# 8 Acids, Bases and Salts

**1.** Which of the following acids is a mineral acid? *[2014-I]*
(*a*) Citric acid (*b*) Hydrochloric acid
(*c*) Ascorbic acid (*d*) Tartaric acid

**2.** The burning sensation of bee sting can be stopped by rubbing the affected area with soap. This is because *[2014-II]*
(*a*) a bee sting is acidic and soap, an alkali, neutralizes it
(*b*) a bee sting is alkaline and soap, an acid, neutralizes it
(*c*) soap cleans the affected area and removes the sting
(*d*) soap acts as an anesthetic and dulls the sensation

**3.** Match List-I with List-II and select the correct answer using the code given below the Lists. *[2015-I]*

| **List-I** *(Compound)* | **List-II** *(Nature)* |
|---|---|
| A. Sodium hydroxide | 1. Strong acid |
| B. Calcium oxide | 2. Alkali |
| C. Acetic acid | 3. Weak acid |
| D. Hydrochloric acid | 4. Base |

**Code:**

| | A | B | C | D |
|---|---|---|---|---|
| (*a*) | 2 | 3 | 4 | 1 |
| (*b*) | 2 | 4 | 3 | 1 |
| (*c*) | 1 | 4 | 3 | 2 |
| (*d*) | 1 | 3 | 4 | 2 |

**4.** Washing Soda is the common name for *[2015-I]*
(*a*) Calcium Carbonate (*b*) Magnesium Carbonate
(*c*) Sodium Carbonate (*d*) Potassium Carbonate

**5.** The main constituent of Vinegar is: *[2015-II]*
(*a*) Acetic acid (*b*) Ascorbic acid
(*c*) Citric acid (*d*) Tartaric acid

**6.** Suppose you have four test tubes labelled as 'A', 'B', 'C', and 'D'. 'A' contains plain water, 'B' contains solution of an alkali, 'C' contains solution of an acid, and 'D' contains solution of sodium chloride. Which one of these solutions will turn phenolphthalein solution pink? *[2016-I]*
(*a*) Solution 'A' (*b*) Solution 'B'
(*c*) Solution 'C' (*d*) Solution 'D'

**7.** Which one of the following elements will ***not*** react with dilute HCl to produce $H_2$? *[2016-I]*
(*a*) Hg (*b*) Al
(*c*) Mg (*d*) Fe

**8.** Which one of the following is the chemical name for baking soda? *[2016-I]*
(*a*) Sodium bicarbonate (Sodium hydrogen carbonate)
(*b*) Sodium carbonate
(*c*) Potassium bicarbonate (Potassium hydrogen carbonate)
(*d*) Potassium carbonate

**9.** The chemical name of baking soda is *[2017-I]*
(*a*) $Na_2CO_3$ (*b*) $NaHCO_3$
(*c*) $CaCO_3$ (*d*) NaOH

**10.** Which one of the following is a cause of acid rains? *[2017-II]*
(*a*) Ozone (*b*) Ammonia
(*c*) Sulphur dioxide (*d*) Carbon monoxide

**11.** The desirable range of pH for drinking water is *[2017-II]*
(*a*) 6.5 to 8.5 (*b*) 5.0 to 6.5
(*c*) 6.5 to 7.0 (*d*) 7.0 to 8.5

**12.** Which compound, when dissolved in water, conducts electricity and forms a basic solution? *[2017-II]*
(*a*) HCl (*b*) $CH_3COOH$
(*c*) $CH_3OH$ (*d*) NaOH

**13.** Which one among the following chemical is used as washing soda? *[2017-II]*
(*a*) Calcium carbonate (*b*) Calcium bicarbonate
(*c*) Sodium carbonate (*d*) Sodium bicarbonate

**14.** Which of the following properties is true for a tooth paste? *[2018-I]*
(*a*) It is acidic
(*b*) It is neutral
(*c*) It is basic
(*d*) It is made up of Calcium phosphate, the material of tooth enamel

