

## Chapter 2: Acids, Bases and Salts

# C02

1. If someone in the family is suffering from a problem of acidity after overeating,
  - a) which of the following would you suggest as a remedy– lemon juice, vinegar or baking soda solution?
  - b) Which property did you think of while choosing the remedy?

a) Baking soda. b) Neutralisation reaction.

2. **Mention the properties of acids.**

Acids are sour to taste. They change the colour of blue litmus to red.

3. **Mention the properties of bases.**

Bases are bitter to taste. They change the colour of red litmus to blue.

4. **What are indicators?**

Indicators are chemical substances which give different colours in acidic or basic.

5. **Name some natural indicators.**

Litmus, turmeric, red cabbage leaves, coloured petals of some flowers.

6. **What happens to a stain of curry on a white cloth when soap is scrubbed on it?**

The stain becomes reddish brown because soap is basic in nature.

7. **Name two synthetic indicators.**

Methyl orange and phenolphthalein.

8. **You have been provided with three test tubes A, B and C. 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?**

In each test tube put blue litmus paper. In test tube B it will turn red but no change will occur in test tubes A and C. Put litmus paper in test tubes A and C. It will turn blue in C showing it contains basic solution but no change will occur in A. A contains distilled water.

9. **(Activity 2.1) You are given the following solutions: Hydrochloric acid (HCl), sulphuric acid (H<sub>2</sub>SO<sub>4</sub>), nitric acid (HNO<sub>3</sub>), acetic acid (CH<sub>3</sub>COOH), sodium hydroxide (NaOH), calcium hydroxide [Ca(OH)<sub>2</sub>], potassium hydroxide (KOH), magnesium hydroxide [Mg(OH)<sub>2</sub>] and ammonium hydroxide (NH<sub>4</sub>OH). Give the colour change for each of these solutions with red litmus, blue litmus, phenolphthalein and methyl orange solutions.**

Given solution	Red litmus solution	Blue litmus solution	Phenolphthalein solution	Methyl orange solution
HCl	no change	turns red	colourless	pink
H <sub>2</sub> SO <sub>4</sub>	no change	turns red	colourless	pink
HNO <sub>3</sub>	no change	turns red	colourless	pink
CH <sub>3</sub> COOH	no change	turns red	colourless	pink
NaOH	turns blue	no change	turns pink	yellow
Ca(OH) <sub>2</sub>	turns blue	no change	turns pink	yellow
Mg(OH) <sub>2</sub>	turns blue	no change	turns pink	yellow
KOH	turns blue	no change	turns pink	yellow
NH <sub>4</sub> OH	turns blue	no change	turns pink	yellow

10. A knife which is used to cut a fruit was immediately dipped into water containing drops of blue litmus solution. If the colour of the solution is changed to red, what inference can be drawn about the nature of the fruit and why?

The fruit is acidic because acidic solution changes blue litmus solution red.

11. What are olfactory indicators? Give example.

Substances whose odour changes in acidic or basic media are called olfactory indicators.  
Ex: Onion, vanilla and cloves.

12. Write the principle on which olfactory indicators work.

An olfactory indicator works on the principle that when an acid or base is added, then its characteristic smell can be detected.

13. (Activity 2.2) What observation do you notice when few drops of dilute HCl solution is added a cloth strips with odour of onion and few drops of NaOH solution is added on another cloth strip with odour of onion?

Onion has a characteristic smell. When a base (like NaOH) is added to a cloth strip treated with onion extract-then the smell is destroyed. An acid solution (HCl) does not destroy the smell of onion.

14. (Activity 2.2) What observation do you notice when few drops of dilute HCl solution is added a cloth strips with odour of vanilla and few drops of NaOH solution is added on another cloth strip with odour of vanilla?

Vanilla extract has a characteristic pleasant smell. If a basic solution like NaOH solution is added to vanilla extract, then we cannot detect the pleasant smell of vanilla. An acidic solution does not affect the smell of vanilla.

15. (Activity 2.2) What observation do you notice when few drops of dilute HCl solution is added a cloth strips with odour of cloves and few drops of NaOH solution is added on another cloth strip with odour of cloves?

Odour of clove oil is not affected in acidic solutions.

16. Write the characteristics of the following olfactory indicators. a) Onion b) Vanilla c) cloves

- a) Onion has a characteristic smell. When a base like NaOH is added to it, the smell is destroyed. An acid solution like HCl does not destroy the smell of onion.  
b) Vanilla extract has a characteristic pleasant smell. If base like NaOH is added then we cannot detect the pleasant smell of vanilla. An acidic solution does not affect the smell of vanilla.  
c) Odour of cloves is not affected by acidic solution.

17. (Activity 2.3) Take about 5 ml of dilute sulphuric acid in a test tube and add a few pieces of zinc granules to it.

- a) What do you observe on the surface of zinc granules?

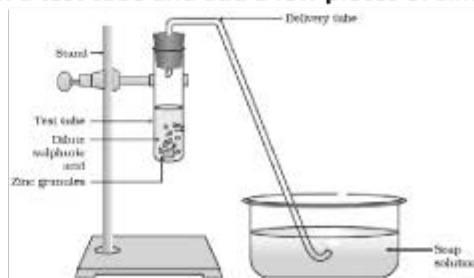
Hydrogen gas bubbles are seen on the surface of zinc granules.

- b) What do you observe when the gas being evolved is passed through the soap solution?

As hydrogen gas pass through soap solution, soap bubbles filled with hydrogen rises up.

- c) Why are bubbles formed in the soap solution?

When hydrogen is passed through the soap solution hydrogen does not get dissolved in it and this gas tries to escape from the solution into the environment when it reaches the



upper surface of soap solution it escapes as bubbles because in soap solution it had less space but as it entered the air it got more space to spread.

**d) What do you observe when a burning candle is taken near a gas filled bubble?**

When the soap bubbles are ignited with a burning candle, the bubble bursts and gas present in it catches fire with a pop sound.

**e) What do you observe when acids like HCl, HNO<sub>3</sub> and CH<sub>3</sub>COOH is taken instead of sulphuric acid?**

The same observation is seen when sulphuric acid is replaced with HCl, HNO<sub>3</sub> or CH<sub>3</sub>COOH.

**18. In the diagram identify the parts labelled A and B.**

Part A is Zinc granules and concentrated hydrochloric acid/sulphuric acid

Part B is Soap bubbles filled with hydrogen.



**19. How do metals react with acid?**

Metals combine with an acid to form salt and hydrogen is displaced from the acid.

Acid + Metal  $\longrightarrow$  Salt + Hydrogen gas.

**20. Illustrate any three chemical properties of acids with examples.**

a) Acids react with metals to produce salt and hydrogen gas.



b) Acids react with metal carbonates and metal hydrogen carbonates to give salt and carbon dioxide.



