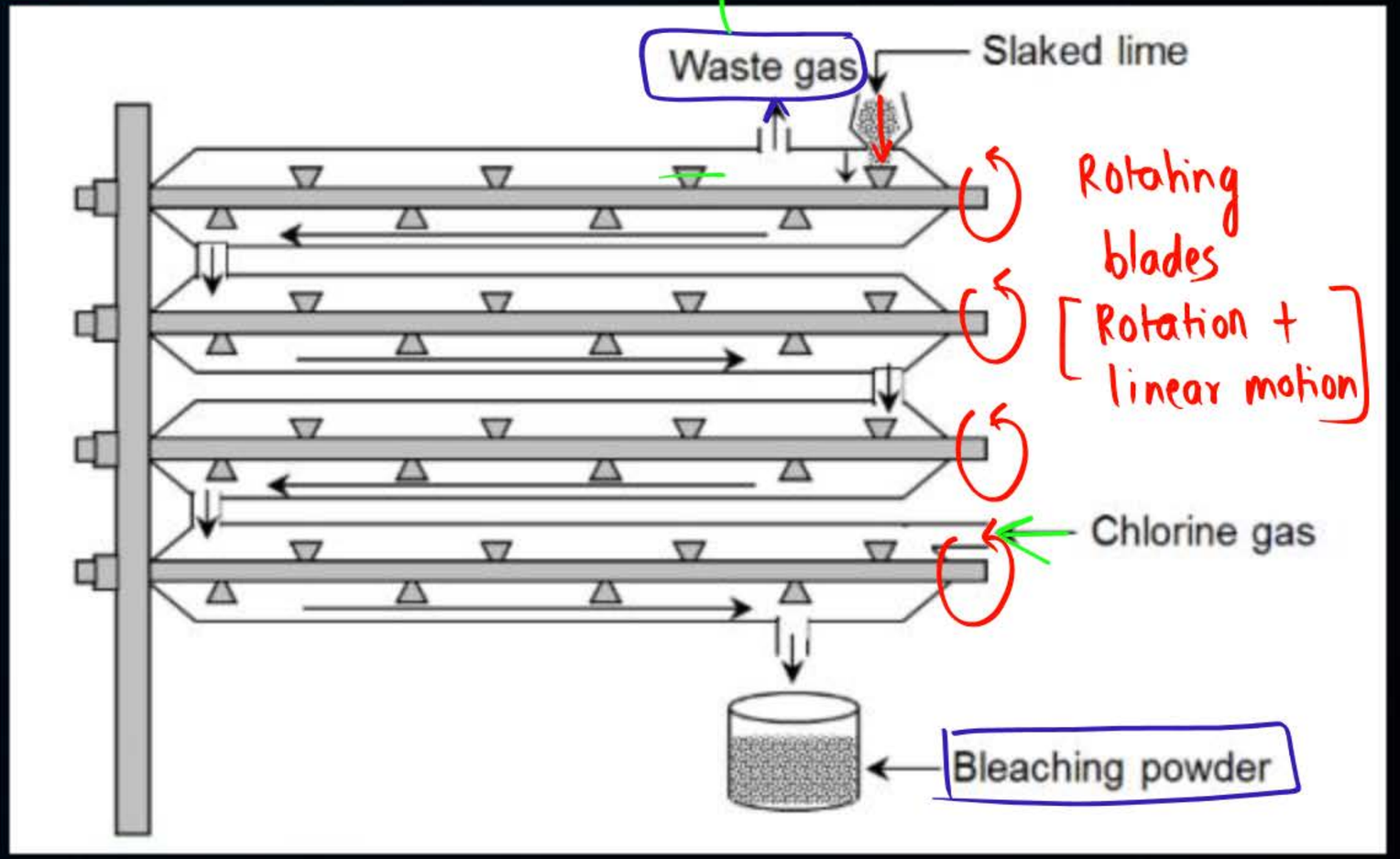
main product

Bleaching powder



# Hasenclever Plant - Out-of-Syllabus

$Ca(OH)_2(s) + Cl_2(g) \rightarrow CaOCl_2(s) + H_2O(g)$



# Uses of Bleaching Powder

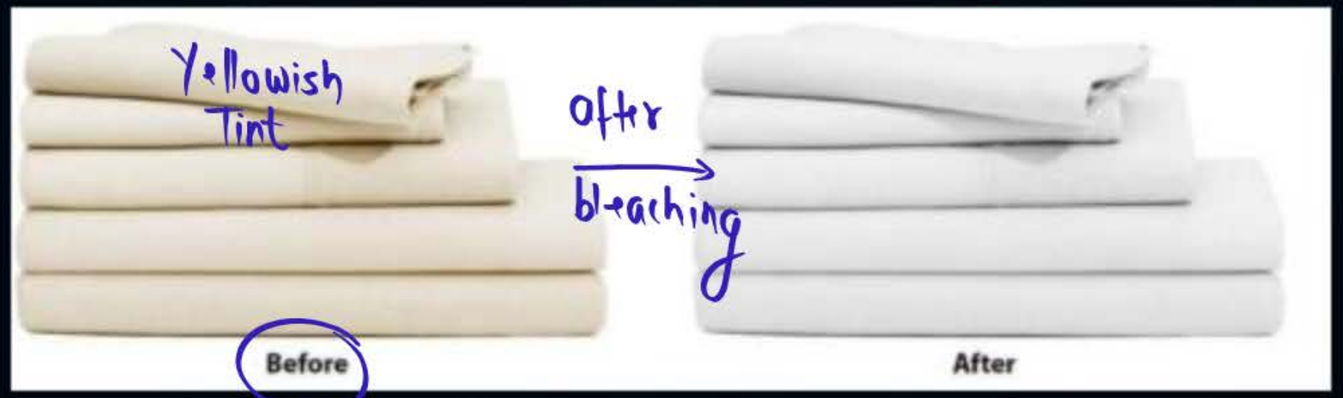
(a) It is used in the textile industry for bleaching cotton and linen. → (fibre obtained from flax plant)

(b) It is used as an oxidising agent in chemical industries.

(c) It is used for disinfecting drinking water by killing germs.

decolourise → whitening effect

all these effects are because of $Cl_2(g)$



# Let's Practice

PW Ka ChemStar!

QUESTION

Which among the following is the correct common name of calcium oxychloride?

A Caustic soda ⟶ Sodium hydroxide ($NaOH$)

B Caustic potash ⟶ Potassium -ll- ($KOH$)

C Slaked lime ⟶ Calcium -ll- [$Ca(OH)_2$]

D Bleaching powder

QUESTION

Which among the following is the by-product of Beckmann's plant?

A $CaOCl_2$

B $H_2O$

C $Ca(OH)_2$

D $Cl_2$