**15.** Which one of the following gives the highest amount of hydrogen ions ($H^+$)? *[2018-I]*
(*a*) Sodium hydroxide solution
(*b*) Milk of magnesia
(*c*) Lemon juice
(*d*) Gastric juice

**16.** Brine is an aqueous solution of *[2018-I]*
(*a*) NaCl (*b*) NaOH
(*c*) $NaHCO_3$ (*d*) $Na_2CO_3$

17. Which one of the following is the chemical formula of Washing Soda? *[2018-I]*
(a) $NaHCO_3$ (b) $Na_2CO_3.10H_2O$
(c) $Na_2CO_3.5H_2O$ (d) NaOH

18. Which one of the following is NOT true for bleaching powder?
(a) It is used as a reducing agent in chemical industries *[2018-I]*
(b) It is used for bleaching wood pulp in paper factories
(c) It is used for disinfecting drinking water
(d) It is used for bleaching linen in textile industry

19. Which one of the following is the number of water molecules that share with two formula unit $CaSO_4$ in plaster of Paris? *[2018-I]*
(a) One (b) Two
(c) Five (d) Ten

20. Which one of the following is a tribasic acid? *[2018-II]*
(a) Hydrochloric acid (b) Nitric acid
(c) Sulphuric acid (d) Phosphoric acid

21. The solution of which one of the following will have pH less than 7? *[2018-II]*
(a) NaOH (b) KCl
(c) $FeCl_3$ (d) NaCl

22. Which one of the following is the chemical formula of gypsum?
(a) $CaSO_4.2H_2O$ (b) $Ca_2SiO_4$ *[2018-II]*
(c) $2CaSO_4.H_2O$ (d) $CaSO_4$

23. Which one of the following is an organic acid? *[2019-I]*
(a) Hydrochloric acid (b) Nitric acid
(c) Acetic acid (d) Sulphuric acid

24. Which one of the following will NOT produce carbon dioxide on reacting with an aqueous solution of hydrochloric acid? *[2019-I]*
(a) Limestone (b) Quick Lime
(c) Chalk (d) Marble

25. Tooth enamel is made up of which one of the following calcium compounds? *[2019-I]*
(a) Calcium carbonate (b) Calcium sulphate
(c) Calcium hydroxide (d) Calcium phosphate

26. Which one of the following does not represent the salt, Calcium carbonate? *[2019-II]*
(a) Lime water (b) Limestone
(c) Chalk (d) Marble

27. Chalk and marble are different forms of *[2020-I]*
(a) Calcium hydrogen carbonate
(b) Calcium carbonate
(c) Calcium acetate
(d) Sodium carbonate

28. Vinegar is also known as *[2020-I]*
(a) ethanoic acid (b) nitric acid
(c) sulphuric acid (d) tartaric acid

29. At nearly 70°C, sodium bicarbonate shows the property of gradually decomposing, which makes it usable in bakery products. The product of decomposition responsible for this use of sodium bicarbonate is *[2020-I]*
(a) Carbon dioxide (b) Hydrogen
(c) Water vapour (d) Oxygen

30. Number of molecules of water of crystallization in copper sulphate, sodium carbonate and Gypsum are *[2020-I]*
(a) 5, 10 and 2 respectively (b) 10, 2 and 5 respectively
(c) 5, 2 and 10 respectively (d) 2, 5 and 10 respectively

31. Which one of the following is the correct sequence of change in colors when a turmeric stain on white clothes is scrubbed by soap and then washed with water? *[2020-I]*
(a) Yellow - pink - blue
(b) Yellow - reddish brown - yellow
(c) Yellow-reddish brown-blue
(d) Yellow - blue - pink

32. Which one of the following was the first mineral acid discovered? *[2020-I]*
(a) Sulphuric acid (b) Hydrochloric acid
(c) Nitric acid (d) Phosphoric acid

33. Which one of the following acids is predominantly found in tomatoes? *[2021-I]*
(a) Acetic acid (b) Tartaric acid
(c) Oxalic acid (d) Lactic acid

