UDAAN

2025

ACIDS, BASES AND SALTS

Some Important NCERT and NCERT Exemplar Problems

CHEMISTRY | Lecture - 10

BY: SUNIL BHAIYA


SUNIL BHAIYA
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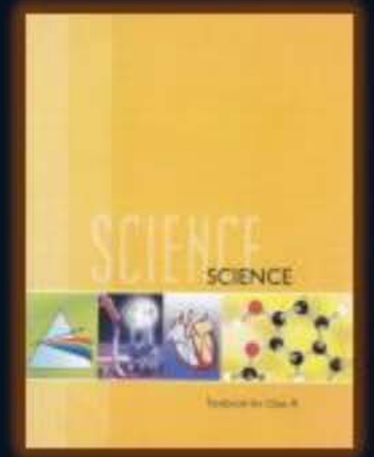
Topics

to be covered

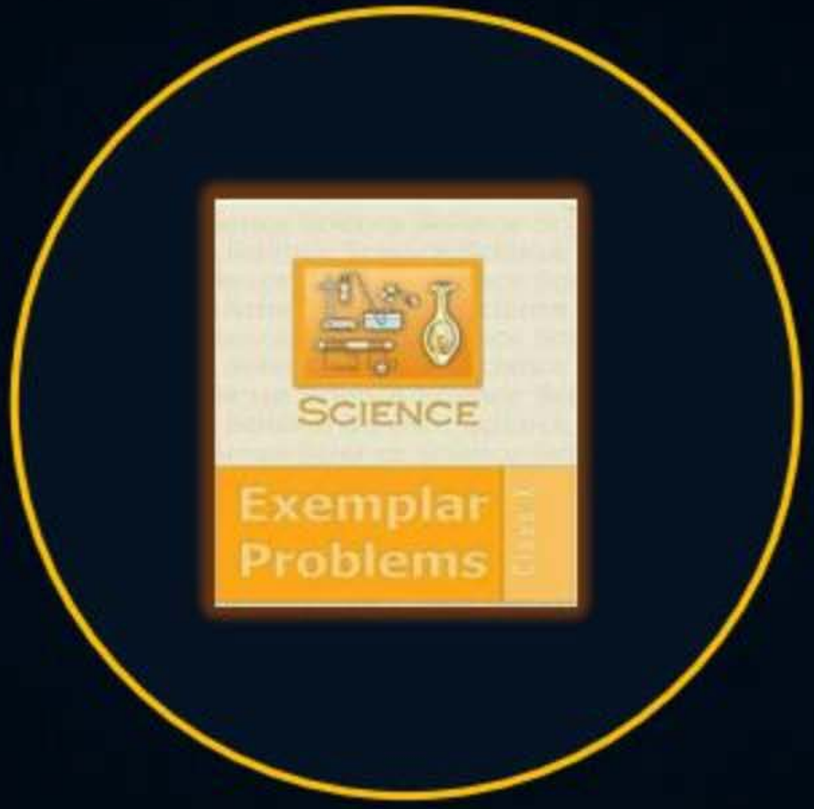
1. Some Important NCERT Questions ✓
2. Some Important NCERT Exemplar Questions ✓

Knowledge Ride On



Some Important NCERT Problems

Knowledge Ride On



Some Important NCERT Exemplar Problems

Knowledge Ride On

Insaniyat Ka Gyaan

Concept Polish (गृहकार्य) – Homework Discussion (Lecture 01) ✓

Group Activity

H_2CO_3 ← (CO_2 is dissolved in H_2O) ← Soda-water

(Citric + Ascorbic acid) ← Lemon Juice

Vinegar (सिरका)

(I) Prepare your own indicator

- Crush beetroot in a mortar.
- Add sufficient water to obtain the extract.
- Filter the extract by the procedure learnt by you in earlier classes.
- Collect the filtrate to test the substances you may have tasted earlier.
- Arrange four test tubes in a test tube stand and label them as A,B,C and D. Pour 2 mL each of lemon juice solution, soda-water, vinegar and baking soda solution in them respectively.
- Put 2-3 drops of the beetroot extract in each test tube and note the colour change if any. Write your observation in a Table.