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# Baking Soda and Washing Soda: Manufacturing and Uses

Soda ash

| Common Name | Soda ash | Baking soda |
| --- | --- | --- |
| Chemical Formula: | $Na_2CO_3$ | $NaHCO_3$ |
| Chemical Name: | Sodium carbonate | Sodium hydrogen carbonate / Sodium bicarbonate |
| Manufactured by: | Ammonia-Soda Process OR Solvay's process | intermediate product (product that is used to make main product) |

Raw materials: X, Y, Z

A → Intermediate product

B (main product) + C (by-product)

main product → $Na_2CO_3$

$NaHCO_3$ → (Sparingly soluble in cold water)

# Ammonia-Soda Process/Solvay's Process

(k) AMMONIA TOWER

(x) Brine Soln
NaCl in $H_2O$

(z) Ammonia gas ($NH_3$)

(y) Ammoniated Brine

Lime kiln

$CaCO_3(s) \xrightarrow{\Delta} CaO(s) + CO_2(g)$

(r) $CO_2(g)$

(t) CARBONATING TOWER

$NaCl(aq) + H_2O(l) + NH_3(g) + CO_2(g)$

$NH_4Cl(aq) + NaHCO_3(s)$

Lime Slaker

$CaO + H_2O \rightarrow Ca(OH)_2$

slaked lime

Filter out (s)