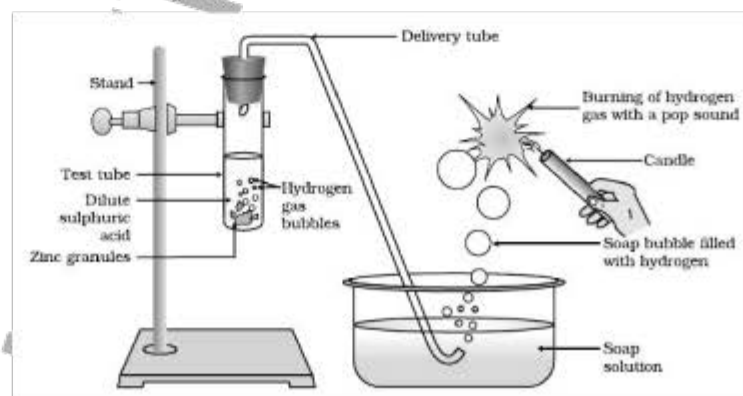
c) Acids react with bases to produce salt and water.



**21. Which gas is usually liberated when an acid reacts with a metal? Illustrate with an example. How will you test for the presence of this gas?**

Hydrogen gas is usually liberated when an acid reacts with a metal.

Take few pieces of zinc granules and add 5 ml of dilute H<sub>2</sub>SO<sub>4</sub>. Shake it and pass the gas produced into a soap solution. The bubbles of the soap solution are formed. These soap bubbles contain hydrogen gas. We can test the evolved hydrogen gas by its burning with a pop sound when a candle is brought near the soap bubbles.



22. **What happens when 2ml of sodium hydroxide solution is added to a test tube containing a few pieces of granulated zinc and warmed?**

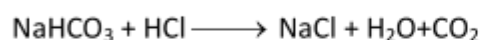
Zinc reacts with sodium hydroxide to form a coordination compound called sodium zincate with evolution of hydrogen gas.



23. **(Activity 2.5) Take two test tubes A and B. Take about 0.5 g of sodium carbonate ( $\text{Na}_2\text{CO}_3$ ) in test tube A and about 0.5 g of sodium hydrogen carbonate ( $\text{NaHCO}_3$ ) in test tube B. Add about 2 ml of dilute HCl to both the test tubes.**

a) **What do you observe?**

Sodium carbonate on reaction with dilute HCl forms sodium chloride, water and carbon dioxide. As sodium carbonate is a basic salt, while hydrochloric acid is an acid neutralization takes place

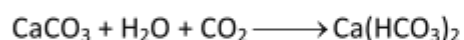


b) **What happens when the gas produced in each test tube is passed through lime water (calcium hydroxide solution)?**

On passing the gas evolved through lime water, it turns milky with formation of white precipitate.

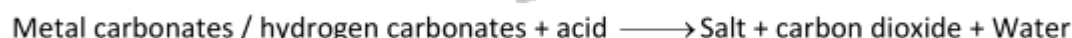
24. **What happens when excess carbon dioxide is passed through calcium carbonate?**

On passing excess  $\text{CO}_2$  the white precipitate disappears as soluble calcium bicarbonate is formed.



25. **How do metal carbonates react with acids?**

All metal carbonates and hydrogen carbonates react with acids to give corresponding salt, carbon dioxide and water.



26. **(Activity 2.6) Take 2 mL of dilute NaOH solution in a test tube and two drops of phenolphthalein solution is added to it.**

**What is the colour of the solution?**

Pink

**When dilute HCl solution is added to the above solution drop by drop. Is there any colour change for the reaction mixture?**

If dilute HCl is added to the solution then the colour of the solution fades. If we keep on adding HCl, the solution becomes colourless.

**Why did the colour of phenolphthalein change after the addition of an acid?**

HCl being a strong acid will neutralize NaOH.

**Does the pink colour of phenolphthalein reappear?**

If few drops of NaOH is added again to the same solution, the solution becomes basic and the pink colour of the phenolphthalein reappears.

27. **Write the reaction taking place when sodium hydroxide reacts with hydrochloric acid.**



**28. What is neutralisation reaction?**

The reaction between an acid and a base to give salt and water is called neutralisation reaction.

**29. Give two examples of neutralisation.**

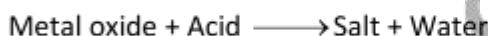
(ii) During indigestion (caused due to the production of excess of hydrochloric acid in the stomach), we administer an antacid (generally milk of magnesia,  $\text{Mg}(\text{OH})_2$  which is basic in nature). The antacid neutralizes the excess of acids and thus gives relief from indigestion.

**30. A student dropped few pieces of marble in dilute HCl contained in a test tube. The evolved gas was passed through lime water.****a) What change would be observed in lime water?**

Lime water turns milky.

**b) Write balanced chemical equation for the above change.****31. (Activity 2.7) Take a small amount of copper oxide in a beaker and add dilute hydrochloric acid slowly while stirring. What is the colour of the solution? What happens to the copper oxide?**

The colour of the solution becomes blue-green and the copper oxide dissolves. The blue-green colour of the solution is due to the formation of copper(II) chloride in the reaction.

**32. Write the general reaction between a metal oxide and an acid.****33. Write the reaction between copper oxide and dilute hydrochloric acid.****34. Why should curd and sour substances not be kept in brass and copper vessels?**

Curd and other sour substances contain acids. Therefore, when they are kept in brass and copper vessels, the metal reacts with the acid to liberate hydrogen gas and harmful products, thereby spoiling the food.

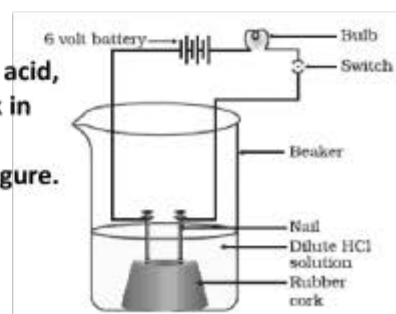
**35. You might have seen lemon or tamarind juice being used to clean tarnished surface of copper vessels. Explain why these sour substances are effective in cleaning the vessels?**

Lemon or tamarind juice is acidic in nature and reacts with oxidised copper to dissolve it into salt and water. Thus copper vessel is cleaned.

**36. 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.****37. (Activity 2.8) Take solutions of glucose, alcohol, hydrochloric acid, sulphuric acid, etc. Fix two nails on a cork, and place the cork in a 100 mL beaker. Connect the nails to the two terminals of a 6 volt battery through a bulb and a switch, as shown in the figure.**

Now pour some dilute HCl in the beaker and switch on the current. What do you observe?

The bulb will start glowing.



Repeat the experiment separately with glucose and alcohol solutions. What do you observe now?

Glucose and alcohol solutions do not conduct electricity.

**Does the bulb glow in all cases?**

The bulb will start glowing in the case of acids (all acids contain hydrogen but not all compounds containing hydrogen are acids)

38. **Compounds such as alcohols and glucose also contain hydrogen but are not categorized as acids. Describe an activity to prove it.**

Two nails are fitted on a cork and are kept it in a 100 mL beaker. The nails are then connected to the two terminals of a 6-volt battery through a bulb and a switch. Some dilute HCl is poured in the beaker and the current is switched on. The same experiment is then performed with glucose solution and alcohol solution.