FINAL: A, B, C: RED & D: Darker RED

Citric Acid	Vinegar	Nothing added	Baking Soda	Drain Cleaner
pH 2	pH 4	pH 7	pH 9	pH 13

NaOH

← ACIDIC → ← Neutral → ← MILD BASE → ← STRONG BASE →

Beetroot Indicator

- ACID → 'Red'
- NEUTRAL → 'Yellow'
- BASIC
  - mild bases (DARKER RED)
  - Strong bases

Some Important NCERT Questions (Intext + Exercise)

All NCERT Questions are important. I am discussing the questions that are a bit different.

All questions and concepts are already covered in classes.

I want to save the most valuable thing of students – TIME.

Question 1., NCERT Intext P.N. 18

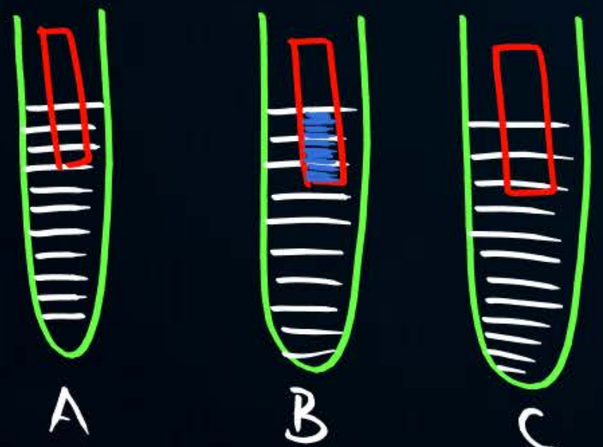
You have been provided with three test tubes. One of them contains distilled water and the other two contain an acidic solution and a basic solution, respectively. If you are given only red litmus paper, how will you identify the contents of each test tube?

'CONCEPT'

Red litmus paper

↓ Neutral & acidic → ↓ 'RED'

↓ Basic → ↓ 'BLUE'



A: Distill water
B: Basic soln
C: Acidic soln

(i) Suppose, it turns blue in solution 'B'.

B: Basic

(ii) Red litmus paper $\xrightarrow[B]{In}$ Blue litmus paper

Blue litmus paper → NEUTRAL & BASIC → BLUE

Blue litmus paper → ACIDIC → RED

(iii) Dip half blue litmus in A & half in C.

A → remains blue

C → turns red

Question 1., NCERT Intext P.N. 18

You have been provided with three test tubes. One of them contains distilled water and the other two contain an acidic solution and a basic solution, respectively. If you are given only red litmus paper, how will you identify the contents of each test tube?

Using red litmus paper, we can determine the contents of each test tube. This can be accomplished by observing the color shift of the red litmus paper:

- **Add red litmus paper in each test tube. The one in which it turns blue is the basic solution.**
- **Now, divide this blue litmus paper in two halves. Now, add a few drops of each of the remaining 2 samples in the test tubes separately on the two blue litmus papers.**
- **Acidic solution turns blue litmus paper to red again while there will be no change in case of distilled water.**

Question 1., NCERT Intext P.N. 22

Why should curd and sour substances not be kept in brass and copper vessels?

(पीतल)

brass → mixture of copper + zinc

(दही) → (Lactic Acid)

(खट्टे पदार्थ) → (contains acid like vinegar in pickle)

CONCEPT

(i) Metal + dil. acid → Salt + Hydrogen gas

Salt → (harmful for body)

Question 1., NCERT Intext P.N. 22

Why should curd and sour substances not be kept in brass and copper vessels?

Brass (mixture of copper and zinc) and copper are metals. Curd and other substances contains acid (lactic acid in case of curd) which reacts with these metals forming salt (harmful compounds) and hydrogen gas.
The curd gets spoiled due to the formation of harmful salts and hence, it should be avoided to keep curd/sour substances in brass and copper vessels.

Question 3., NCERT Intext P.N. 22

Metal compound A reacts with dilute hydrochloric acid to produce effervescence. The gas evolved extinguishes a burning candle. Write a balanced chemical equation for the reaction if one of the compounds formed is calcium chloride.

