CHAPTER 2

Acids, Bases and Salts

3.1 ACIDS

Acids are chemical compounds which have sour taste, consist of hydrogen (H), and turn blue litmus solution red. On the basis of their sources, acids can be classified as:

3.1.1 Organic Acids

They are derived from living organisms, i.e., plants and animals. For example, tomatoes contain oxalic acid and ants contain formic acid.

3.1.2 Mineral Acids

They are obtained from mineral sources, e.g., sulphuric acid, nitric acid and hydrochloric acid. They are inorganic acids. Many mineral acids find extensive use and application.

3.1.3 Arrhenius Theory of Acids

According to this theory, acids are substances that ionise to give H^+ ions when dissolved in water, e.g.,

$$HCl\,(aq) \rightleftharpoons H^+(aq) + Cl^-(aq)$$

3.1.4 Strong Acids

These acids ionise more or less completely when dissolved in water, e.g., sulphuric acid (H_2SO_4) nitric acid (HNO_3) and hydrochloric acid (HCl).

$$HCl\,(aq) \longrightarrow H^+(aq) + Cl^-(aq)$$

$$H_2SO_4(aq) \longrightarrow 2H^+(aq) + SO_4^{2-}(aq)$$

3.1.5 Weak Acids

These acids ionise to a small extent when dissolved in water, e.g., acetic acid (CH_3COOH), formic acid (HCOOH) and carbonic acid (H_2CO_3).

$$CH_2COOH\,(aq) \rightleftharpoons CH_3COO^-(aq) + H^+(aq)$$

$$H_2CO_3 \rightleftharpoons 2H^+(aq) + CO_3^{2-}(aq)$$

3.1.6 Reactions of Acids with Metals

Dilute acids react with metals to evolve hydrogen.

$$Zn\,(s) + dil.H_2SO_4 \longrightarrow ZnSO_4(aq) + H_2(g)$$

H_2 gas is not evolved when a metal reacts with nitric acid (HNO_3).

3.1.7 Reactions of Acids with Metal Oxides

Metal oxides, being basic in nature, react with acids to form salt and water.

$$CaO\,(s) + 2HCl\,(aq) \longrightarrow CaCl_2(aq) + H_2O\,(l)$$

3.1.8 Reactions of Acids with Metal Carbonates and Metal Hydrogen carbonates

Acids break up metal carbonates and metal hydrogen carbonates to evolve carbon dioxide gas with brisk effervescence.

$$NaCO_3(s) + 2HCl\,(aq) \longrightarrow 2NaCl\,(aq) + H_2O\,(l) + CO_2(g)$$

$$NaHCO_3(s) + HCl\,(aq) \longrightarrow NaCl\,(aq) + H_2O\,(l) + CO_2(g)$$

3.2 BASES

Bases are chemical compounds which have bitter taste, are soapy and slippery to touch, and turn red litmus solution blue, e.g., sodium hydroxide, potassium hydroxide, aluminium hydroxide, etc. Those bases which are soluble in water are called alkalis.

3.2.1 Arrhenius Theory of Bases

According to this theory, bases are substances that ionise to give hydroxyl ion (OH^-) when dissolved in water, e.g.,

$$NaOH(aq) \longrightarrow Na^+(aq) + OH^-(aq)$$

3.2.2 Strong Bases

They ionise more or less completely on dissolving in water, e.g., NaOH, KOH, $Ca(OH)_2$ etc.

$$NaOH(aq) \longrightarrow Na^+(aq) + OH^-(aq)$$

3.2.3 Weak Bases

They ionise to a small extent on dissolving in water, e.g., ammonium hydroxide (NH_4OH), copper hydroxide [$Cu(OH)_2$], etc.

$$NH_4OH(aq) \rightleftharpoons NH_4^+(aq) + OH^-(aq)$$

3.2.4 Indicators

Acid-base indicators (indicators) are natural or synthetic dyes which show a change of colour depending upon the acidity or alkalinity of a solution.

The indicator like litmus is red in acidic and blue in basic medium. Methyl orange is red in acidic and yellow in basic medium. Phenolphthalein is colourless in acidic and pinkish-red in basic medium.

1. **Olfactory Indicators :** Those substances whose odour changes in acidic or basic medium are called olfactory indicators, e.g., the smell of onion diminishes in a base but remains as such in an acid.