Result:

HCl dissociates into  $H^+$  and  $Cl^-$  ions. These ions conduct electricity in the solution resulting in the glowing of the bulb. On the other hand, the glucose solution does not dissociate into ions. Therefore, it does not conduct electricity.

Conclusion:

From this activity, it can be concluded that all acids contain hydrogen but not all compounds containing hydrogen are acids. That is why, though alcohols and glucose contain hydrogen, they are not categorised as acids.

39. **Why do HCl,  $HNO_3$ , etc., show acidic characters in aqueous solutions while solutions of compounds like alcohol and glucose do not show acidic character?**

The dissociation of HCl or  $HNO_3$  to form hydrogen ions always occurs in the presence of water. Hydrogen ions ( $H^+$ ) combine with  $H_2O$  to form hydronium ions ( $H_3O^+$ ).

The reaction is as follows:

Although aqueous solutions of glucose and alcohol contain hydrogen, these cannot dissociate in water to form hydrogen ions. Hence, they do not show acidic character.

40. **What is responsible for the acidic property?**

The  $H^+$  ions in solution are responsible for the acidic property of acid.

41. **(Activity 2.9) Take about 1g solid NaCl in a clean and dry test tube and set up the apparatus as shown in figure.**

**Add some concentrated sulphuric acid to the test tube.**

**What do you observe? Is there a gas coming out of the delivery tube?**

Reaction takes place and hydrochloric acid gas is produced.

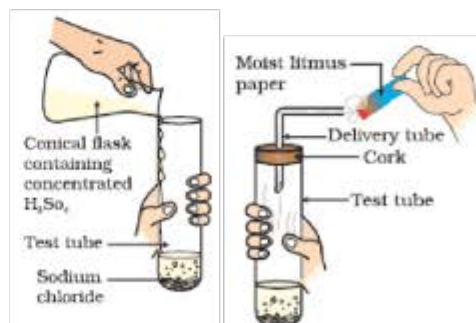


Test the gas evolved successively with dry and wet blue litmus paper.

**In which case does the litmus paper change colour?**

The gas has no effect on dry litmus paper but wet litmus paper turns red.

**On the basis of the above Activity, what do you infer about the acidic character of: (i) dry HCl gas (ii) HCl solution?**



Experiment suggests that hydrogen ions in HCl are produced in the presence of water. The separation of H<sup>+</sup> ion from HCl molecules cannot occur in the absence of water.

**42. Why does dry HCl gas not change the colour of the dry litmus paper?**

Colour of the litmus paper is changed by the hydrogen ions. Dry HCl gas does not contain H<sup>+</sup> ions. It is only in the aqueous solution that an acid dissociates to give ions. Since in this case, neither HCl is in the aqueous form nor the litmus paper is wet, therefore, the colour of the litmus paper does not change.

**43. Why does an aqueous solution of acid conduct electricity?**

Acids dissociate in aqueous solutions to form ions. These ions are responsible for conduction of electricity.

**44. Why does distilled water not conduct electricity, whereas rain water does?**

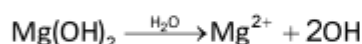
Distilled water is a pure form of water and does not contain any ions. So it does not conduct electricity. Rain water, being an impure form of water, contains many ionic species such as acids and therefore it conducts electricity.

**45. Why do acids not show acidic behaviour in the absence of water?**

Acids do not show acidic behaviour in the absence of water because the dissociation of hydrogen ions from an acid occurs in the presence of water only. It is the hydrogen ions that are responsible for the acidic behaviour.

**46. What happens when a base reacts with water?**

Bases produce hydroxide (OH<sup>-</sup>) ions in water.



**47. What are alkalis?**

Bases which are soluble in water are called alkalis.

**48. Write the characteristics of alkalis.**

Alkalis are soapy to touch. They are bitter and corrosive.

**49. Write the general reaction between acid and base.**



**50. (Activity 2.10) Take 10 mL water in a beaker. Add a few drops of concentrated H<sub>2</sub>SO<sub>4</sub> to it and swirl the beaker slowly.**

**Touch the base of the beaker. Is there a change in temperature?**

The temperature rises.

**Is this an exothermic or endothermic process?**

Dissolution of acid in water is an exothermic process.

**Add sodium hydroxide pellets to 10ml water in a beaker. What do you observe?**

The temperature of beaker increases as sodium hydroxide dissolves in water.

**51. Give reason: Acid must be added to water and not vice versa during dilution.**

We should always add acid slowly to water, keeping the solution continuously stirred, while preparing dilute solutions of acid like nitric acid and sulphuric acid. If water is added to acid, so much heat is produced during the dilution process that the container may break. The hot contents may also cause an explosion and spill on our clothes and body.

**52. What is dilution?**

The process of mixing an acid or base with water to decrease the concentration of ions ( $\text{H}_3\text{O}^+$  /  $\text{OH}^-$ ) is called dilution.

**53. How is the concentration of hydronium ions ( $\text{H}_3\text{O}^+$ ) affected when a solution of an acid is diluted?**

When an acid is diluted, the concentration of hydronium ions ( $\text{H}_3\text{O}^+$ ) per unit volume decreases. This means that the strength of the acid decreases.

**54. How is the concentration of hydroxide ions ( $\text{OH}^-$ ) affected when excess base is dissolved in a solution of sodium hydroxide?**

The concentration of hydroxide ions ( $\text{OH}^-$ ) would increase when excess base is dissolved in a solution of sodium hydroxide.

**55. What is a universal indicator?**

An indicator which shows different colours at different concentrations of hydrogen ions in a solution is called universal indicator.

**56. What is pH scale?**

A scale for measuring hydrogen ion concentration in a solution is called pH scale.

**57. (Activity 2.11) Test the pH values of solutions given below:**

No.	Solution	Colour of pH paper	pH Value	Nature of substance
1	Saliva (before meal)	Light green	7.4	Basic
2	Saliva (after meal)	Pale yellow	5.8	Acidic
3	Lemon juice	Pink red	2.5	Acidic
4	Colourless aerated drink	Pale yellow	6	Acidic
5	Carrot juice	Light orange	4	Acidic
6	Coffee	Orange yellow	5	Acidic
7	Tomato juice	Dark orange	4.1	Acidic
8	Tap water	Green	7	Neutral
9	1M NaOH	Dark blue, violet	13-14	Basic
10	1M HCl	Red	1	Acidic

**58. What are strong acids?**

Acids that give rise to more  $\text{H}^+$  ions or acids in which complete dissociation of hydrogen ion takes place are called strong acid. Ex: Hydrochloric acid, sulphuric acid, nitric acid.

**59. What are weak acids?**

Acids that give less  $\text{H}^+$  ions or acids in which there is partial dissociation of hydrogen ions are called weak acids.

**60. What are strong bases?**

Bases in which complete dissociation of hydroxide ions takes place are called strong base.



61. 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<sub>3</sub>COOH) 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?

The fizzing will occur strongly in test tube A, in which hydrochloric acid (HCl) is added. This is because HCl is a stronger acid than CH<sub>3</sub>COOH and therefore produces hydrogen gas at a faster speed due to which fizzing occurs.