34. Common salt (NaCl) is not used as a raw material for preparation of which one of the following compounds? *[2021-I]*
(a) Bleaching powder (b) Baking soda
(c) Plaster of Paris (d) Washing soda

35. The pH value of Milk of Magnesia is approximately *[2021-II]*
(a) Zero (b) 7 (c) 10 (d) 14

36. What is the number of water molecules present in a Ferrous Sulphate crystal? *[2021-II]*
(a) 1 (b) 3 (c) 5 (d) 7

37. Which one of the following is the chemical formula of Plaster of Paris? *[2021-II]*
(a) $CaSO_4 \cdot \frac{1}{2}H_2O$ (b) $CaSO_4 \cdot 2H_2O$
(c) $CaSO_4 \cdot 5H_2O$ (d) $CaSO_4 \cdot 4H_2O$

38. Which one of the following salts does not possess water of crystallization? *[2022-II]*
(a) Potassium permanganate (b) Blue vitriol
(c) Washing soda (d) Mohr's salt

39. Bee sting leaves an acid which causes pain and irritation. The acid released is *[2022-II]*
(a) tartaric acid (b) citric acid
(c) ethanoic acid (d) methanoic acid

40. Copper sulphate crystals available in the market are blue coloured crystals. By careful heating, they turn to white colour. Which one of the following is responsible for the blue colour? *[2023-I]*
(a) Oxygen (b) Nitrogen (c) Water (d) Hydrogen

41. Among the following, which is ***not*** the correct method for keeping the curd? *[2023-I]*
(a) Keeping in stainless steel vessel
(b) Keeping in copper vessel
(c) Keeping in plastic vessel
(d) Keeping in glass vessel

42. Toothpaste prevents tooth decay by: *[2023-I]*
(a) neutralizing the excess acidity.
(b) means of emulsification.
(c) the action of fluoride.
(d) making a coat of calcium over the teeth surface.

43. Litmus, a well-known acid-base indicator, is derived from: *[2024-I]*

(a) Fungi (b) Lichens
(c) Bacteria (d) Termite

44. Human body works in the pH range of: *[2024-I]*

(a) 6.8 – 7.2 (b) 7.0 – 7.8 (c) 6.5 – 7.5 (d) 7.5 – 8.0

45. Which one among the following is present in the nettle leaf hairs that causes burning pain? *[2024-I]*

(a) Methanoic acid (b) Ethanoic acid
(c) Benzoic acid (d) Acetic acid

46. Which one among the following is known as Milk of Magnesia? *[2024-I]*

(a) Magnesium bicarbonate
(b) Magnesium carbonate
(c) Magnesium sulphate
(d) Magnesium hydroxide

## ANSWER KEY

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **1.** (b) | **2.** (a) | **3.** (b) | **4.** (c) | **5.** (a) | **6.** (b) | **7.** (a) | **8.** (a) | **9.** (b) | **10.** (c) |
| **11.** (a) | **12.** (d) | **13.** (c) | **14.** (c) | **15.** (d) | **16.** (a) | **17.** (b) | **18.** (a) | **19.** (a) | **20.** (d) |
| **21.** (c) | **22.** (a) | **23.** (c) | **24.** (b) | **25.** (d) | **26.** (a) | **27.** (b) | **28.** (a) | **29.** (a) | **30.** (a) |
| **31.** (b) | **32.** (a) | **33.** (c) | **34.** (c) | **35.** (c) | **36.** (d) | **37.** (a) | **38.** (a) | **39.** (d) | **40.** (c) |
| **41.** (b) | **42.** (a) | **43.** (b) | **44.** (b) | **45.** (a) | **46.** (d) | | | | |

## EXPLANATIONS

**1.** (b) A mineral acid is derived from one or more inorganic compounds. Examples of mineral acids are nitric acid, hydrochloric acid, sulphuric acid, phosphoric acid, boric acid, and hydrofluoric acid.

**2.** (a) A bee sting contains formic acid, which causes the burning sensation. Soap is alkaline, so it helps to neutralize the acid, reducing the pain and discomfort.