CO_2 → extinguishes a burning candle by 'SMOTHERING'

CONCEPT:

Metal bicarbonate / carbonate + Acid → Salt + Water + Carbon dioxide

Calcium carbonate → $CaCO_3(s) + 2\,dil.HCl(aq) \longrightarrow CaCl_2(aq) + H_2O(l) + CO_2(\uparrow)$

Calcium bicarbonate → $Ca(HCO_3)_2(s) + 2\,dil.HCl(aq) \longrightarrow CaCl_2(aq) + 2H_2O(l) + 2CO_2(\uparrow)$

Question 3., NCERT Intext P.N. 22

Metal compound A reacts with dilute hydrochloric acid to produce effervescence. The gas evolved extinguishes a burning candle. Write a balanced chemical equation for the reaction if one of the compounds formed is calcium chloride.

- **Carbon dioxide (CO_2): Gas that extinguishes a burning candle by smothering (displacing oxygen)**
- **Now, metal compound A is a metal carbonate or bicarbonate as they produce carbon dioxide gas with effervescence on reacting with acids.**
- **$CaCO_3(s) + 2dil.\ HCl(aq) \rightarrow CaCl_2(aq) + H_2O\ (l) + CO_2(g)$**

Question 1., NCERT Intext P.N. 28

You have two solutions, A and B. The pH of solution A is 6 and pH of solution B is 8. Which solution has more hydrogen ion concentration? Which of this is acidic and which one is basic?

(i) (ii)

At 25°C, pH → (0-14)

$H^+(aq)$ ion concentration (↑) (Neutral) $H^+(aq)$ ion concentration (↓)

$OH^-(aq)$ –11– (↓) $OH^-(aq)$ –11– (↑)

(i) A has more hydrogen ion concentration.

(ii) A → acidic
B → basic

$H^+(aq)$ ion concentration = $OH^-(aq)$ ion concentration

Question 1., NCERT Intext P.N. 28

You have two solutions, A and B. The pH of solution A is 6 and pH of solution B is 8. Which solution has more hydrogen ion concentration? Which of this is acidic and which one is basic?

At 25 °C, the solutions may have pH from 0 to 14. For different solutions the pH values will be:
Neutral solutions: pH = 7
Acidic solutions: pH < 7
Basic solutions: pH > 7

- **Solution A has more hydrogen ion concentration than solution B.**
- **Now, applying the above logic, solution with pH 6 is acidic while solution with pH 8 is basic.**

Question 2., NCERT Intext P.N. 28

What effect does the concentration of H^+ (aq) ions have on the nature of the solution?

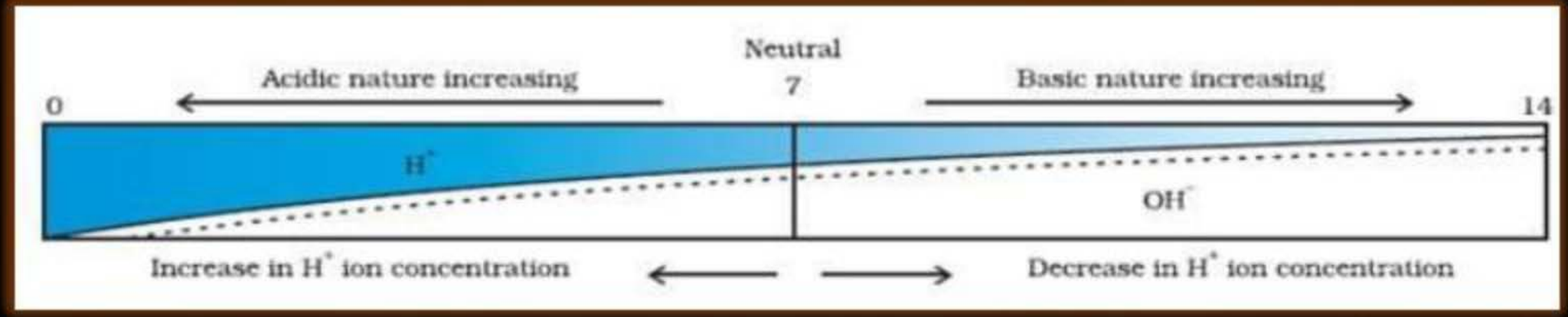
Slide 16th

Question 2., NCERT Intext P.N. 28

What effect does the concentration of H^+ (aq) ions have on the nature of the solution?

If the pH value decreases than 7, the H^+ (aq) ions concentration increases and hence the acidic character increases.