62. What is an antacid?

An antacid is a base which is used to reduce the pain and irritation caused by excess production of acid in the stomach due to indigestion. Ex: Magnesium hydroxide (Milk of magnesia)

63. A person is suffering from indigestion due to the intake of hot spicy food. What remedy will you prescribe to the patient? Give the name of a chemical that can give relief to him.

The person should be given an antacid like milk of magnesia [Mg(OH)<sub>2</sub>]

64. How do antacids reduce the pain and irritation caused due to indigestion?

Antacids neutralise the excess acid produced by the stomach during indigestion.

65. What is tooth-decay? How is it caused?

Tooth decay is the corrosion of the tooth enamel.

When the pH in the mouth is below 5.5, bacteria present in the mouth produce acids by degradation of sugar and food particles remaining in the mouth after eating. This corrodes the tooth enamel causing tooth decay.

66. How can tooth-decay be reduced?

The best way to prevent tooth decay is to clean the mouth after eating food. Using toothpastes, which are generally basic, for cleaning the teeth can neutralise the excess acid and prevent tooth decay.

67. Why does the medium become acidic in mouth? What are the ill-effects of this acidic medium? How can this be prevented?

OR

“Sweet tooth may lead to tooth decay” explain why? What is the role of toothpaste in preventing cavities?

OR

How does the enamel undergo damage due to eating of chocolates and sweets? What should be done to prevent it?

Tooth enamel is chemically calcium phosphate. Sugar present in chocolates and sweets gets broken to acids by bacteria present in the mouth. It starts corroding when pH falls below 5.5, food particles in the mouth degrade to produce acid which lowers the pH of the mouth. Doctors advice the use of paste to prevent tooth decay because these are alkaline and neutralise the acid produced.

68. How can the pain and irritation caused by bee sting be reduced?

Bee-sting leaves an acid which causes pain and irritation. Use of a mild base like baking soda on the stung area reduces the pain and irritation.

69. A student accidentally touches a nettle plant while trekking. How can you help to reduce the pain and irritation caused by it?

The leaves of nettle plant have stinging hair which releases methanoic acid. We can neutralise the pain and irritation of the acid by rubbing the area with the leaf of the dock plant. Dock plant produces base which neutralises the acid.

70. Name the acid present in the following.

Substance	Acid	Substance	Acid
Vinegar	Acetic acid	Sour milk (Curd)	Lactic acid
Orange	Citric acid	Lemon	Citric acid
Tamarind	Tartaric acid	Ant sting	Methanoic acid
Tomato	Oxalic acid	Nettle sting	Methanoic acid

71. 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?

A pH value of less than 7 indicates an acidic solution, while greater than 7 indicates a basic solution. Therefore, the solution with pH = 6 is acidic and has more hydrogen ion concentration than the solution of pH = 8 which is basic.

72. 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.

- Solution D is neutral (pH=7)
- Solution C is strongly alkaline (pH=11)
- Solution A is strongly acidic (pH=4)
- Solution E is weakly acidic (pH=1)
- Solution E is weakly alkaline (pH=9)

pH in the increasing order of hydrogen ion concentration is:

pH=11 < pH=9 < pH=7 < pH=4 < pH=1

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

Concentration of  $H^+(aq)$  can have a varied effect on the nature of the solution. With an increase in  $H^+$  ion concentration, the solution becomes more acidic, while a decrease of  $H^+$  ion causes an increase in the basicity of the solution.

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

Yes, basic solution also has  $H^+(aq)$  ions. However, their concentration is less as compared to the concentration of  $OH^-$  ions that makes the solution basic.

75. 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)?

If the soil is acidic and improper for cultivation, then to increase the basicity of soil, the farmer would treat the soil with quick lime or slaked lime or chalk.

76. The soil in a field is highly acidic. List any two materials which can be added to this soil to reduce its acidity. Give reason.

Calcium carbonate, calcium oxide, magnesium oxide or magnesium carbonate can be added to neutralise the acidity of the soil.

77. Write the importance of pH in our daily life.

- Our body works within the pH range of 7-7.8.
- When pH of rain water is less than 5.6, it is called acid rain.
- Acid produced in stomach which causes pain and irritation.
- To get rid of this pain, people use antacid (mild base) like milk of magnesia

- v) Tooth decay starts when pH of mouth is lower than 5.5.
- vi) Using toothpaste (generally basic) tooth decay can be prevented.
- vii) Bee sting leaves an acid which cause pain and irritation. Use of a mild base like baking soda on stung area gives relief.
- viii) Stinging hair of nettle leaves inject methanoic acid causing burning pain. Rubbing with leaf of dock plant gives relief.
78. Kamala was playing in the garden. She was stung by a wasp. Her mother immediately applied a coating of toothpaste on the affected area and then took her to the doctor.
- a) What does wasp sting contain?
- b) Why did her mother apply toothpaste on the affected area?
- a) Wasp sting contains venom which is acidic.
- b) As toothpaste is basic in nature. So on applying it on the affected area, it neutralises the effect of acidic wasp sting.
79. Which of the following has highest value of pH? Aerated drink, saliva (after meal), saliva (before meal), vinegar  
Saliva (before meal)
80. Which of the following has highest value of pH? Milk of magnesia, milk of lime, pure water, sodium hydroxide.  
Sodium hydroxide
81. An acidic solution has pH equal to 4. It is diluted with water. Will its pH increase or decrease?  
pH will increase
82. (Activity 2.13) Write the formulae of the salts given below. Potassium sulphate, sodium sulphate, calcium sulphate, magnesium sulphate, copper sulphate, sodium chloride, sodium nitrate, sodium carbonate and ammonium chloride. Identify the acids and bases from which the above salts may be obtained.

Salt	Formula	Source of salt	
		Acids	Bases
Potassium sulphate	$K_2SO_4$	$H_2SO_4$	KOH
sodium sulphate	$Na_2SO_4$	$H_2SO_4$	NaOH
calcium sulphate	$CaSO_4$	$H_2SO_4$	$Ca(OH)_2$
magnesium sulphate	$MgSO_4$	$H_2SO_4$	$Mg(OH)_2$
copper sulphate	$CuSO_4$	$H_2SO_4$	$Cu(OH)_2$
sodium chloride	NaCl	HCl	NaOH
sodium nitrate	$NaNO_3$	$HNO_3$	NaOH
sodium carbonate	$Na_2CO_3$	$H_2CO_3$	NaOH
ammonium chloride	$NH_4Cl$	HCl	$NH_4OH$

83. The tanks in which milk is stored for retail selling are cleaned with sodium hydroxide solution every time fresh milk is filled in them. Give reason for this practice.

Milk contains lactic acid and its effect remains in the empty tank. The acidic effect in the tank can be neutralised by cleaning it with a solution of a base. It changes the acid into salt which then gets removed from the tank by cleaning with water.

84. Give reason: NaCl and Na<sub>2</sub>SO<sub>4</sub> belong to the family of sodium salts.

NaCl and Na<sub>2</sub>SO<sub>4</sub> have the same positive radicals so they belong to the family of sodium salts.