**3.** (b) Sodium hydroxide (NaOH) is a strong base and is classified as an alkali. Calcium oxide (CaO) is a basic oxide and reacts with water to form a strong base (calcium hydroxide). Acetic acid ($CH_3COOH$) is a weak acid as it does not fully ionize in solution. Hydrochloric acid (HCl) is a strong acid because it completely ionizes in solution.

**4.** (c) Sodium carbonate is also known as washing soda.

**5.** (a) The main constituent of vinegar is acetic acid.

**6.** (b) Phenolphthalein is an acid-base indicator that turns pink in basic (alkaline) solutions and remains colorless in acidic or neutral solutions. Given the test tubes:

A: Contains plain water (neutral).

B: Contains a solution of an alkali (basic).

C: Contains a solution of an acid (acidic).

D: Contains a solution of sodium chloride (neutral).

Among these, the only solution that will make phenolphthalein turn pink is the one that is basic.

**7.** (a) The element that will not react with dilute hydrochloric acid (HCl) to produce hydrogen gas ($H_2$) is Hg (Mercury).

**8.** (a) Sodium bicarbonate is a chemical name for baking soda.

**9.** (b) The chemical name of baking soda is $NaHCO_3$.

**10.** (c) Acid rain is primarily caused by the presence of sulphur dioxide ($SO_2$) and nitrogen oxides ($NO_x$) in the atmosphere. These pollutants, when released from sources such as burning fossil fuels, react with water vapour in the atmosphere to form sulphuric and nitric acids. These acids then fall to the ground as acid rain. Ozone, ammonia, and carbon monoxide are not primary causes of acid rain.

**11.** (a) The desirable range of pH for drinking water is 6.5 to 8.5.

**12.** (d) Strong electrolyte is a compound that dissociates completely in water and conducts electricity. From the given options, only HCl and NaOH are strong electrolytes and NaOH alone would form a basic solution when dissolved in water.

**13.** (c) The chemical formula for washing soda is Sodium carbonate $Na_2CO_3$.

**14.** (c) Properties of tooth paste is basic. This is because it helps neutralize acids in the mouth that can contribute to tooth decay and enamel erosion.

**15.** (d) Gastric juice contains hydrochloric acid (HCl), which is a strong acid. It dissociates completely in water, releasing a high concentration of hydrogen ions ($H^+$).

**16.** (a) Sodium chloride (NaCl) and water ($H_2O$) solution is called as brine solution.

**17.** (b) The chemical formula of washing soda is $Na_2CO_3.10H_2O$, and its chemical name is Sodium Carbonate.

**18.** (a) Bleaching powder is not used as a reducing agent in chemical industries.

**19.** (*a*) The number of $H_2O$ molecules that share with 2 formula unit $CaSO_4$ in POP is one. The chemical formula of plaster of Paris is $CaSO_4 \cdot \frac{1}{2} H_2O$. $CaSO_4 \cdot \frac{1}{2} H_2O$ means that two formula units of $CaSO_4$ shares one molecule of $H_2O$.

**20.** (*d*) A tribasic acid is an acid that can donate three protons ($H^+$ ions). Phosphoric acid ($H_3PO_4$) is a tribasic acid because it has three acidic hydrogen atoms that can dissociate in aqueous solution.

**21.** (*c*) $FeCl_3$ is an acid salt because Fe $(OH)_3$ is weak base and HCl is a strong acid. Therefore, pH is less than 7.

**22.** (*a*) Gypsum is a soft sulphate mineral composed of calcium sulphate dihydrate, with the chemical formula $CaSO_4.2H_2O$

**23.** (*c*) With the chemical formula $CH_3COOH$, Acetic acid is a carboxylic acid and is an organic substance.

The second-simplest carboxylic acid is this one.

**24.** (*b*) Marble,Limestone and chalk are all types of calcium carbonate which when reacted with Hydrochloric acid release Carbon dioxide.

