Next Toppers

आरंभ BATCH

ACP

AARAMBH CHAPTERWISE PROBLEMS

Class-10th



ACID BASES AND SALT

PRASHANT KIRAD



(Options acche se padhna)

VERY SHORT QUESTIONS (1 Mark)



(A) Multiple Choice Questions (MCQ's)

1. Mild non-corrosive basic salt is: [CBSE SQP 2023]

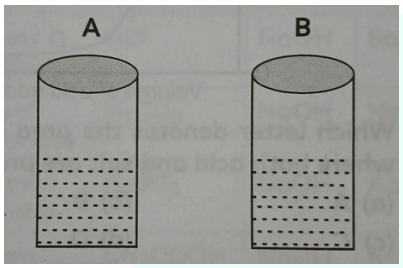
(a) $Ca(OH)_2$

(b) NaCl

(c) NaOH

(d) $NaHCO_3$

2. Rama gives test-tube A and test-tube B to Seeta. One contains water and the other contains a dilute solution of sodium hydroxide. [British Council 2022]



Which test should Seeta use to identify the sodium hydroxide solution?

(a) Blue litmus solution

(b) Baking soda solution

(c) Dilute soap solution

(d) Red litmus solution

3. Identify the product 'X' obtained in the following chemical reaction:

$CaCO_3 \rightarrow \Delta \rightarrow X + CO_2$ [CBSE 2024]

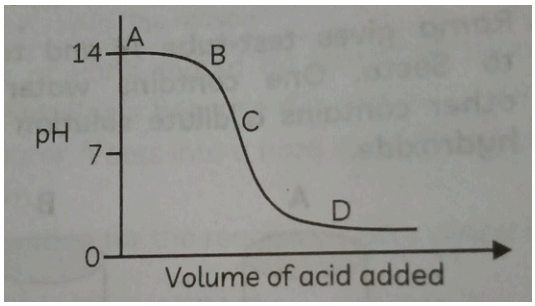
(a) Quick lime

(b) Gypsum

(c) Lime stone

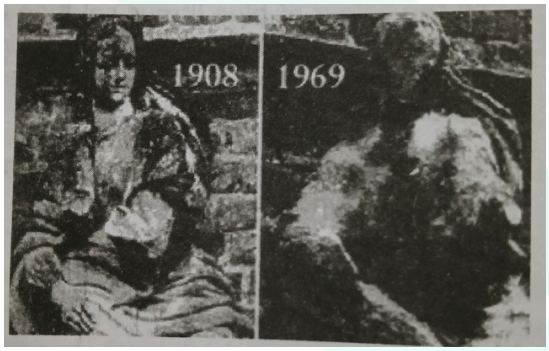
(d) Plaster of Paris

4. The graph given below depicts a neutralisation reaction (acid + alkali → salt + water). The pH of a solution changes as we add excess of acid to an alkali. [CBSE Term-1 SQP 2021]



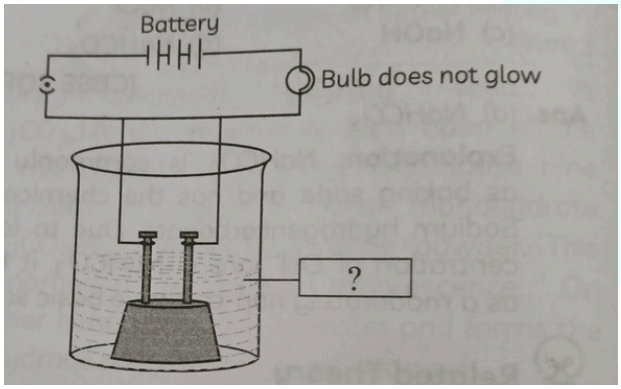
Which letter denotes the area of the graph where both acid and salt are present?
(a) A
(b) B
(c) C
(d) D

5. Marble statues are corroded or stained when they repeatedly come into contact with polluted rain water. Identify the main reason. [CBSE 2022]



(a) Decomposition of calcium carbonate to calcium oxide.
(b) Polluted water is basic in nature hence, it reacts with calcium carbonate.
(c) Polluted water is acidic in nature hence, it reacts with calcium carbonate.
(d) Calcium carbonate dissolves in water to give calcium hydroxide.