85. Give reason: NaCl and KCl belong to the family of chloride salts.

NaCl and KCl have the same negative radicals, so they belong to the family of chloride salts.

86. (Activity 2.14) Check the solubility in distilled water of the following salts. Find the pH using a pH paper. Which of the salts are acidic, basic or neutral? Identify the acid or base used to form the salt.

Sodium chloride, potassium nitrate, aluminium chloride, zinc sulphate, copper sulphate, sodium acetate, sodium carbonate and sodium hydrogen carbonate.

Salt	Solubility in water	Acidic/ Basic/ Neutral	pH Value	Acid used	Base used
Sodium chloride	Soluble	Neutral	7	HCl	NaOH
potassium nitrate	Soluble	Neutral	7	HNO <sub>3</sub>	KOH
Aluminium chloride	Soluble	Acidic	<7	HCl	Al(OH) <sub>3</sub>
Zinc sulphate	Soluble	Acidic	<7	H <sub>2</sub> SO <sub>4</sub>	Zn(OH) <sub>3</sub>
Copper sulphate	Soluble	Acidic	<7	H <sub>2</sub> SO <sub>4</sub>	Cu(OH) <sub>3</sub>
Sodium acetate	Soluble	Basic	>7	CH <sub>3</sub> COOH	NaOH
Sodium carbonate	Soluble	Basic	>7	H <sub>2</sub> CO <sub>3</sub>	NaOH
Sodium hydrogen carbonate	Soluble	Basic	>7	H <sub>2</sub> CO <sub>3</sub>	NaOH

87. Fresh milk has a pH of 6. How do you think the pH will change as it turns into curd? Explain your answer.

The pH of milk is 6. As it changes to curd, the pH will reduce because curd is acidic in nature. The acids present in it decrease the pH.

88. A milkman adds a very small amount of baking soda to fresh milk.

(a) Why does he shift the pH of the fresh milk from 6 to slightly alkaline?

(b) Why does this milk take a long time to set as curd?

(a) The milkman shifts the pH of the fresh milk from 6 to slightly alkaline because in alkaline condition, milk does not set as curd easily.

(b) Since this milk is slightly basic than usual milk, acids produced to set the curd are neutralized by the base. Therefore, it takes a longer time for the curd to set.

89. Distinguish between acid and alkali.

Acid	Alkali
Compound formed by the reaction of acidic oxide with water.	The hydroxide of metals which dissolve water
Turns litmus solution red	Turn litmus solution blue

90. Distinguish between base and alkali.

Base	Alkali
Base is a substance which contains hydroxyl group	The hydroxide of metal which dissolves in water.
Ex: NaOH, KOH, Al(OH) <sub>3</sub>	Ex: NaOH, KOH, Ca(OH) <sub>2</sub>

91. What is rock salt?

Large crystals of sodium chloride are called rock salts.

92. Why is rock salt brown in colour?

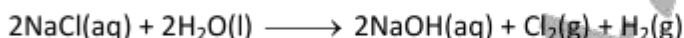
Rock salt is brown in colour due to impurities.

93. Name some materials which are prepared from common salt.

Sodium hydroxide, baking soda, Washing soda, bleaching powder, etc.

94. Explain how sodium hydroxide is prepared. OR Explain chlor-alkali process of preparation of sodium hydroxide.

When electricity is passed through an aqueous solution of sodium chloride, it decomposes to form sodium hydroxide.



95. In the chlor-alkali process of manufacture of sodium hydroxide,

- i) Name the gas produced at a) cathode b) anode  
ii) At which electrode is sodium hydroxide formed?

- i) Chlorine gas is given off at the anode, and hydrogen gas at the cathode.  
ii) Sodium hydroxide is formed at the cathode.

96. Name the products of electrolysis of brine and state their uses.

Products of electrolysis of brine are i) chlorine gas ii) hydrogen gas iii) sodium hydroxide.

**Uses of chlorine gas:**

- a) It is used for water treatment.  
b) It is used in swimming pools as disinfectant.  
c) It is used for manufacture of PVC, CFC's, bleaching powder and pesticides.

**Uses of hydrogen gas:**

- a) It is used as fuel.  
b) It is used in the manufacture of ammonia.  
c) It is used for manufacture of ghee, margarine etc.

**Uses of sodium hydroxide:**

- a) It is used for de-greasing metals.  
b) It is used in making paper.  
c) It is used for the manufacture of soaps and detergents.  
d) It is used in artificial fibre industry.

97. Mention the uses of hydrochloric acid.

- a) Hydrochloric acid is used for cleaning steel.  
b) It is used in the manufacture of ammonium chloride.  
c) It is used in the manufacture of medicines and cosmetics.

**98. How is bleaching powder prepared?**

Bleaching powder is produced by the action of chlorine on dry slaked lime  $[\text{Ca}(\text{OH})_2]$ .

**99. Name the substance which on treatment with chlorine yields bleaching powder.**

Slaked lime  $[\text{Ca}(\text{OH})_2]$

**100. Write the chemical name and formula of bleaching powder.**

Bleaching powder is chemically calcium oxy-chloride. Its formula is  $\text{CaOCl}_2$ .

**101. Write the uses of bleaching powder.**

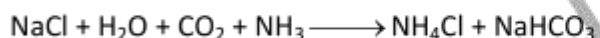
- Bleaching powder is used for bleaching cotton and linen in the textile industry, bleaching wood pulp in paper factories, bleaching washed clothes in laundry.
- It is used as an oxidising agent in many chemical industries.
- It is used for disinfecting drinking water to make it free of germs.

**102. Write the chemical name and formula of baking soda.**

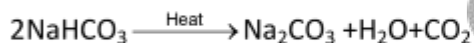
Baking soda is chemically sodium hydrogen carbonate. Its chemical formula is  $\text{NaHCO}_3$ .

**103. How is baking soda prepared? Write the chemical equation.**

Baking soda is produced using sodium chloride as one of the raw materials.

**104. What happens when baking soda is heated during cooking?**

When baking soda (sodium hydrogen carbonate) is heated during cooking sodium carbonate is formed.

**105. Write the uses of sodium hydrogen carbonate or baking soda.**

- Baking soda is used in the manufacture of baking powder.
- It is used in antacids to neutralize excess acids in the stomach and provide relief.
- It is used in soda-acid fire extinguishers.

**106. What is baking powder?**

Baking powder is a mixture of baking soda (sodium hydrogen carbonate) and a mild edible acid such as tartaric acid.

**107. What happens when baking powder is heated or mixed with water? OR What will happen if a solution of sodium hydro carbonate is heated? Give the equation of the reaction involved.**

When baking powder is heated or mixed in water, the following reaction takes place

**108. Why is baking powder used in bakery industry?**

When baking powder is used in bakery products like bread or cake, carbon dioxide produced makes the products soft and spongy.

**109. Why does bread or cake become soft and spongy when baking powder is added to the dough?**

When the dough is mixed with baking powder and water and heated, carbon dioxide is produced which makes the bread or cake to rise making them soft and spongy.

**110. Why is sodium hydrogen carbonate used in antacids?**

Sodium hydrogen is alkaline; it neutralizes the excess acid in the stomach and provides relief.