3.2.5 Reactions of Bases with Metals

Metals like Zn and Al react with strong alkalis to evolve H_2 gas.

$$Zn(s) + 2NaOH(aq) \rightarrow \underset{\text{Sodium zincate}}{Na_2ZnO_2(aq)} + H_2(g)$$

3.2.6 Reactions of Bases with Non-metallic Oxides

Bases react with acidic oxides to form salt and water.

$$2NaOH(aq) + CO_2(g) \longrightarrow Na_2CO_3(aq) + H_2O(l)$$

3.2.7 Neutralisation

When an acid reacts with a base, it gives salt and water, it is called neutralisation reaction, and also it is an exothermic process.

$$HCl(aq) + NaOH(aq) \rightarrow NaCl(aq) + H_2O(l)$$

3.2.8 pH

The negative exponent of 10 to which it must be raised in order to express the hydrogen ion concentration of the solution in mole per litre. Mathematically, $[H^+(aq)] = 10^{-pH}$

Higher the $H^+(aq)$ concentration, lower is the pH value.

3.2.9 pH Scale

In neutral solution and pure water, $pH = 7$, acidic solutions, $pH < 7$ and alkaline solutions, $pH > 7$.

3.2.10 Universal Indicator

It is a pH indicator composed of several compounds that exhibit colour changes over a pH value range from 0 to 14. It not only shows acidic or basic nature of solution but also shows approximate pH by giving a particular colour for a specific value of pH.

3.3 SALTS

They are ionic compounds formed by the combination of cation from base and anion from acid.

$$\underset{\text{(Base)}}{NaOH(aq)} + \underset{\text{(Acid)}}{HCl(aq)} \longrightarrow \underset{\text{(Salt)}}{NaCl(aq)} + \underset{\text{(Water)}}{H_2O(l)}$$

3.3.1 pH of Salt Solutions

1. The salt of a strong acid and a weak base gives acidic solution (pH less than 7).

$$NH_4Cl(s) + H_2O(l) \rightleftharpoons NH_4OH(aq)$$

$$+HCl\,(aq)$$

Here, hydrochloric acid (strong acid) ionises to give $H^+(aq)$ ions which is greater than ammonium hydroxide (weak base) ionises to give $OH^-(aq)$ ions, so, the solution is acidic.

2. The salt of a strong base (NaOH) and a weak acid H_2CO_3 gives basic solution (pH more than 7).

$$NH_2CO_3(s) + H_2O\,(l) \rightleftharpoons 2NaOH\,(aq) + H_2CO_3(aq)$$

Here, NaOH releases $OH^-(aq)$ ion more and H_2CO_3 releases $H^+(aq)$ ion less, so, the solution is basic.

3. The salt of a weak acid (HA) and a weak base (BOH) gives slightly acidic or slightly basic or neutral solution (BA).

$$BA + H_2O \rightleftharpoons HA + BOH$$

If acid is stronger than base, the solution is acidic ($pH < 7$). If acid is weaker than the base, the solution is basic ($pH > 7$). If acid and base formed are of equal strength, the solution is neutral ($pH = 7$).

4. The salt of a strong acid and a strong base gives neutral solution($pH = 7$). Salts of strong acids and bases, e.g., NaCl, Na_2SO_4, etc., on dissolving in water do not hydrolyse, so, not disturb the $pH = 7$.

3.3.2 Sodium Chloride (NaCI)

It is common salt. It is obtained from sea water by the process of evaporation.

Uses of Sodium Chloride

1. Sodium chloride (NaCI) helps in proper functioning of the human body, i.e., in muscle contraction, etc. It helps the body to prepare hydrochloric acid in gastric juice.
2. It is used in cooking food and it improves the flavour of food.
3. It is used to prepare NaOH, Na_2CO_3, etc.

3.3.3 Sodium Hydroxide (NaOH)

It is prepared on a large scale by electrolysis of a conc. solution of sodium chloride. This solution is called brine.

$$2NaCl\,(aq) + 2H_2O\,(l) \xrightarrow[\text{Current}]{\text{Electric}} 2NaOH\,(aq) + H_2(g) + Cl_2(g)$$

Hydrogen gas is obtained at cathode and chlorine gas at anode. NaOH remains in solution. The solution on evaporation gives solid NaOH. This process is called chlor-alkali process.