$CaO + dil.2HCl \rightarrow Ca + H_2O$

**25.** (*d*) The chemical substance present in teeth is $Ca_3(PO_4)_2$ Calcium phosphate

Enamel is the tooth's thin outer covering. This tough shell is the human body's hardest tissue. Enamel protects the crown, which is the visible part of the tooth.

Enamel is made up of the mineral calcium phosphate, which is arranged in a crystal structure called hydroxyapatite.

Calcium carbonate is used to make seashells.

**26.** (*a*) Calcium carbonate is present in marble, chalk, and **limestone**.

Calcium carbonate is not present in **lime water**; it contains lime or citrus.

**27.** (*b*) The calcium carbonate is the main constituent of chalk and marble. The chemical formula for calcium carbonate is $CaCO_3$.

**28.** (*a*) The chemical formula of vinegar is $CH_3COOH$. The IUPAC name of $CH_3COOH$ is ethanoic acid and commonly known as acetic acid.

**29.** (*a*) Carbon dioxide is the responsible product, which makes sodium bicarbonate usable in bakery products at 70°C. Decomposition reaction of sodium bicarbonate is-

$2NaHCO_3(s) \rightarrow Na_2CO_3(s) + CO_2(g) + H_2O(g)$

**30.** (*a*) Molecular formula of copper sulphate is $CuSO_4.5H_2O$ i.e. copper sulphate contain 5 molecules of water that's why crystal of copper sulphate appears blue in color.

Sodium carbonate has molecular formula $Na_2CO_3.10H_2O$ i.e. sodium carbonate contains 10 water molecules.

Molecular formula of gypsum $CaSO_4.2H_2O$ i.e. contain 2 water molecules.

**31.** (*b*) When turmeric stain on a white cloth comes in contact with soap it turns into a reddish color because soap is basic in nature and when the cloth is washed i.e. base is removed it again turns into yellow color.

**32.** (*a*) Sulphuric acid was the first mineral acid discovered by Johann Glauber. Molecular formula of sulfuric acid is $H_2SO_4$.

**33.** (*c*) Oxalic acid is predominantly found in tomatoes. Its amount in tomatoes is 50mg per 100g.

**34.** (*c*) Preparation of Plaster of Paris doesn't require the use of NaCl. It is simply obtained by heating gypsum ($CaSO_4 \cdot 2H_2O$) at 120°C in a rotary kiln.

**35.** (*c*) Milk of magnesia is basic in nature having pH value around 10.

**36.** (*d*) The formula of ferrous sulphate crystal is $FeSO_4 \cdot 7H_2O$.

**37.** (*a*) The chemical formula of plaster of Paris is $CaSO_4 \cdot \frac{1}{2} H_2O$

**38.** (*a*) $KMnO_4$ does not contain water of crystallizaion.

**39.** (*d*) Bee sting release methanoic acid which causes pain & irritation.

**40.** (*c*) Crystals of copper sulphate contain water of crystallization which give blue colour to it. On heating, molecules of water get removed and hence, colour of crystals becomes white.

**41.** (*b*) When curd is stored in copper containers, the lactic acid in the curd reacts with the copper, causing corrosion and the formation of poisonous ions that are not digestible.

**42.** (*a*) Toothpastes are basic in nature. They neutralise the action of acids, preventing tooth decay.

**43.** (*b*) The most commonly used natural indicator is litmus. It is extracted from lichens. It has a mauve (purple) colour in distilled water. When added to an acidic solution, it turns red and when added to a basic solution, it turns blue. It is available in the form of a solution, or in the form of strips of paper, known as litmus paper. Generally, it is available as red and blue litmus paper.

**44.** (*b*) The human body works within the pH range of 7.0 to 7.8.

**45.** (*a*) Methanoic acid, also known as formic acid, is the substance found in the hairs of nettle leaves that causes the characteristic burning sensation and pain when the skin comes into contact with nettles.

**46.** (*d*) Magnesium hydroxide is commonly referred to as Milk of Magnesia. It is frequently used as an antacid .