111. Write the chemical name and formula of washing soda?

Washing soda is chemically sodium carbonate. Its formula is  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ .

112. How is washing soda prepared? Write the chemical reaction.

When baking soda is heated, sodium carbonate is produced. Re-crystallisation of sodium carbonate gives washing soda.



113. Mention the uses of sodium carbonate or washing soda.

- Washing soda is used in the manufacture of glass, soap and paper.
- It is used in the manufacture of sodium compounds such as borax.
- It is used as a cleaning agent for domestic purposes.
- It is used for removing permanent hardness of water.

114. Name the sodium compound which is used for softening hard water.

Sodium carbonate or washing soda.

115. (Activity 2.15) Heat a few crystals of copper sulphate in a dry boiling tube.

- What is the colour of the copper sulphate after heating?
- Do you notice water droplets in the boiling tube?
- Where have these come from?

Add 2-3 drops of water on the sample of copper sulphate obtained after heating.

d) What do you observe?

e) Is the blue colour of copper sulphate restored?

a) The colour of copper sulphate after heating is white-grey.

b) Yes

c) Water droplets come from water molecules of crystallisation.

d) If few drops of water is added, blue colour of the crystals reappears.

116. What is meant by water of crystallization?

Water of crystallisation is the fixed number of water molecules present in one formula unit of a salt.

117. Name some compounds which possess water of crystallisation.

Copper sulphate  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

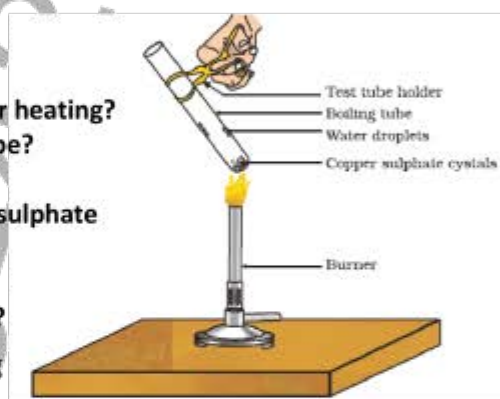
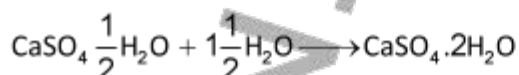
Sodium carbonate  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

Gypsum  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

118. Write the chemical name and formula of plaster of Paris.

Plaster of Paris is chemically calcium sulphate hemihydrate. Its formula is  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ .

119. Write an equation to show the reaction between Plaster of Paris and water.



**120. Plaster of Paris should be stored in a moisture-proof container. Explain why?**

Plaster of Paris (POP) should be stored in a moisture-proof container because Plaster of Paris, a powdery mass, absorbs water (moisture) to form a hard solid known as gypsum.

**121. Write the uses of Plaster of Paris.**

- Plaster of Paris is used by doctors for supporting fractured bones in the right position.
- It is used for making toys.
- It is used for making materials for decoration.
- It is used for making surface smooth.

**122. Write the common name of the following compounds.**

- a)  $\text{NaHCO}_3$  b)  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  c)  $\text{COCl}_2$  d)  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$

- a) Baking soda b) Washing soda c) Bleaching powder d) Plaster of Paris.

**123. Name some hydrated salts.**

- Ferrous sulphate  $\text{FeSO}_4 \cdot 6\text{H}_2\text{O}$
- Magnesium sulphate  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$
- Barium chloride  $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$
- Calcium sulphate  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

**124. Crystals of a substance changed their colour on heating in a closed vessel but regained it after sometime when they were allowed to cool down. Name one such substance. Explain the phenomenon involved.**

The substance is a hydrated salt, it can be copper sulphate pentahydrate ( $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ) or any other hydrated salt. Copper sulphate pentahydrate is blue in colour and anhydrous copper sulphate is grey-white in colour.

When the crystals of hydrated salts are heated, they lose their water of crystallisation which is responsible for its colour, when it is left to cool down, it absorbs moisture from air and again gains its water of crystallisation and thus, also its colour.

**125. Explain why dry crystals of copper sulphate change colour on heating.**

When the crystals of copper sulphate are heated, they lose their water of crystallisation which is responsible for its colour.

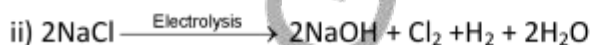
**126. When electricity is passed through a common salt solution, sodium hydroxide is produced along with the liberation of two gases 'X' and 'Y'. 'X' burns with a pop sound whereas 'Y' is used for disinfecting drinking water.**

i) Identify X and Y

ii) Give the chemical equation for the reaction stated above.

iii) State the reaction of Y with dry slaked lime.

i) X is hydrogen gas and Y is chlorine gas.



iii) Bleaching powder is obtained when Y ( $\text{Cl}_2$ ) is passed over slaked lime.

**127. Name the compound whose one formula unit is associated with 10 water molecules.**

Washing soda or Sodium Carbonate Decahydrate  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$



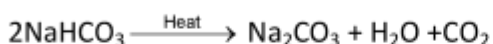
128. State in brief the preparation of washing soda from baking soda. Write balanced chemical equation of the reaction involved.

When baking soda is heated, sodium carbonate is produced. Re-crystallisation of sodium carbonate gives washing soda.



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

Baking soda (Sodium bicarbonate) on heating decomposes to give sodium carbonate, carbon dioxide and water.



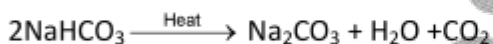
Sodium carbonate is used for removing permanent hardness of water. Hence salt A is sodium bicarbonate and salt B is sodium carbonate. C is carbon dioxide.

130. A housewife found that the cake prepared by her is hard and small in size. Which ingredient has she forgotten to add that would have made the cake fluffy? Give reason.

The housewife must have forgotten to add baking powder (sodium bicarbonate) because when baking powder is added as ingredient while making cake, decomposes to produce carbon dioxide which increases the size of cake and hence make it soft.

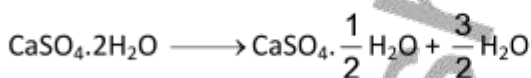
131. If at home your mother used baking soda instead of baking powder in cake then how will it affect the taste of cake and why? How can baking soda be converted into baking powder? Write the reaction which takes place when baking powder is heated.

The taste of cake becomes bitter as the medium becomes too basic on heating baking soda. Baking soda on heating gives baking powder.

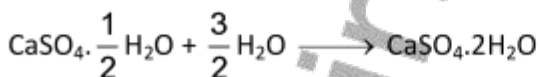


132. Doctor applies wet surgical bandages on the fractured bones of a patient for supporting them in right position. What changes are likely to occur? Write chemical equation for the reaction involved.

Plaster of Paris is prepared by heating gypsum to 373 K. After heating gypsum turns into powder form.



When plaster of Paris is applied on surgical bandages after making them wet it again gains its water of crystallisation and becomes hard, thus keeping the fractured bone in its place.



133. What are the special properties of 'plaster of Paris' which makes it useful in the hospital?

Plaster of Paris has a property of setting and hardening. When wetted with water it forms a solid mass which results in hard porous mass within 10-15 minutes. Therefore it is used in plastering fractured parts of the body.