1. Sodium Hydroxide is used in manufacturing soaps, detergents, paper, artificial silk (rayon) and dyes. It is used in manufacturing chemicals, i.e., sodium hypochlorite, sodium chlorate, etc.

3.3.4 Uses of Hydrogen Gas

It is used In manufacturing of ammonia and methyl alcohol and to prepare hydrochloric acid. It is used fur hydrogenating oils to give fats. Vegetable oils on hydrogenation give margarine. Vegetable oil $+H_2 \rightarrow$ Margarine (vegetable ghee)

3.3.5 Uses of Chlorine Gas

It is used as a bleaching agent in textile industry and used for sterilising water.

3.3.6 Washing Soda ($Na_2CO_3 \cdot 10H_2O$)

It is obtained from sodium carbonate (Na_2CO_3) through ammonia-soda or Solvay process. Its chemical name is sodium carbonate decahydrate.
Uses of Washing Soda : It is used for washing clothes and in manufacturing glass, caustic soda, borax, etc.

3.3.7 Baking Soda ($NaHCO_3$)

It is prepared by passing carbon dioxide through an aqueous solution of sodium carbonate. Its chemical name is sodium hydrogen carbonate or sodium bicarbonate.

$$Na_2CO_3 + CO_2 + H_2O \longrightarrow 2NaHCO_3$$

It Is a white crystalline solid, sparingly soluble in water and its aqueous solution is mildly alkaline. It decomposes on heating to give Na_2CO_3 and release CO_2. It reacts with acids (H^+) to evolve CO_2.

$$2NaHCO_3 \xrightarrow{\text{Heat}} Na_2CO_3 + H_2O + CO_2$$

$$NaHCO_3 + H^+ \longrightarrow Na^+ + H_2O + CO_2$$

3.3.8 Uses of Baking Soda

It is used in cooking and as an antacid to correct the acidity of stomach. It is used in making effervescent drinks and in fire extinguishers, and also in preparing baking powder.

3.3.9 Bleaching Powder

The chemical name of bleaching powder is calcium oxychloride ($CaOCl_2$). It is obtained by passing Cl_2 gas over dry slaked lime.

$$Ca(OH)_2(s) + Cl_2(g) \xrightarrow{30^\circ C - 35^\circ C} CaOCl_2(s) + H_2O(l)$$

3.3.10 Uses of Bleaching Powder

It is used for bleaching of wood pulp, cotton, and as a disinfectant.

3.3.11 Plaster of Paris

Its chemical name is calcium sulphate hemihydrate [$CaSO_4 \cdot (1/2)H_2O$]. It is obtained by heating gypsum ($CaSO_4 \cdot 2H_2O$).

$$CaSO_4 \cdot 2H_2O \xrightarrow[\text{In a kiln}]{373\,K - 398\,K} CaSO_4 \cdot (1/2)H_2O + (3/2)H_2O$$

Plaster of Paris on mixing with an adequate quantity of water, it forms a gypsum again.

$$CaSO_4 \cdot (1/2)H_2O + (3/2)H_2O \longrightarrow CaSO_4 \cdot 2H_2O$$

3.3.12 Uses of Plaster of Paris

It is used for immobilising the affected fractured part of bone leading to quick recovery. It is also used for making decorative pieces such as toys, statues, etc.

Plaster of Paris should be stored in moisture-proof container.

3.3.13 Water of Crystallisation

1. **Hydrated Salts :** A crystalline salt molecule that is loosely attached to a certain number of water molecules is called hydrated salt. These water molecules are water of crystallisation.
2. **Hygroscopy :** Those substances which absorb moisture from atmosphere at ordinary temperature, are called hygroscopic substances, and the property is known as hygroscopy, e.g., conc. H_2SO_4, etc.
3. **Deliquescence :** Those substances which absorb moisture from atmosphere at ordinary temperature and ultimately dissolve in the absorbed water to form a solution are called deliquescent substances and the phenomenon is called deliquescence, e.g., NaOH, KOH, etc.
4. **Efflorescence :** Certain hydrated salts when exposed to air at ordinary temperature lose their water of crystallisation either partially or completely, are called efflorescent salts and the phenomenon is called efflorescence, e.g., washing soda, epsom salt, etc.