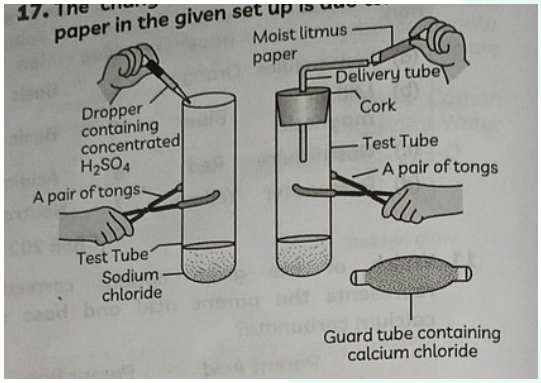
6. The solution in the given figure is likely to be: [CBSE SQP 2024]



(a) HNO_3
(b) C_2H_5OH
(c) H_2SO_4
(d) CO_2 in water

7. A few students added phenolphthalein solution to solution 'A'. The phenolphthalein solution turned pink. On addition of an aqueous solution 'B' to 'A', the pink colour disappears. Which of the following statements is true for the solutions 'A' and 'B'? [CBSE SQP 2024]
(a) A is strongly basic and B is a weak acid.
(b) A is strongly acidic and B is a weak base.
(c) A has a pH greater than 7 and B has a pH less than 7.
(d) A has a pH less than 7 and B has a pH greater than 7.

8. The change in the colour of the moist litmus paper in the given set up is due to: [CBSE SQP 2024]

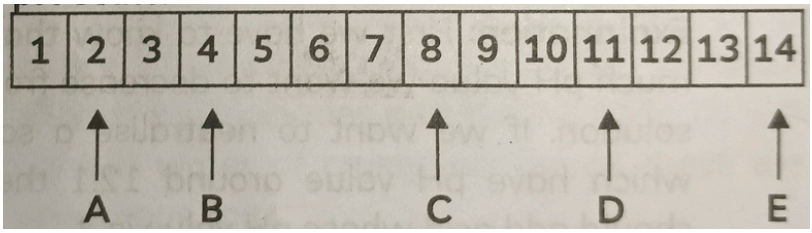


(i) presence of acid
(ii) presence of base
(iii) presence of $H^+(aq)$ in the solution
(iv) presence of litmus which acts as an indicator
(a) (i) and (ii)
(b) Only (ii)
(c) Only (iii)
(d) Only (iv)

9. Select a pair of natural indicator from the following: [CBSE 2024]
(a) Litmus and Methyl orange
(b) Turmeric and Litmus
(c) Phenolphthalein and Methyl orange
(d) Methyl orange and Turmeric

10. The name of the compound 'A' formed in the following reaction is:
$NaCl + NH_3 + H_2O + CO_2 \rightarrow$ 'A' + NH_4Cl [CBSE Compartment 2024]
(a) Sodium carbonate
(b) Ammonium carbonate
(c) Sodium hydrogencarbonate
(d) Ammonium hydrogencarbonate

11. The image shows five solutions labelled on a pH scale. [2022]



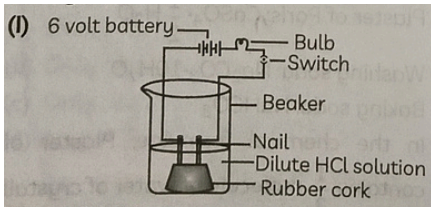
Options	Strongest Acid	Strongest Base
(a)	B	E
(b)	A	C
(c)	A	E
(d)	B	C