$2NaHCO_3(s) \xrightarrow[\text{or } \Delta]{\text{heat}} Na_2CO_3(s) + H_2O(\uparrow) + CO_2(\uparrow)$

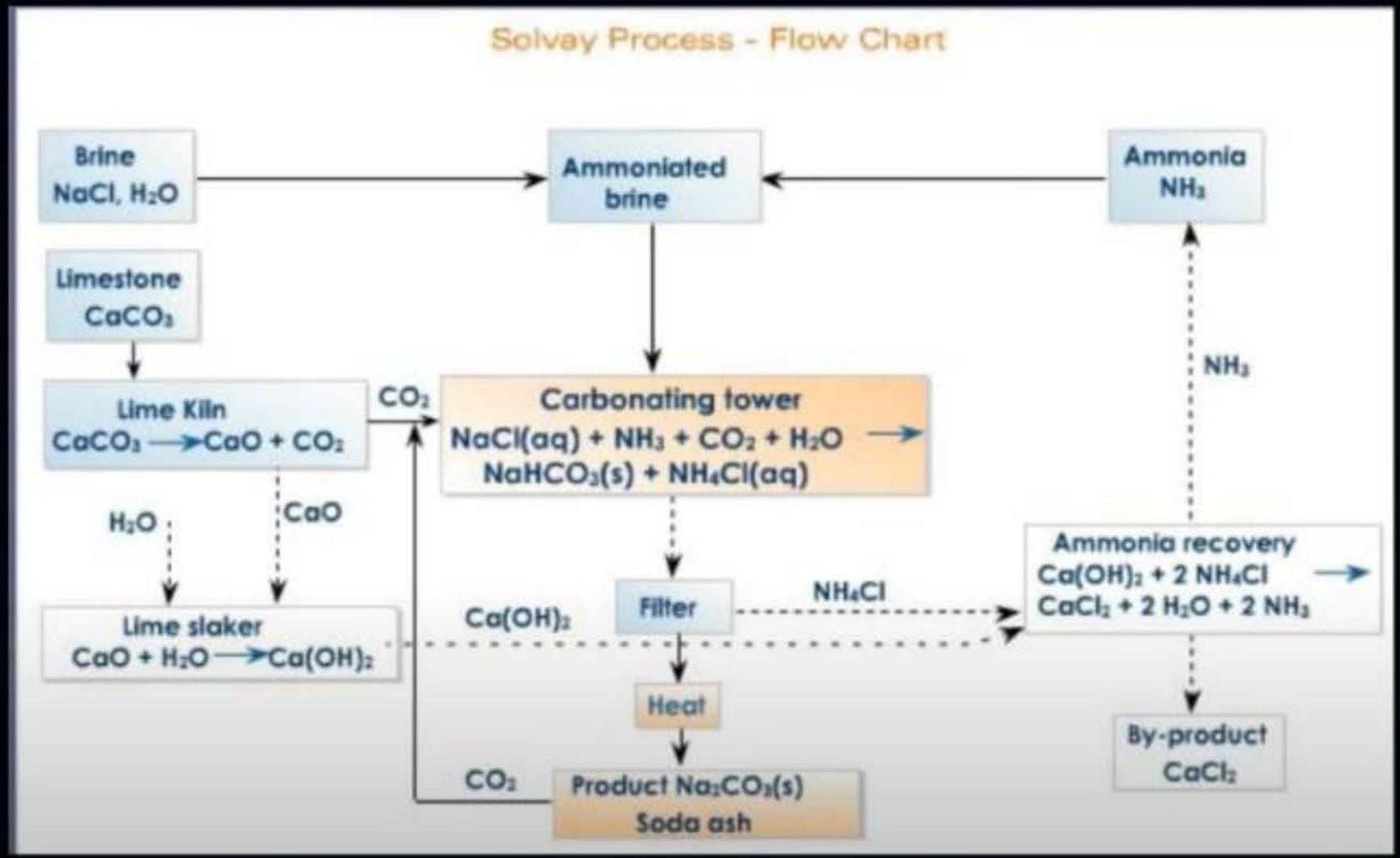
main product

by-products

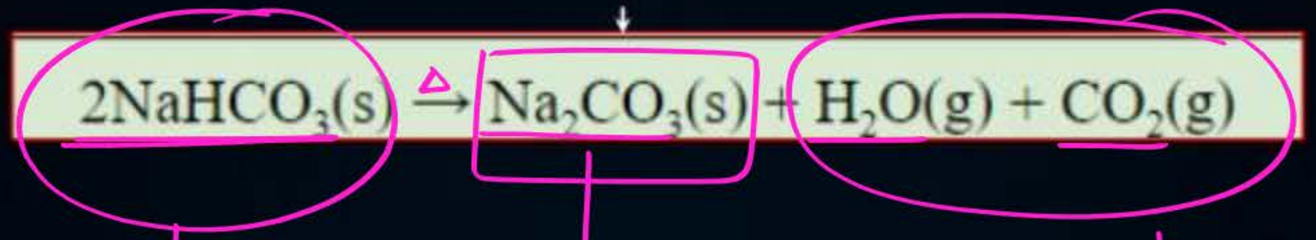
$\underset{C\ A}{Ca(OH)_2} + \underset{C\ A}{NH_4Cl} \rightarrow CaCl_2 + NH_4OH$

$NH_4OH \rightarrow NH_3 + H_2O$