□□□□□□□

MULITIPLE 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?
1. Salt formation takes place.
2. The temperature of the solution remains the same.
3. The temperature of the solution decreases.
4. The temperature of the solution increases.

(a) Only 1
(b) 1 and 2
(c) 2 and 4
(d) 1 and 4

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 Cl^- ions from the evolved gas.

8. Which of the following salts does not contain water of crystallization?
(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 < Hydrochloric
(b) Water < Hydrochloric < Acetic
(c) Acetic < Water < Hydrochloric
(d) Hydrochloric < Water < Acetic

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) Neutralize 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?
1. It turns lime water milky.
2. It extinguishes a burnings splinter.
3. it dissolves in a solution of sodium hydroxide.
4. It has a pungent odour.
(a) 1 and 2
(b) 1, 2 and 3
(c) 2, 3 and 4
(d) 1 and 4

15. Common salt besides being used in kitchen can also be used as the raw material for making
1. washing soda

2. bleaching powder
3. baking soda
4. slaked lime

(a) 1 and 2
(b) 1, 2 and 4
(c) 1 and 3
(d) 1, 3 and 4

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 toothpaste 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 base?
1. Higher the pH, stronger the acid
2. Higher the pH, weaker the acid
3. Lower the pH, stronger the base
4. Lower the pH, weaker the base

(a) 1 and 3
(b) 2 and 3
(c) 1 and 4
(d) 2 and 4

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?
1. Ionization
2. Neutralization
3. Dilution
4. Salt formation

(a) 1 and 2
(b) 1 and 3
(c) 2 and 3
(d) 2 and 4

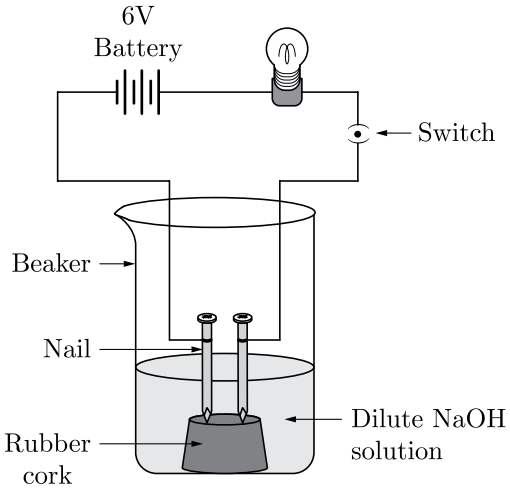
21. Which one of the following can be used as an acid-base indicator by a visually impaired student?
(a) Litmus
(b) Turmeric
(c) Vanilla essence
(d) Petunia leaves

22. Which of the following substances 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 (figure) was set up.



Which among the following statement (s) is (are) correct?
1. Bulb will not glow because electrolyte is not acidic.
2. Bulb will glow because NaOH is a strong base and furnishes ions for conduction.
3. Bulb will not glow because circuit is incomplete.
4. Bulb will not glow because it depends upon the type of electrolytic solution.

(a) 1 and 3
(b) 2 and 4
(c) Only 2
(d) Only 4

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) NH_4OH
(d) C_2H_5OH

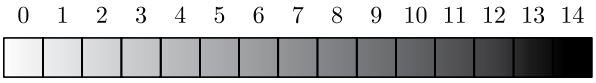
28. Which of the following statements is not correct?
(a) All metal carbonates react with acid to give a salt, water and carbon dioxide.
(b) All metal oxides react with water to give salt and acid.
(c) Some metals react with acids to give salt and hydrogen.
(d) Some non-metal oxides react with water to form acid.

29. Match the chemical substances given in column (A) with their appropriate application given in column (B)

	Column (A)		**Column (B)**
A.	Bleaching powder	(i)	Preparation of glass
B.	Baking soda	(ii)	Production of H_2 and Cl_2
C.	Washing soda	(iii)	Decolorization
D.	Sodium chloride	(iv)	Antacid

(a) A- (ii), B- (i), C- (iv), D- (iii)
(b) A- (iii), B- (ii), C- (iv), D- (i)
(c) A- (iii), B- (iv), C- (i), D- (ii)
(d) A- (ii), B- (iv), C- (i), D- (iii)

30. 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?