If the pH value increases than 7, the H^+ (aq) ions concentration decreases and hence the basic character increases.

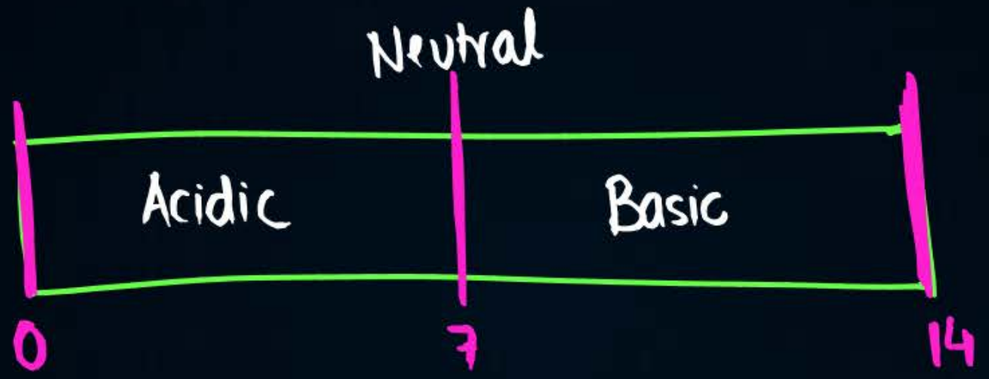


Question 3, NCERT Intext P.N. 28

Yes

Do basic solutions also have H^+ (aq) ions? If yes, then why are these basic?

At 25 °C, pH scale → 0-14



H^+(aq) ion concentration (↓)

OH^-(aq) — " ——— (↑)

↓

Basic character is because of this!

Question 3., NCERT Intext P.N. 28

Do basic solutions also have H^+ (aq) ions? If yes, then why are these basic?

Yes, basic solutions also H^+ (aq) ions concentration. They are considered basic because concentration of OH^- (aq) ions is more than H^+ (aq) ions.

Question 4., NCERT Intext P.N. 28

Under what soil condition do you think a farmer would treat the soil of his fields with quick lime (calcium oxide) or slaked lime (calcium hydroxide) or chalk (calcium carbonate)?

Quicklime (CaO) → Base

Slaked lime $Ca(OH)_2$ → Base

Chalk $CaCO_3$ → Basic salt

→ added to soil to neutralise acidic content of soil.

↓

Neutral pH of soil

↓

Getting ready for cultivation of crops like sugarcane.

Question 4., NCERT Intext P.N. 28

Under what soil condition do you think a farmer would treat the soil of his fields with quick lime (calcium oxide) or slaked lime (calcium hydroxide) or chalk (calcium carbonate)?

Quicklime (CaO) or slaked lime [$Ca(OH)_2$] or calcium carbonate ($CaCO_3$) are basic in nature which neutralizes the excess acid in the soil and can be made proper for cultivation.

Question 7, NCERT Exercise

Why does distilled water not conduct electricity, whereas rain water does?

distilled water → don't contain any dissolved solids or salt → No carrier of electricity

rain water → dissolved salts like H_2CO_3, HNO_3, H_2SO_4 etc. → dissociate into ions & conducts electricity

Ion → Cation → moves to cathode & gain e^-

↳ anion → moves to anode & lose e^-

Question 7., NCERT Exercise

Why does distilled water not conduct electricity, whereas rain water does?

Distilled water does not contains any dissolved salts or compounds in it while rainwater contains dissolved acids (H_2CO_3, H_2SO_4 and HNO_3). They dissociate into ions which makes rainwater a conductor of electricity.

Question 9., NCERT Exercise

Five solutions A, B, C, D and E when tested with universal indicator showed pH as 4, 1, 11, 7 and 9, respectively. Which solution is

(a) neutral?

(b) strongly alkaline?

(c) strongly acidic?

(d) weakly acidic?

(e) weakly alkaline? Arrange the pH in increasing order of hydrogen-ion concentration.