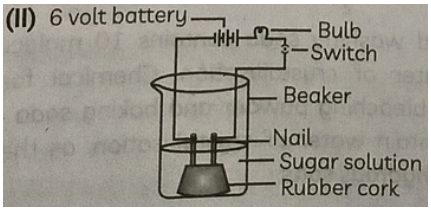
12. The equation shows the reaction of hydrochloric acid with sodium hydroxide: $HCl + NaOH \rightarrow NaCl + H_2O$
If the pH of the salt is 7, what are the positive and negative radicals in the salt? [CBSE Question Bank 2022]
(a) Na – positive radical; Cl – positive radical
(b) Na – positive radical; Cl – negative radical
(c) Na – negative radical; Cl – positive radical
(d) Na – negative radical; Cl – negative radical

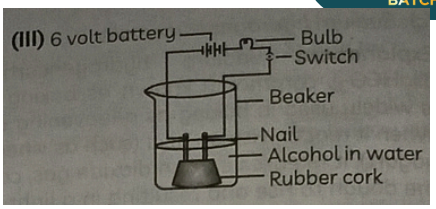
13 .Which of the following salts do not have the water of crystallisation? [CBSE Term-1 2021]
(I) Bleaching powder
(II) Plaster of Paris
(III) Baking soda
(IV) Washing soda
(a) (I) and (IV)
(b) (II) and (III)
(c) (I) and (III)
(d) (II) and (IV)

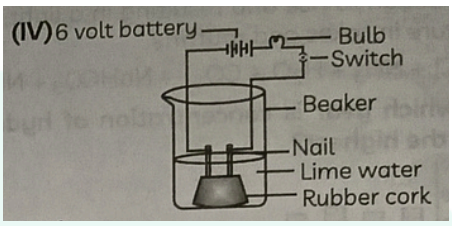
14. Consider the pH value of the following acidic samples: [CBSE Term-1 2021]
Sample (I): Lemon juice – pH 2.2
Sample (II): Gastric juice – pH 1.2
Sample (III): Vinegar – pH 3.76
Sample (IV): Dil. acetic acid – pH 3.0
The decreasing order of their H^+ ion concentration is:
(a) (III) > (IV) > (I) > (II)
(b) (II) > (I) > (IV) > (III)
(c) (II) > (I) > (III) > (IV)
(d) (I) > (II) > (IV) > (III)

15.In which of the following setups would the bulb glow?



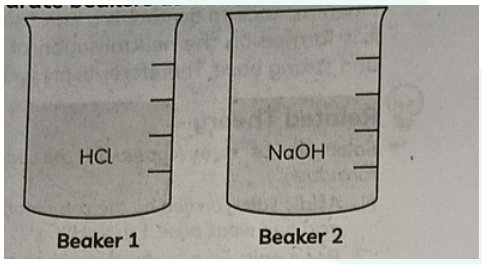






(a) (I) and (IV)
(b) (I) and (III)
(c) (II), (III), and (IV)
(d) (I), (II), and (IV)

16.Rashmi placed 10 mL HCl and NaOH in two separate beakers as shown. [CBSE Question Bank 2022]



In beaker 1, 4 mL of NaOH is added whereas in beaker 2, 4 mL of HCl is added. She noted the possible change in pH in both solutions.

	Change in pH (Beaker 1)	Change in pH (Beaker 2)
A	Increase	Increase
B	Reduce	Increase
C	Increase	Reduce
D	Reduce	Reduce

Which change in pH is correct?
(a) A
(b) B
(c) C
(d) D

17. Neetu suffered a fracture in her foot while riding the bicycle. She had to be admitted to the nursing home where the doctor plastered her foot. She suddenly recalled that her teacher had once taught her about plaster of paris.