(a) Red
(b) Yellow
(c) Yellowish green
(d) Blue

31. Which of the following is (are) true when HCl(g) is passed through water?
1. It does not ionise in the solution as it is a covalent compound.
2. It ionizes in the solution.
3. It gives both hydrogen and hydroxyl ion in the solution.
4. It forms hydronium ion in the solution due to the combination of hydrogen ion with water molecule.

(a) Only 1
(b) Only 3
(c) 2 and 4
(d) 3 and 4

32. 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

33. Which of the following are present in a dilute aqueous solution of hydrochloric acid?
(a) $H_3O^+ + Cl^-$
(b) $H_3O^+ + OH^-$
(c) $Cl^- + OH^-$
(d) Unionized HCl

34. Identify the correct representation of reaction occurring during chlor-alkali process.
(a) $2NaCl_{(l)} + 2H_2O_{(l)} \rightarrow 2NaOH_{(l)} + Cl_{2(g)} + H_{2(g)}$
(b) $2NaCl_{(aq)} + 2H_2O_{(aq)} \rightarrow 2NaOH_{(aq)} + Cl_{2(g)} + H_{2(g)}$
(c) $2NaCl_{(aq)} + 2H_2O_{(l)} \rightarrow 2NaOH_{(aq)} + Cl_{2(aq)} + H_{2(aq)}$
(d) $2NaCl_{(aq)} + 2H_2O_{(l)} \rightarrow 2NaOH_{(aq)} + Cl_{2(g)} + H_{2(g)}$

35. Which of the following statements is/are correct for litmus?
1. Litmus solution is a purple dye.
2. It is extracted from lichen.
3. In neutral solution. it remains colourless.

(a) 1 and 2
(b) 2 and 3
(c) 1 and 3
(d) 1, 2 and 3

36. Which of the following is/are correct for olfactory indicators?
1. Their colour changes with acid or base.
2. Onion, vanilla or clove are examples.

(a) Only 1
(b) Only 2
(c) Both 1 and 2
(d) Neither 1 nor 2

37. Which of the following are correctly matched?

1.	Acid + salt	metal + hydrogen
2.	Acid + metal carbonate	salt + carbon dioxide + water
3.	Metal oxide + acid	salt + water

(a) 1 and 2
(b) 2 and 3
(c) 1 and 3
(d) 1, 2 and 3

38. Which of the following is/are correct for diluting acid?
1. Adding acid to water by stirring.
2. Adding water to acid by stirring.

(a) Only 1
(b) Only 2
(c) Both 1 and 2
(d) Neither 1 nor 2

39. Which of the following is/are correct for pH?
1. A scale for measuring hydronium ion concentration.
2. Values less than 7 on the pH scale represent an acidic solution.
3. As the pH value increases from 7 to 14, it represents an increase in hydrogen ion concentration in the solution.

(a) Only 1
(b) Only 2
(c) Only 3
(d) 1, 2 and 3

40. Which of the following are correctly matched?

1.	Plants and animals	pH range is 7.0 to 7.8
2.	Rain water	pH is 7.6
3.	Tooth decay	pH less than 5.5

(a) 1 and 2
(b) 2 and 3
(c) 1 and 3
(d) 1, 2 and 3

41. Which of the following are correctly

matched?

1.	Common salt	formed by sodium hydroxide and hydrochloric acid.
2.	Brine	aqueous solution of sodium chloride.
3.	Chlor-alkali process	formation of sodium chloride

(a) 1 and 2
(b) 2 and 3
(c) 1 and 3
(d) 1, 2 and 3

42. Which of the following are correctly matched?

1.	Bleaching powder	oxidising agent in chemical industries.
2.	Baking powder	a mixture of sodium hydrogen carbonate and a mild edible acid.
3.	Washing soda	remove permanent hardness of water.