Fill in the blanks:

- 1) Acids are sour to taste.
- 2) Acids change the colour of blue litmus to red.
- 3) Bases are bitter to taste.
- 4) Bases change the colour of red litmus to blue.
- 5) An example of natural indicator is litmus/turmeric/red cabbage leaves/petals of hydrangea.
- 6) The gas liberated when dilute sulphuric acid reacts with zinc granules is hydrogen.
- 7) Acid + metal  $\longrightarrow$  salt + hydrogen gas
- 8) The products formed when zinc reacts with sodium hydroxide are sodium zincate and hydrogen.
- 9) Lime stone, chalk and marble are different forms of calcium carbonate.
- 10) Acid + Metal carbonate  $\longrightarrow$  salt + carbon dioxide + water
- 11) Acid + Metal hydrogen carbonate  $\longrightarrow$  salt + carbon dioxide + water
- 12) The colour of phenolphthalein in acid is colourless.
- 13) The colour of phenolphthalein in base is pink.
- 14) The reaction between an acid and a base to give salt and water is known as neutralisation.
- 15) Metal oxide + Acid  $\longrightarrow$  Salt + Water
- 16) The separation of H<sup>+</sup> ions from HCl molecules cannot occur in absence of water.
- 17) Bases generate hydroxide (OH<sup>-</sup>) ions in water.
- 18) Bases which are soluble in water are called as alkalis.
- 19) Alkalis are soapy to touch.
- 20) Alkalis are bitter to taste.
- 21) The process of dissolving an acid or a base in water is exothermic.
- 22) The p in pH scale denotes potenz which mean power.
- 23) pH of a neutral solution is 7.
- 24) The strength of acid or base depends upon the hydrogen ion concentration.
- 25) The pH value decreases with increase in hydrogen ion concentration.
- 26) Our body works within the pH range of 7.0 to 7.8.
- 27) When pH of rain water is less than 5.6, it is called acid rain.
- 28) Tooth enamel is made up of calcium phosphate.
- 29) The acid present in stinging hair of nettle leaves is methanoic acid.
- 30) Salts of a strong acid and a strong base are neutral.
- 31) Salts of a strong acid and weak base are acidic.
- 32) Salts of a strong base and weak acid are basic.
- 33) Large crystals of sodium chloride are called rock salts.
- 34) The colour of rock salt is brown.
- 35) An aqueous solution of sodium chloride is called brine.

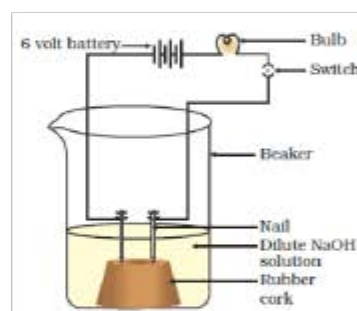
- 36) Chlor-alkali process is used in the manufacture of sodium chloride.
- 37) In the electrolysis of brine solution, the gas given off at anode is chlorine.
- 38) In the electrolysis of brine solution, the gas given off at cathode is hydrogen.
- 39) In the electrolysis of brine solution, sodium hydroxide is formed at cathode.
- 40) The gas used in the manufacture of ammonia for fertilisers is hydrogen.
- 41) The gas used in water treatment is chlorine.
- 42) The compound of sodium used in de-greasing metals is sodium hydroxide.
- 43) The chemical name of bleaching powder is calcium oxychloride.
- 44) The chemical formula of bleaching powder is CaOCl<sub>2</sub>.
- 45) The compound used for disinfecting drinking water is bleaching powder.
- 46) The chemical name of baking soda is sodium hydrogen carbonate.
- 47) The compound of sodium used in antacids sodium hydrogen carbonate/baking soda.
- 48) The compound formed when sodium hydrogen carbonate is heated is sodium carbonate.
- 49) Baking powder is a mixture of sodium hydrogen carbonate and tartaric acid.
- 50) The compound of sodium used in soda-acid fire extinguishers is sodium hydrogen carbonate.
- 51) The chemical name of washing soda is sodium carbonate.

Multiple Choice questions:

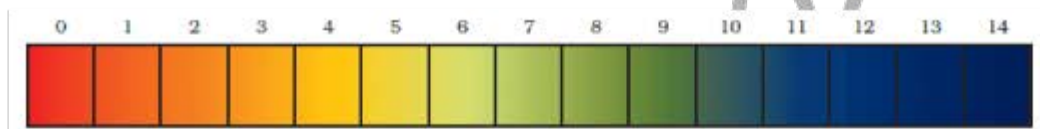
- 1) A solution turns red litmus blue, its pH is likely to be:  
(a) 1                      (b) 4                      (c) 5                      (d) 10
- 2) A solution reacts with crushed egg-shells to give a gas that turns lime-water milky. The solution contains:  
(a) NaCl                      (b) HCl                      (c) LiCl                      (d) KCl
- 3) 10 mL of a solution of NaOH is found to be completely neutralised by 8 mL of a given solution of HCl. If we take 20 mL of the same solution of NaOH, the amount of HCl solution (the same solution as before) required to neutralise it will be:  
(a) 4 mL                      (b) 8 mL                      (c) 12 mL                      (d) 16 mL
- 4) Which one of the following types of medicines is used for treating indigestion?  
(a) Antibiotic                      (b) Analgesic                      (c) Antacid                      (d) Antiseptic
- 5) What happens when a solution of an acid is mixed with a solution of a base in a test tube?  
(i) The temperature of the solution increases  
(ii) The temperature of the solution decreases  
(iii) The temperature of the solution remains the same  
(iv) Salt formation takes place  
(a) (i) only                      (b) (i) and (iii)                      (c) (ii) and (iii)                      (d) (i) and (iv)
- 6) An aqueous solution turns red litmus solution blue. Excess addition of which of the following solution would reverse the change?  
(a) Baking powder                      (b) Lime  
(c) Ammonium hydroxide solution                      (d) Hydrochloric acid