(a) $CaSO_4.2H_2O$
(b) $CaSO_4.H_2O$
(c) $CaSO_4.1/2\ H_2O$
(d) $2CaSO_4.\ H_2O$



(yaha Marks katate h)

Assertion and Reason type of Questions

In the following questions a statement of Assertion is followed by a statement of Reason.
Mark the correct choice as two statements are given one labeled Assertion (A) and the other labeled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:
(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

18. Assertion (A): Sodium hydrogen carbonate is used as an ingredient in antacids.

Reason (R): $NaHCO_3$ is a mild non-corrosive basic salt. [Term 1, 2021–22]

19. Assertion (A): It is advised that while diluting an acid one should add water to acid and not acid to water keeping the solution continuously stirred.

Reason (R): The process of dissolving an acid into water is highly exothermic. [CBSE 2023]

20. Assertion (A): Fresh milk in which baking soda is added, takes a longer time to set as curd.

Reason (R): Baking soda decreases the pH value of fresh milk to below 6. [CBSE SQP Term-I]

21. Assertion (A): HCl gas does not change the colour of dry blue litmus paper.

Reason (R): Acids always produce hydrogen ions.

22. Assertion (A): Sodium hydrogencarbonate is used in fire extinguishers.

Reason (R): Sodium hydrogencarbonate is a weak base. [Delhi Gov. 2022]

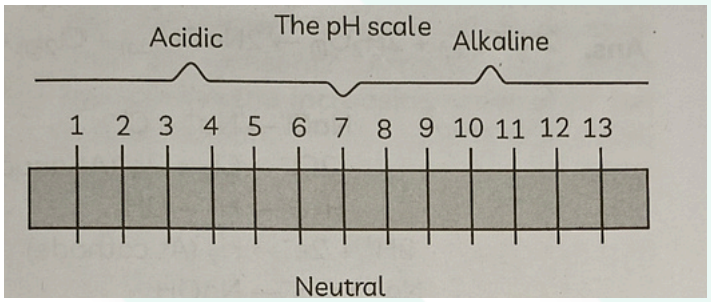
23. Assertion (A): Dry hydrogen chloride gas does not change the color of dry litmus paper.

Reason (R): Ionization of HCl occurs only in the presence of water.

(ho jaayenge aaram se)

SHORT ANSWER TYPE QUESTIONS (2 and 3 Marks)

24. Name an indicator solution which shows different colours at different concentration of ions in the solution.



25. Sumit along with his friend went to a nearby shopping mall. They were standing under a tree when an ant stung his friend on his hands due to which his friend's hand was paining a lot.
Name the chemical that is responsible for causing such pain in the hand of Sumit's friend. Also, write its chemical formula.



26. Find out whether the weak acid is the same as dilute acid.

27. Give reasons for the following:
(A) Sodium hydrogencarbonate is used as an antacid.
(B) On strong heating, blue coloured copper sulphate crystals turn white. [CBSE 2020]

28. If you think it is unsafe to use water to put off a fire involving an electrical appliance, explain the reason. Also name the substance which can be used to put off such fire safely. There are situations when you should not use water to deal with a fire at all. For example, an electrical fire.
Name the chemicals used in acid fire extinguisher and the gas evolved from it when it is used.



29. . How is washing soda prepared from sodium carbonate? Give its chemical equation. State the type of hardness of water which can be removed by it? [CBSE 2020]

30. What is meant by the term pH of a solution? The pH values of rain water collected from two cities 'A' and 'B' was found to be 6.1 and 5.3 respectively. The water of which city is more acidic? Justify your answer. State with reason what would happen to the aquatic life of a pond in which the rain water of city 'B' flows. [CBSE 2024]

31. Five solutions A, B, C, D and E when tested with pH paper showed pH as 4.1, 13, 7, 10 and 10 respectively. Which solution is:
(1) Strongly acidic
(2) Strongly alkaline
(3) Weakly acidic
(4) Neutral and
(5) Weakly alkaline?
Arrange the solutions in increasing order of H^+ ion concentration.