(a) D (pH = 7)

(b) C (pH = 11)

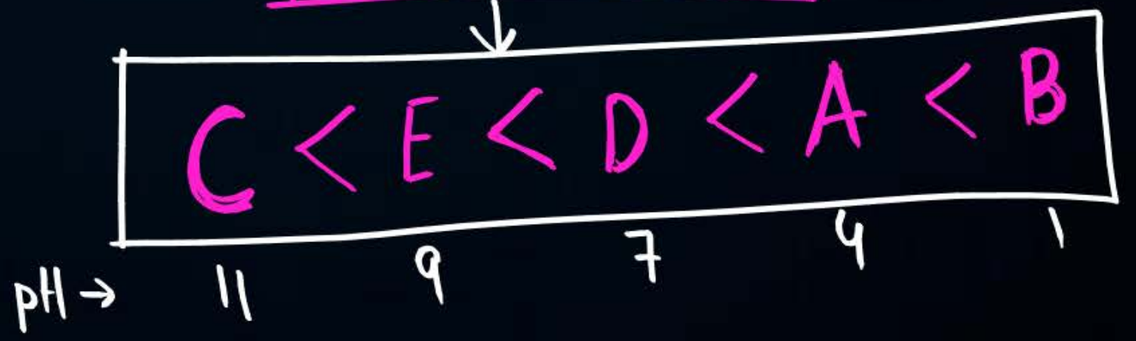
(c) B (pH = 1)

(d) A (pH = 4)

(e) E (pH = 9)

(कम से ज्यादा)

alkaline to acidic



Question 9., NCERT Exercise

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(a) neutral?

(b) strongly alkaline?

(c) strongly acidic?

(d) weakly acidic?

(e) weakly alkaline? Arrange the pH in increasing order of hydrogen-ion concentration.

C: Strongly alkaline

E: Weakly alkaline

D: Neutral

A: Weakly acidic

B: Acidic

Question 10., NCERT Exercise

Equal lengths of magnesium ribbons are taken in test tubes A and B. Hydrochloric acid (HCl) is added to test tube A, while acetic acid (CH_3COOH) is added to test tube B. Amount and concentration taken for both the acids are same. In which test tube will the fizzing occur more vigorously and why?

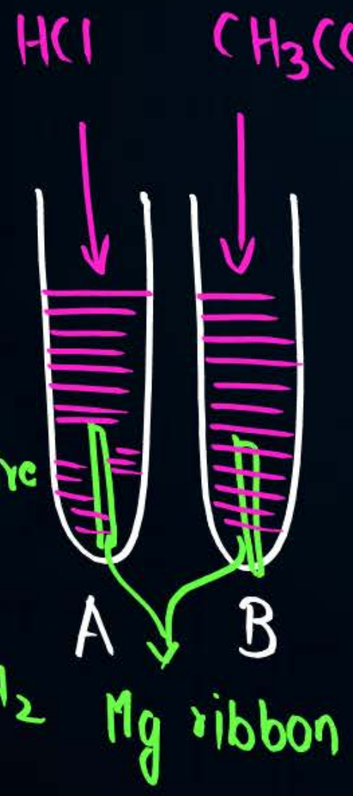
CONCEPT-II

HCl → Strong acid

CH_3COOH → Weak acid

→ more $H^+(aq)$ ions will be produced in HCl as compare to CH_3COOH

→ Speed of formation of H_2 in A > B.



CONCEPT-I

Metal + dil. acid → Salt + Hydrogen gas

Same in A & B

HCl

CH_3COOH

Speed of production of H_2 will be faster.

Question 10., NCERT Exercise

Equal lengths of magnesium ribbons are taken in test tubes A and B. Hydrochloric acid (HCl) is added to test tube A, while acetic acid (CH_3COOH) is added to test tube B. Amount and concentration taken for both the acids are same. In which test tube will the fizzing occur more vigorously and why?

In test tube A fizzing occurs more vigorously because HCl is stronger acid than acetic acid (CH_3COOH). Hence, HCl liberates hydrogen gas more vigorously, which causes fizzing more vigorously.

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Some Important NCERT Exemplar Questions

(i) Solve all NCERT Exemplar MCQs' / Solve all DHAs'

(ii) Try to solve as many questions possible from Exemplar

Question 37., NCERT Exemplar

How would you distinguish between baking powder (white) and washing soda (white) by heating?