# Ammonia-Soda Process/Solvay's Process



# Thermal Decomposition of Baking Soda / Thermolysis of baking soda




intermediate product

main product

by-product

# Concept Polish (गृहकार्य)

# Decode This Activity!

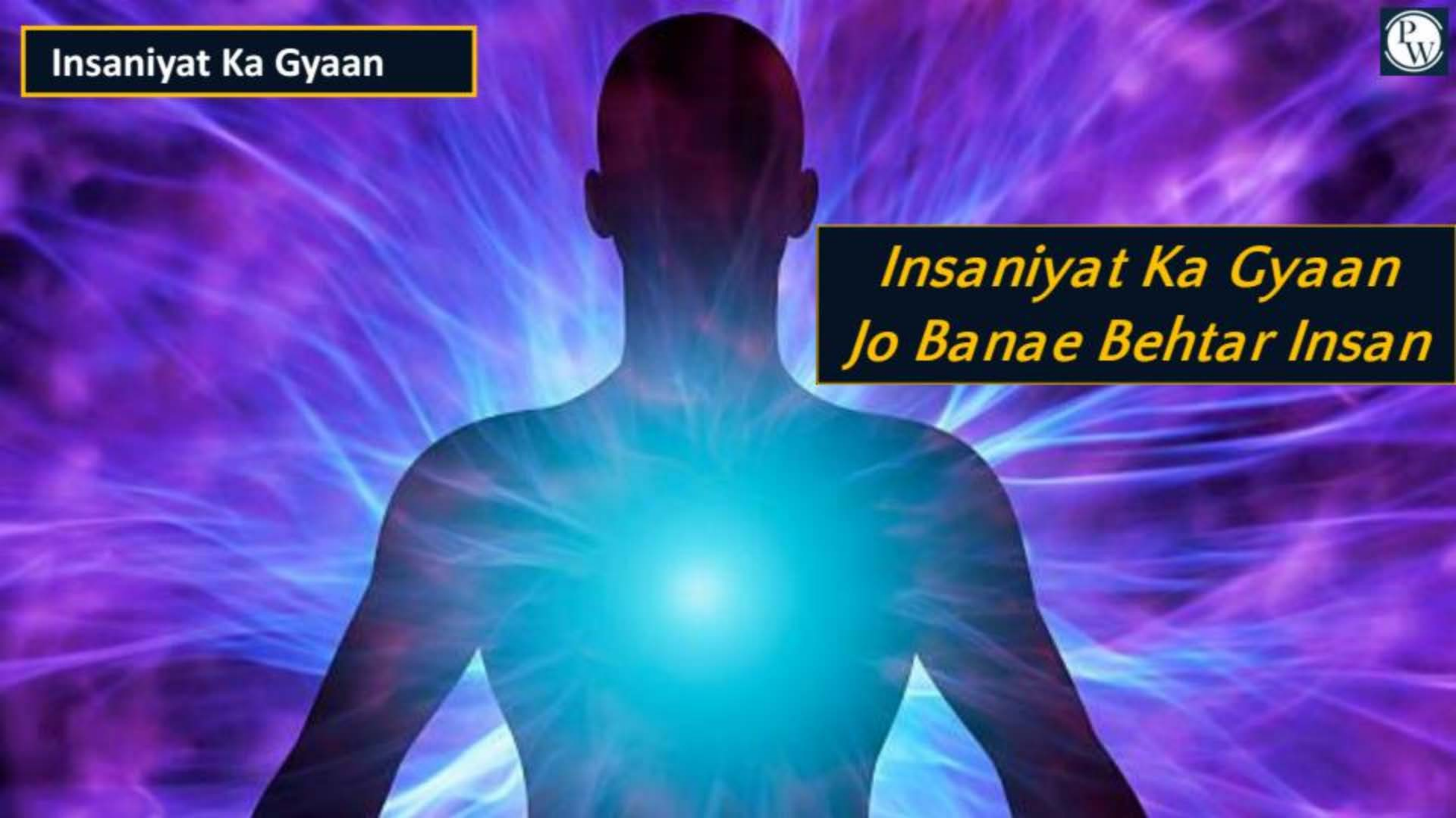
(II) **Preparing a soda-acid fire extinguisher**