(B) Write the name and formula of:
(1) an acidic salt and
(2) a basic salt giving the name of the parent acid and parent base used to form the salt in each case. [CBSE 2024]

32. Name and state in brief the process which is used to prepare sodium hydroxide from sodium chloride. In this process along with the main product two gases 'X' and 'Y' are also given off at the two electrodes. Name 'X' and 'Y' specifying the name of their respective electrode at which each gas is obtained. One of these gases when reacts with dry calcium hydroxide produces a compound 'Z' which is widely used in water treatment plants and textile industries. Name 'Z' and write chemical equation for the reaction involved in its formation. [CBSE 2024]

(pahle points socho firr likho)

LONG ANSWER TYPE QUESTIONS (5 Marks)

33.(i) Identify the acid and the base from which NaCl is obtained. Which type of salt is it? When is it called rock salt? How is rock salt formed?
(ii) Blue litmus solution is added to two test tubes A and B containing dilute HCl and NaOH solution respectively. In which test tube, a colour change will be observed? State the colour change and give its reason. [CBSE 2019]

34. (i) Write the main difference between an acid and a base. With the help of suitable examples, explain the term neutralisation.
(ii) What is observed when 2 mL of dilute hydrochloric acid is added to 1 g of sodium carbonate taken in a clean and dry test tube? Write chemical equation of the reaction involved. [CBSE 2019]

35. (i) Salt 'P', commonly used in bakery products, on heating gets converted into another salt 'Q' which itself is used for the removal of hardness of water and a gas 'R' is evolved. The gas 'R' when passed through freshly prepared lime water turns milky. Identify 'P', 'Q' and 'R', giving chemical equation for the justification of your answer.
(ii) A solution 'X' gives orange colour when a drop of it falls on pH paper, while another solution 'Y' gives blue colour when a drop of it falls on pH paper. What is the nature of both the solutions? Determine the pH range of solutions 'X' and 'Y'. [CBSE 2019]

36. (i) Sometimes the pH of our mouth gets lower than 5.5. Why?
(ii) A basic salt X is obtained by heating baking soda followed by crystallisation. Identify X and state its two industrial uses.
(iii) Why do copper sulphate crystals turn white on heating? [CBSE 2023]

37. (A) Why does acidic solution conduct electricity?
(B) Can basic solution conduct electricity?
(C) Can separation of H^+ ions in acids take place when HCl is added to a non-aqueous solution?
(D) While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid? [DIKSHA]

38. For making cake, baking powder is used. 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?

39. Aditi adds 1 mole of dilute hydrochloric acid to an aqueous solution of 1 mole of sodium carbonate.
(A) Write the balanced equation for the reaction that takes place.
(B) How will the colour of a red litmus and a blue litmus paper change when dipped in this mixture? Explain why.

(pahle points socho firr likho)

Case Study/Source Based Question

40. Read the following passage and answer the questions that follow:

Baking powder is used in making cakes, bread and pastries to make them soft and spongy. It is used in pakoda, but is not directly used; instead, baking soda is used. Baking powder contains sodium hydrogencarbonate and a mild edible acid. When baking powder mixes with water, the sodium hydrogencarbonate reacts with the acid to evolve carbon dioxide gas which gets trapped in the wet dough and bubbles out slowly making the cake rise and become 'soft and spongy' thus imparting the mixture with a light, fluffy texture. The chemical reaction which takes place can be shown as: $NaHCO_3 + H^+ \rightarrow Na^+ + CO_2 + H_2O$ [Mod. Delhi Gov. SQP 2022]

Questions:
(A) Sodium hydrogencarbonate is prepared by heating:
(a) Sodium chloride + ammonia + water + carbon dioxide
(b) Sodium chloride + ammonia
(c) Ammonia + carbon dioxide
(d) All of these

(B) The gas released during heating of sodium hydrogencarbonate is:
(a) Sulphur dioxide
(b) Hydrogen
(c) Carbon dioxide
(d) Carbon monoxide