On heating

(I) Baking powder contains baking soda + cream of tartar/dry citric acid (dry tartaric acid) + Cornstarch

Thermal decomposition

$$2NaHCO_3(s) \xrightarrow{\Delta} Na_2CO_3(s) + H_2O(g) + CO_2(g)$$

(i) extinguishes a burning candle

(ii) limewater turns milky/turbid

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

(II) On heating washing soda

$$\underset{\text{Washing soda}}{Na_2CO_3.10H_2O(s)} \xrightarrow{\Delta} \underset{\text{Soda ash}}{Na_2CO_3(s)} + 10H_2O(g)$$

$10H_2O(g)$ → blue cobalt chloride paper turns pink.

Question 38., NCERT Exemplar

Salt A commonly used in bakery products on heating gets converted into another salt B which itself is used for removal of hardness of water and a gas C is evolved. The gas C when passed through lime water, turns it milky. Identify A, B and C.

(i) Bakery products → Salt used is : $NaHCO_3$ (A)

(used to remove permanent hardness of water)

(ii) $2\,NaHCO_3(s) \xrightarrow{\Delta} \underset{(B)}{Na_2CO_3(s)} + H_2O(g) + \underset{(C)}{CO_2(g)}$

form of $Na_2CO_3 \rightarrow Na_2CO_3.10H_2O$ (washing soda)

(iii) $Ca(OH)_2(aq) + CO_2(g) \longrightarrow CaCO_3(s) + H_2O(\ell)$

(colourless Soln)

(Soln turns turbid / milky because of this)

Question 39, NCERT Exemplar

In one of the industrial processes used for manufacture of sodium hydroxide, a gas X is formed as by product. The gas X reacts with lime water to give a compound Y which is used as a bleaching agent in chemical industry. Identify X and Y giving the chemical equation of the reactions involved.

(*) NaOH → Industrial Process → Chlor-alkali process → Cl_2 (X), H_2 — by-products

(†) $Ca(OH)_2(s)$ (dry slaked lime) + $Cl_2(g)$ (X) ⟶ $CaOCl_2(s)$ (Y) + $H_2O(g)$

↳ Bleaching powder

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

Question 44., NCERT Exemplar

For making cake, baking powder is taken. If at home your mother uses baking soda instead of baking powder in cake,

(a) how will it affect the taste of the cake and why?

(b) how can baking soda be converted into baking powder?

(c) what is the role of tartaric acid added to baking soda?

(i) If mother uses acid like citric acid(lemon juice)/vinegar then:

$$\text{Baking soda} + \text{Lemon juice/ Vinegar} \longrightarrow \text{Salt} + \text{water} + \text{Carbon dioxide}$$

(no change in taste if reactants are properly consumed)

(makes the cake fluffier)

(ii) If amount of acid is not enough to neutralise baking soda then:

$$2NaHCO_3(s) \xrightarrow{\Delta} \boxed{Na_2CO_3(s)} + H_2O(g) + CO_2(g)$$

(Na_2CO_3 → metallic / bitter taste)

Question 44., NCERT Exemplar

For making cake, baking powder is taken. If at home your mother uses baking soda instead of baking powder in cake,

(a) how will it affect the taste of the cake and why?

(b) how can baking soda be converted into baking powder?

(c) what is the role of tartaric acid added to baking soda?

(b) Baking soda can be converted to baking powder by adding cream of tartar/tartaric acid. or dry citric acid.

Cornstarch is also added by the companies to prevent unintentional reaction between baking soda and dry acid.

Question 44., NCERT Exemplar

For making cake, baking powder is taken. If at home your mother uses baking soda instead of baking powder in cake,

(a) how will it affect the taste of the cake and why?

(b) how can baking soda be converted into baking powder?

(c) what is the role of tartaric acid added to baking soda?

(c) Role of tartaric acid is:

(i) Production of CO_2 gas → (makes the cake fluffier)

(ii) It make sure to neutralise baking soda else it shows thermal decomposition; Na_2CO_3 is formed & makes the taste of cake bitter/ metallic.

Question 45, NCERT Exemplar

A metal carbonate X on reacting with an acid gives a gas which when passed through a solution Y gives the carbonate back. On the other hand, a gas G that is obtained at anode during electrolysis of brine is passed on dry Y, it gives a compound Z used for disinfecting drinking water. Identity X, Y, G and Z.