- 7) During the preparation of hydrogen chloride gas on a humid day, the gas is usually passed through the guard tube containing calcium chloride. The role of calcium chloride taken in the guard tube is to:
- (a) absorb the evolved gas (b) moisten the gas  
(c) absorb moisture from the gas (d) absorb  $\text{Cl}^-$  ions from the evolved gas
- 8) Which of the following salts does not contain water of crystallisation?
- (a) Blue vitriol (b) Baking soda (c) Washing soda (d) Gypsum
- 9) Sodium carbonate is a basic salt because it is a salt of:
- (a) strong acid and strong base (b) weak acid and weak base  
(c) strong acid and weak base (d) weak acid and strong base
- 10) Calcium phosphate is present in tooth enamel. Its nature is:
- (a) basic (b) acidic (c) neutral (d) amphoteric
- 11) A sample of soil is mixed with water and allowed to settle. The clear supernatant solution turns the pH paper yellowish-orange. Which of the following would change the colour of this pH paper to greenish-blue?
- (a) Lemon juice (b) Vinegar (c) Common salt (d) An antacid
- 12) Which of the following gives the correct increasing order of acidic strength?
- (a) Water < Acetic acid < Hydrochloric acid (b) Water < Hydrochloric acid < Acetic acid  
(c) Acetic acid < Water < Hydrochloric acid (d) Hydrochloric acid < Water < Acetic acid
- 13) If a few drops of a concentrated acid accidentally spills over the hand of a student, what should be done?
- (a) Wash the hand with saline solution  
(b) Wash the hand immediately with plenty of water and apply a paste of sodium hydrogen carbonate  
(c) After washing with plenty of water apply solution of sodium hydroxide on the hand  
(d) Neutralise the acid with a strong alkali
- 14) Sodium hydrogen carbonate when added to acetic acid evolves a gas. Which of the following statements are true about the gas evolved?
- (i) It turns lime water milky (ii) It extinguishes a burning splinter  
(iii) It dissolves in a solution of sodium hydroxide (iv) It has a pungent odour
- (a) (i) and (ii) (b) (i), (ii) and (iii) (c) (ii), (iii) and (iv) (d) (i) and (iv)
- 15) Common salt besides being used in kitchen can also be used as the raw material for making
- (i) washing soda (ii) bleaching powder (iii) baking soda (iv) slaked lime
- (a) (i) and (ii) (b) (i), (ii) and (iv) (c) (i) and (iii) (d) (i), (iii) and (iv)
- 16) One of the constituents of baking powder is sodium hydrogen carbonate, the other constituent is:
- (a) hydrochloric acid (b) tartaric acid  
(c) acetic acid (d) sulphuric acid
- 17) To protect tooth decay we are advised to brush our teeth regularly. The nature of the tooth paste commonly used is
- (a) acidic (b) neutral (c) basic (d) corrosive

- 18) Which of the following statements is correct about an aqueous solution of an acid and of a base?  
 (i) Higher the pH, stronger the acid      (ii) Higher the pH, weaker the acid  
 (iii) Lower the pH, stronger the base      (iv) Lower the pH, weaker the base  
 (a) (i) and (iii)      (b) (ii) and (iii)      (c) (i) and (iv)      **(d) (ii) and (iv)**
- 19) The pH of the gastric juices released during digestion is:  
**(a) less than 7**      (b) more than 7      (c) equal to 7      (d) equal to 0
- 20) Which of the following phenomena occur, when a small amount of acid is added to water?  
 (i) Ionisation      (ii) Neutralisation      (iii) Dilution      (iv) Salt formation  
 (a) (i) and (ii)      **(b) (i) and (iii)**      (c) (ii) and (iii)      (d) (ii) and (iv)
- 21) Which one of the following can be used as an acid–base indicator by a visually impaired student?  
 (a) Litmus      (b) Turmeric      **(c) Vanilla essence**      (d) Petunia leaves
- 22) Which of the following substance will not give carbon dioxide on treatment with dilute acid?  
 (a) Marble      (b) Limestone      (c) Baking soda      **(d) Lime**
- 23) Which of the following is acidic in nature?  
**(a) Lime juice**      (b) Human blood      (c) Lime water      (d) Antacid
- 24) In an attempt to demonstrate electrical conductivity through an electrolyte, the following apparatus was set up. Which among the following statement(s) is (are) correct?  
 (i) Bulb will not glow because electrolyte is not acidic  
 (ii) Bulb will glow because NaOH is a strong base and furnishes ions for conduction.  
 (iii) Bulb will not glow because circuit is incomplete  
 (iv) Bulb will not glow because it depends upon the type of electrolytic solution  
 (a) (i) and (iii)      (b) (ii) and (iv)      **(c) (ii) only**      (d) (iv) only
- 25) Which of the following is used for dissolution of gold?  
 (a) Hydrochloric acid      (b) Sulphuric acid      (c) Nitric acid      **(d) Aqua regia**
- 26) Which of the following is not a mineral acid?  
 (a) Hydrochloric acid      **(b) Citric acid**      (c) Sulphuric acid      (d) Nitric acid
- 27) Which among the following is not a base?  
 (a) NaOH      (b) KOH      (c)  $\text{NH}_4\text{OH}$       **(d)  $\text{C}_2\text{H}_5\text{OH}$**
- 28) Which of the following statements is not correct?  
 (a) All metal carbonates react with acid to give a salt, water and carbon dioxide  
**(b) All metal oxides react with water to give salt and acid**  
 (c) Some metals react with acids to give salt and hydrogen  
 (d) Some non-metal oxides react with water to form an acid



- 29) Equal volumes of hydrochloric acid and sodium hydroxide solutions of same concentration are mixed and the pH of the resulting solution is checked with a pH paper. What would be the colour obtained? (You may use colour guide given in the figure.)



- (a) Red (b) Yellow  
(c) Yellowish green (d) Blue
- 30) Which of the following is (are) true when HCl (g) is passed through water?  
(i) It does not ionise in the solution as it is a covalent compound.  
(ii) It ionises in the solution  
(iii) It gives both hydrogen and hydroxyl ion in the solution  
(iv) It forms hydronium ion in the solution due to the combination of hydrogen ion with water molecule  
(a) (i) only (b) (iii) only (c) (ii) and (iv) (d) (iii) and (iv)
31. Which of the following statements is true for acids?  
(a) Bitter and change red litmus to blue (b) Sour and change red litmus to blue  
(c) Sour and change blue litmus to red (d) Bitter and change blue litmus to red
32. Which of the following are present in a dilute aqueous solution of hydrochloric acid?  
(a)  $\text{H}_3\text{O}^+ + \text{Cl}^-$  (b)  $\text{H}_3\text{O}^+ + \text{OH}^-$  (c)  $\text{Cl}^- + \text{OH}^-$  (d) unionised HCl
33. Identify the correct representation of reaction occurring during chloralkali process  
(a)  $2\text{NaCl}(\text{l}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{NaOH}(\text{l}) + \text{Cl}_2(\text{g}) + \text{H}_2(\text{g})$   
(b)  $2\text{NaCl}(\text{aq}) + 2\text{H}_2\text{O}(\text{aq}) \rightarrow 2\text{NaOH}(\text{aq}) + \text{Cl}_2(\text{g}) + \text{H}_2(\text{g})$   
(c)  $2\text{NaCl}(\text{aq}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{NaOH}(\text{aq}) + \text{Cl}_2(\text{aq}) + \text{H}_2(\text{aq})$   
(d)  $2\text{NaCl}(\text{aq}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{NaOH}(\text{aq}) + \text{Cl}_2(\text{g}) + \text{H}_2(\text{g})$

Match the following:

Column I	Column II	Answer
1) Lactic acid	a) Tomato	
2) Acetic acid	b) Lemon	
3) Citric acid	c) Vinegar	
4) Oxalic acid	d) Curd	

Match the following:

Column I	Column II	Answer
1) Plaster of Paris	a) $\text{Ca}(\text{OH})_2$	
2) Gypsum	b) $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$	
3) Bleaching powder	c) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$	
4) Slacked lime	d) $\text{CaOCl}_2$	