(C) The edible acid added to the sodium hydrogencarbonate to make baking powder is:
(a) Tartaric acid
(b) Tartaric acid + hydrochloric acid
(c) Formic acid
(d) Nitric acid

(D) Sodium hydrogencarbonate is used to prepare cakes because:
(a) It makes the cake tasty
(b) It makes the cake sweet
(c) It makes the cake soft and spongy
(d) All of these

41. The strength of an acid or an alkali can be tested by using a scale called the pH scale (0–14) which gives the measure of hydrogen ion concentration in a solution. A neutral solution has a pH of exactly 7, while an acidic solution has a pH less than 7 and a basic solution a pH more than 7. Living beings carry out their metabolic activities within an optimal pH range. [Delhi Gov. SQP 2024]
(A) You have three solutions – A, B and C having a pH of 6, 2 and 9 respectively. Arrange these solutions in increasing order of hydrogen ion concentration.

(B) Which of the three is most acidic?
(C)(i) What happens to the hydrogen ion concentration in A as it is diluted?
(ii) Write the pH range in which human body works?



PK Special [KBC]

42. A solution turns methyl orange red, shows no change with phenolphthalein, and fails to liberate hydrogen gas when zinc is added. Explain the precise nature of this solution and the chemical basis for each of these observations.

43. A student reacts acetic acid with sodium carbonate and captures the evolved gas in lime water, observing initial turbidity followed by clearing on further gas passage. Write all balanced reactions and discuss the step-by-step chemical logic.

44. When a dry mixture of ammonium chloride and sodium hydroxide is gently heated, multiple products form. Identify each product, write the ionic equations, and explain how this experiment serves as a confirmatory test for ammonium salts.

45. Aluminium metal reacts with both hydrochloric acid and sodium hydroxide. Write and balance both reactions, then discuss why this dual behavior classifies aluminium oxide as amphoteric.

46. A strong acid (HCl) is neutralized by a weak base (NH_4OH) to give an acidic salt solution. Using ionic equations and pH reasoning, explain why the final solution remains acidic.

47. Compare the pH and equilibria of solutions of sodium carbonate (Na_2CO_3) versus sodium hydrogen carbonate ($NaHCO_3$). Despite both deriving from carbonic acid, why do their pH values differ so markedly?

48. Design a laboratory procedure (without using liquid water) to demonstrate acid-base reactions and confirm the necessity of water for ionic behavior. Describe the setup, reagents, and expected observations.

49. Explain, in terms of hydrolysis and ion interactions, why aqueous solutions of ammonium chloride (NH_4Cl) or sodium acetate (CH_3COONa) are distinctly acidic or basic even though they are "just salts."

50. You are handed three colorless, odorless solutions labeled A, B, and C, known only to be one each of HCl, CH_3COOH, and NaCl. Devise a foolproof identification scheme that uses no pH indicators.

Kitne Questions kar paaye?

SOLUTIONS



SOLUTIONS

VERY SHORT ANSWER TYPE QUESTIONS:

1. (d)

2. (d)

3. (a)

4. (d)

5. (c)

6. (b)

7. (c)

8. (c)

9. (b)

10. (c)

11. (c)

12. (b)

13. (d)

14. (c)

15. (b)

16. (c)

17. (c)

18. (a)

19. (a)

SOLUTIONS

20. (c)

21. (c)

22. (b)

23. (a)

24. The indicator solution which shows different colours at different concentration of ions in the solution is called universal indicator. Universal indicator is a mixture of many different indicators which gives different colours at different pH values of entire pH scale.

25. The acid present in ant sting is methanoic acid (formic acid). The chemical formula for a methanoic acid is HCOOH.
When an ant sting, it leaves formic acid (methanoic acid) which causes pain and irritation.

26. No. A weak acid partially ionizes in water, while a dilute acid has low concentration. They are not the same.

27 (A). Sodium hydrogencarbonate neutralizes excess stomach acid as it is a mild base.
(B). On heating, copper sulphate loses water of crystallization and turns white.