(i) Metal carbonate (X) + Acid ⟶ Salt + Water + Carbon dioxide (Gas)

$Y + CO_2 \longrightarrow X$

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

(Y) (X)

(ii) Electrolysis of brine / aq. NaCl → chlor-alkali process → Gas G

Cl_2 is obtained at anode

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

(Y) (G) (Z)

(Z) → used for disinfecting drinking water (because of Cl_2 gas)

Question 46, NCERT Exemplar

A dry pellet of a common base B, when kept in open absorbs moisture and turns sticky. The compound is also a ~~by-product~~ main product of chlor-alkali process. Identify B. What type of reaction occurs when B is treated with an acidic oxide? Write a balanced chemical equation for one such solution.

Chlor-alkali process → Main product → NaOH → (deliquescent material) → (absorbs moisture from air & dissolves into it)

Chlor-alkali process → By-products ⇒ Cl_2 & H_2

B: NaOH

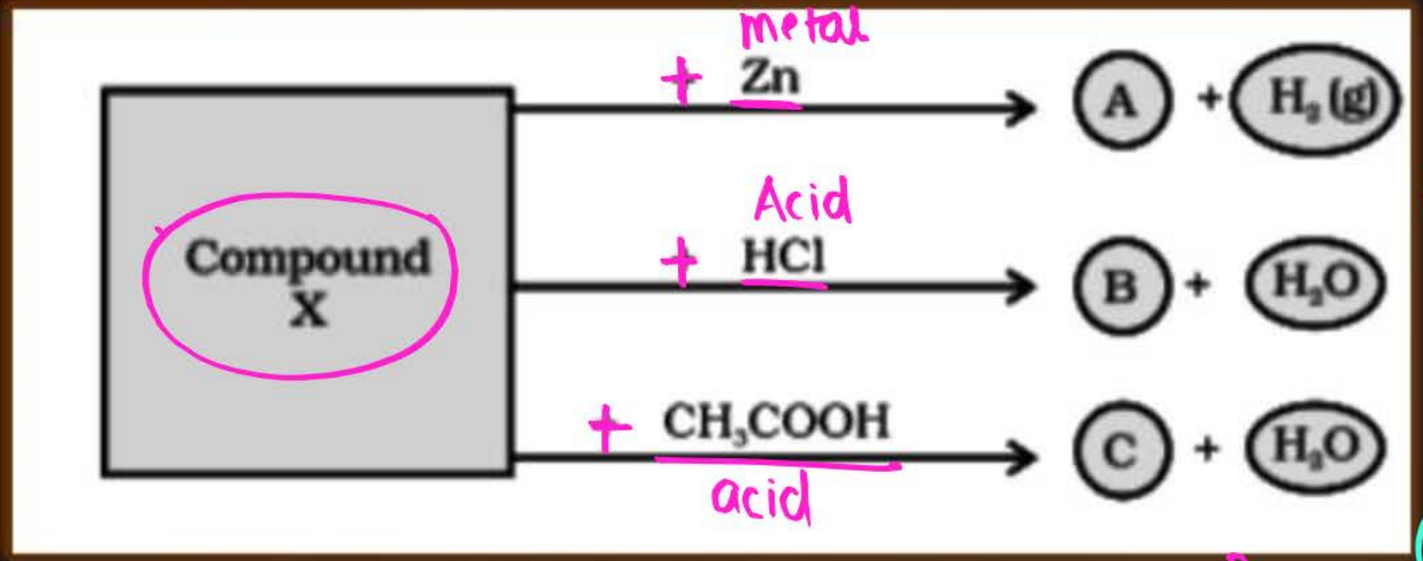
$$2NaOH + CO_2 \longrightarrow Na_2CO_3 + H_2O$$

NaOH: Base; CO_2: Acidic oxide; Na_2CO_3: Salt; H_2O: Water

→ (Neutralisation Rxn)

Question 48, NCERT Exemplar

Identify the compound X on the basis of the reactions given below. Also, write the name and chemical formulae of A, B and C.