The reaction of acids with metal hydrogencarbonates is used in the fire extinguishers which produce carbon dioxide.

- Take 20 mL of sodium hydrogencarbonate ($NaHCO_3$) solution in a wash-bottle.
- Suspend an ignition tube containing dilute sulphuric acid in the wash-bottle (Fig. 2.10).
- Close the mouth of the wash-bottle.
- Tilt the wash-bottle so that the acid from the ignition tube mixes with the sodium hydrogencarbonate solution below.
- You will notice discharge coming out of the nozzle.
- Direct this discharge on a burning candle. What happens?

QUESTION

Difference between baking soda and baking powder in detail?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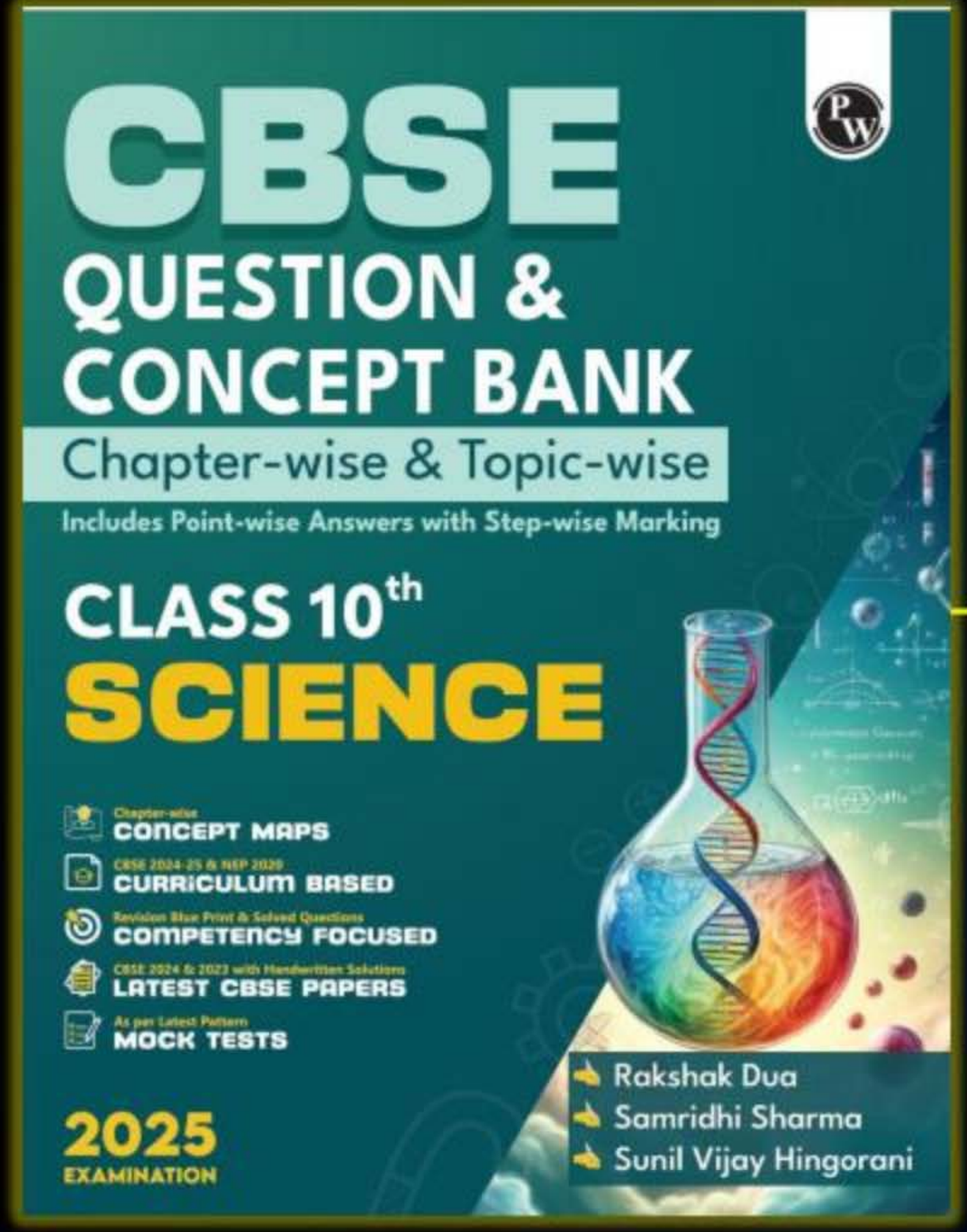


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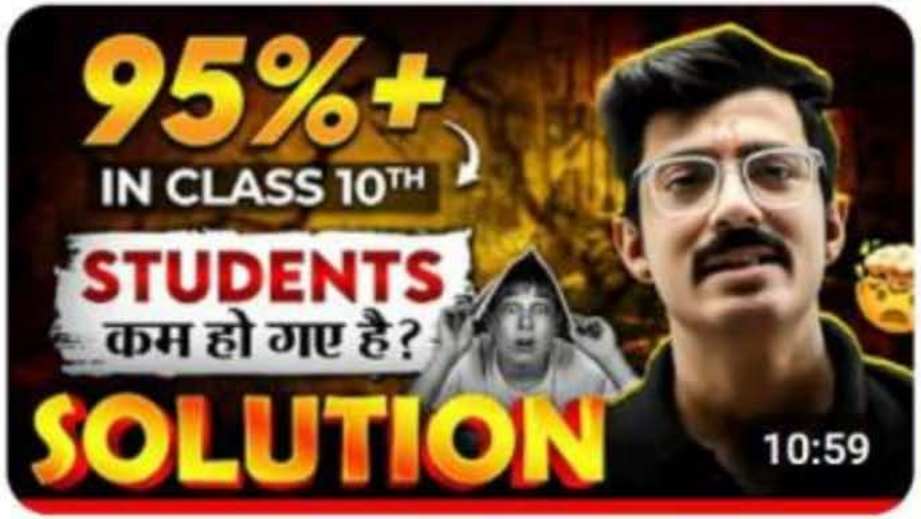


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😱 Reason and Solution ✅

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#sbsathhai

#pwsathhai

# THANK YOU