28. Water conducts electricity and can cause electric shock. Dry chemical powder like sodium bicarbonate is used instead.
Acid fire extinguisher chemicals and gas evolved:
Answer: Chemicals used: Dilute sulphuric acid and sodium bicarbonate. Gas evolved: Carbon dioxide (CO_2).

29. Washing soda is prepared by recrystallization of sodium carbonate.
Equation: $Na_2CO_3 + 10H_2O \rightarrow Na_2CO_3 \cdot 10H_2O$
It removes permanent hardness of water.

30. pH is the measure of hydrogen ion concentration in a solution.
City B (pH 5.3) is more acidic than City A (pH 6.1).
Rainwater of City B can lower pond pH, harming aquatic life by affecting enzyme activity and survival.

SOLUTIONS

31 (A).(1) Strongly acidic – A (pH 4.1)
(2) Strongly alkaline – B (pH 13)
(3) Weakly acidic – A (pH 4.1)
(4) Neutral – C (pH 7)
(5) Weakly alkaline – D & E (pH 10)
Increasing order of H^+ ion concentration: B < D = E < C < A
(B). (1) Acidic salt – Sodium bisulphate ($NaHSO_4$), from H_2SO_4 and NaOH
(2) Basic salt – Magnesium chloride hydroxide ($Mg(OH)Cl$), from HCl and $Mg(OH)_2$

32. Sodium hydroxide is prepared by electrolysis of brine (NaCl solution).
Gas X: Chlorine (Cl_2) – at anode
Gas Y: Hydrogen (H_2) – at cathode
Gas X reacts with dry calcium hydroxide to form compound Z: Bleaching powder ($CaOCl_2$)
Equation: $Cl_2 + Ca(OH)_2 \rightarrow CaOCl_2 + H_2O$

33 (i). Acid – HCl, Base – NaOH.
NaCl is a neutral salt.
It is called rock salt when it is obtained as a natural mineral deposit.
Rock salt forms from evaporation of ancient saltwater lakes.
(ii). In test tube A (HCl), blue litmus turns red (acidic).
In test tube B (NaOH), no change (remains blue, basic).

34 (i). Acids release H^+ ions; bases release OH^- ions in water.
Neutralisation: Reaction of an acid and a base to form salt and water.
Example: $HCl + NaOH \rightarrow NaCl + H_2O$
(ii). Brisk effervescence due to CO_2 gas.
Equation: $Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2\uparrow$

35 (i). P – Baking soda ($NaHCO_3$)
Q – Washing soda (Na_2CO_3)
R – Carbon dioxide (CO_2)
Equation: $2NaHCO_3 \rightarrow Na_2CO_3 + CO_2 + H_2O$
(ii). X – Acidic (orange colour), pH ~ 4–5
Y – Basic (blue colour), pH ~ 8–9

36 (i).Due to bacterial action on food particles, acids form and lower pH below 5.5.
(ii). X – Washing soda ($Na_2CO_3 \cdot 10H_2O$)
Uses – (1) Softening hard water, (2) Manufacture of glass, soap, and paper.

SOLUTIONS

(iii). Copper sulphate loses water of crystallisation and becomes white.

37 (A). Acids release free H^+ ions in solution, which carry current.
(B). Yes, bases release OH^- ions which conduct electricity.
(C). No, H^+ ions form only in aqueous (water-based) solutions.
(D). Acid to water prevents splashing due to exothermic heat release.

38 (A).The cake will taste bitter due to unreacted sodium carbonate.
(B). By adding tartaric acid to baking soda.
(C). Tartaric acid neutralises bitter taste and releases CO_2 for fluffiness.

39 (A). $Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2\uparrow$
(B).Red litmus – No change; Blue litmus – Turns red (acidic medium due to excess HCl).