Compound 'X' can be any alkali

(I) Alkali + Amphoteric metal → Salt + Hydrogen gas

$2NaOH(aq) + Zn(s) \rightarrow \underset{A}{Na_2ZnO_2(aq)} + H_2(\uparrow)$

(II) Alkali (Base) + Acid → Salt + Water

$\underset{C}{NaOH(aq)} + \underset{A}{HCl(aq)} \rightarrow \underset{B}{NaCl(aq)} + H_2O(l)$

$\underset{C}{NaOH(aq)} + \underset{A}{CH_3COOH(aq)} \rightarrow \underset{C}{CH_3COONa(aq)} + H_2O(l)$

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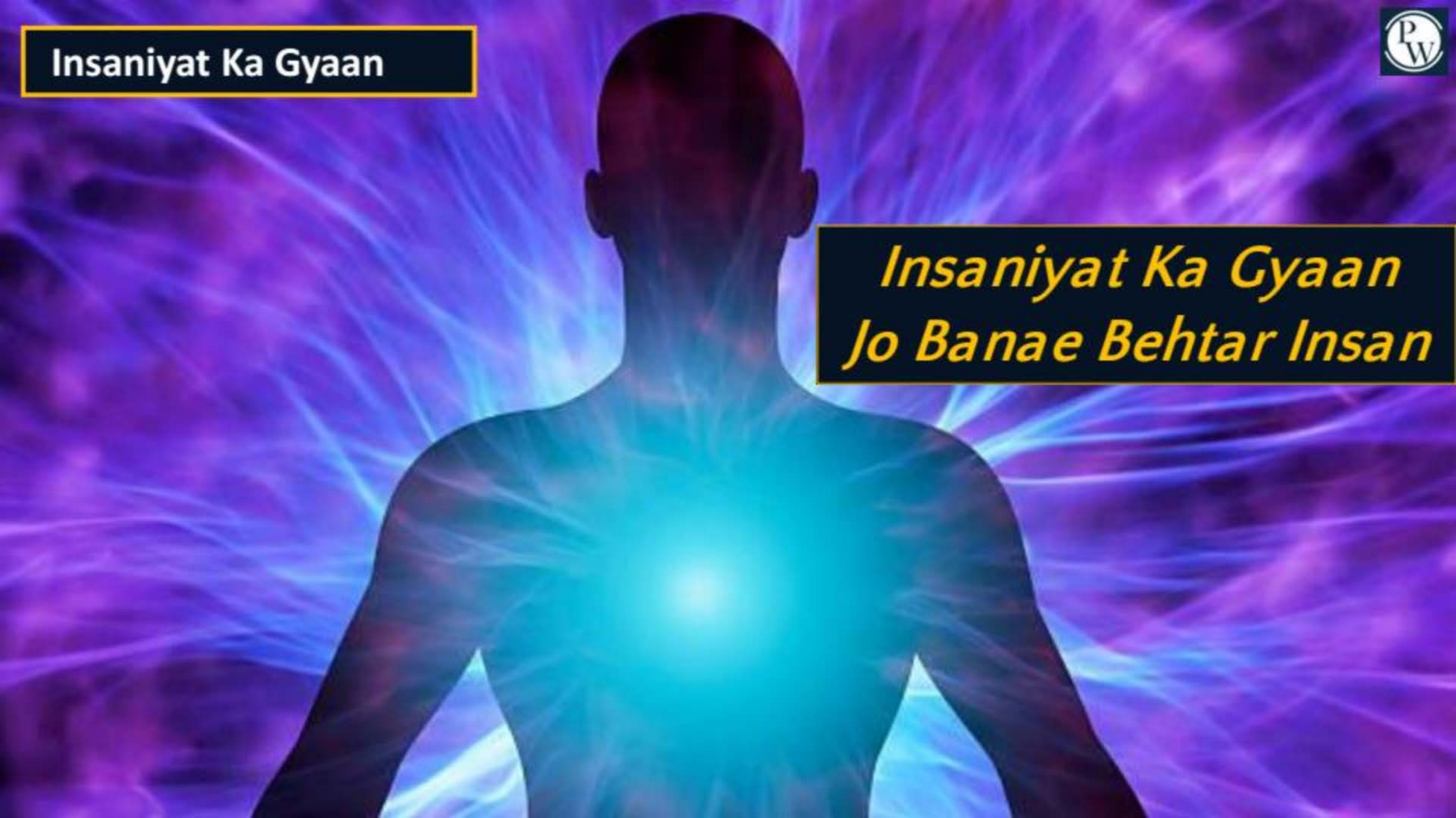
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THANK YOU