40 (A). (a)
(B). (c)
(C). (a)
(D). (c)

41 (A). C (pH 9) < A (pH 6) < B (pH 2) (increasing order of H^+ ion concentration)
(B). B is the most acidic
(C)(i). Hydrogen ion concentration decreases on dilution of A
(ii). pH range for human body: 7.35 – 7.45

PK SPECIAL [KBC] :

42. The solution is acidic.

- Turns methyl orange red: Indicates pH < 4.4 (acidic).
- No change with phenolphthalein: Phenolphthalein remains colorless in acidic medium.
- No H_2 gas with zinc: Strong acids release H_2 with Zn, so the absence indicates a weak acid or non-reactive acidic solution (e.g., organic acid with low dissociation).

43. Step 1: Reaction of acetic acid with sodium carbonate
$CH_3COOH + Na_2CO_3 \rightarrow CH_3COONa + H_2O + CO_2\uparrow$
Step 2: CO_2 reacts with lime water ($Ca(OH)_2$)
$Ca(OH)_2 + CO_2 \rightarrow CaCO_3\downarrow + H_2O \rightarrow$ milky solution
Step 3: Excess CO_2
$CaCO_3 + CO_2 + H_2O \rightarrow Ca(HCO_3)_2$ (soluble) → clears turbidity

SOLUTIONS

44. Reaction: $NH_4Cl + NaOH \rightarrow NH_3\uparrow + NaCl + H_2O$
Ionic equation: $NH_4^+ + OH^- \rightarrow NH_3\uparrow + H_2O$
Observation: Pungent ammonia gas confirms presence of ammonium salt.
Confirmatory Test: Gas turns moist red litmus paper blue (basic gas = NH_3).

45. With HCl: $2Al + 6HCl \rightarrow 2AlCl_3 + 3H_2\uparrow$
With NaOH: $2Al + 2NaOH + 6H_2O \rightarrow 2Na[Al(OH)_4] + 3H_2\uparrow$
Explanation: Aluminium reacts with both acids and bases → amphoteric behavior of Al_2O_3.

46. Reaction: $NH_4OH + HCl \rightarrow NH_4Cl + H_2O$
Ionic form: $NH_4^+ + Cl^- + H_2O$
NH_4^+ hydrolyses: $NH_4^+ + H_2O \rightleftharpoons NH_3 + H_3O^+$ → acidic solution
Conclusion: Acidic salt formed → pH < 7

47. Na_2CO_3 → Stronger base (from weak H_2CO_3), undergoes hydrolysis → pH ≈ 11
$NaHCO_3$ → Weaker base, only one H^+ replaced → pH ≈ 8.5
Reason: More carbonate ions in Na_2CO_3 make it more basic; $NaHCO_3$ only partially neutralized.

48. Setup: Dry HCl gas passed over dry litmus → no change
Moisten litmus with water → turns red
Inference: Acidic behavior only in aqueous form
Reagents: Dry HCl gas, litmus paper (dry & moist)
Observation: Water enables ionization of HCl → H^+ shows acidity.

49. NH_4Cl → NH_4^+ undergoes hydrolysis: $NH_4^+ + H_2O \rightleftharpoons NH_3 + H_3O^+$ → acidic
CH_3COONa → CH_3COO^- undergoes hydrolysis: $CH_3COO^- + H_2O \rightleftharpoons CH_3COOH + OH^-$ → basic
Conclusion: Nature depends on hydrolysis of conjugate acid/base of salt ions.

50. Step 1: Add Zn metal
- Effervescence: HCl (liberates H_2)
- No reaction: CH_3COOH and NaCl

Step 2: Add $NaHCO_3$
- Effervescence: CH_3COOH (forms CO_2)
- No reaction: NaCl

Remaining: NaCl – neutral behavior in both tests
Final ID:

SOLUTIONS

- Gas with Zn → HCl
- Gas with $NaHCO_3$ → CH_3COOH
- No reaction → NaCl