(a) 1 and 2
(b) 2 and 3
(c) 1 and 3
(d) 1, 2 and 3

43. The chemical formula of plaster of paris is
(a) $CaSO_4 \cdot \frac{1}{2}H_2O$
(b) $CaSO_3 \cdot \frac{1}{2}H_2O$
(c) $Ca \cdot SO_4\frac{1}{2}O_2$
(d) $SO_4 \cdot \frac{1}{2}H_2O$

44. Which of the following are responsible for causing acid-rain?
(a) Oxides of sulphur and carbon dioxide
(b) Oxides of nitrogen and carbon monoxide
(c) Hydrogen sulphide and carbon dioxide
(d) Oxides of sulphur and nitrogen

45. On washing with soap, a turmeric stain on the cloth turns to red because
1. Soap solution is alkaline.
2. Soap solution is acidic.
3. Turmeric contains a natural indicator.
4. Turmeric contains litmus.

Select the correct alternative.
(a) 1 and 3
(b) 2 and 4
(c) 3 and 2
(d) 1 and 4

46. Which of the following are used as an antacid to reduce acidity in stomach?
(a) Sodium carbonate and magnesium hydroxide
(b) Magnesium hydroxide and sodium hydroxide
(c) Sodium bicarbonate and calcium hydroxide
(d) Sodium bicarbonate and magnesium hydroxide

47. A highly reactive element (X) reacts with oxygen of air even at room temperature to give an oxide (Y). The oxide (Y) is soluble in water. The aqueous solution of (Y) does not change the colour of red litmus solution but reacts with an aqueous solution of

sodium hydroxide. Here X is-
(a) sodium
(b) phosphorus
(c) carbon
(d) sulphur

48. Some of the substances used in making of a modern safety match box are listed below :
1. Antimony trisulfide
2. Glass powder
3. Potassium chlorate
4. Red phosphorus

The head of modern safety match stick contains :
(a) 1 and 4
(b) 2 and 3
(c) 3 and 4
(d) 3 and 1

49. Calamine is used to reduce the irritating effect of ant bite/sting because it reacts with (X) released due to the bite/sting of ants with (Y) present in calamine. Then (X) and (Y) respectively are :
(a) Sodium hydrogen carbonate and formic acid
(b) Formic acid and zinc carbonate
(c) Acetic acid and common salt
(d) Hydrochloric acid and zinc oxide

50. A metal carbonate X on treatment with a mineral acid liberates a gas which when passed through an aqueous solution of a substance Y on reaction with the gas obtained at anode during electrolysis of brine gives a compound Z which can decolourise coloured fabrics. The compounds X, Y and Z respectively are
(a) $CaCO_3$, $Ca(OH)_2$, $CaOCl_2$
(b) $Ca(OH)_2$, CaO, $CaOCl_2$
(c) $CaCO_3$, $CaOCl_2$, $Ca(OH)_2$
(d) $Ca(OH)_2$, $CaCO_3$, $CaOCl_2$

51. A salt can be produced by reaction between
1. a weak acid and weak base.
2. metal oxide and water.
3. metal and a mineral acid.
4. metal oxide and a mineral acid.

(a) 1, 2 and 3
(b) 2, 3 and 4
(c) 3, 4 and 1
(d) 4, 1 and 2

52. Which of the following is true about the two statements?
Statement I : Reactivity of aluminium decreases when it is dipped in nitric acid
Statement II : A protective layer of aluminium nitrate is formed when aluminium is dipped in nitric acid.
(a) I is correct but II is incorrect
(b) I is incorrect but II is correct
(c) Both the statements are correct and II is also the correct explanation of I
(d) Both the statements are correct but II is not correct explanation of I

53. A silvery white metal X reacts with water at room temperature to produce a water soluble compound Y and a colourless gas Z. The reaction is highly exothermic and the Z catches fire immediately during the reaction. The solution of Y in water on reacting with stoichiometric amount of

dilute solution of hydrochloric acid gives a solution of pH $= 7.0$. The compounds X, Y and Z respectively are-

(a) Al, $Al(OH)_3$ and H_2

(b) Ag, AgOH and H_2

(c) K, KCl and H_2

(d) Na, NaOH and H_2

54. Match the items of Column I with the items of the Column II

	Column I		**Column II**
(i)	$NH_4OH + CH_3COOH \rightarrow CH_3COONH_4 + H_2O$	(A)	Thermal decomposition
(ii)	$2AgBr \rightarrow 2Ag + Br_2$	(B)	Thermite reaction
(iii)	$ZnCO_3 \rightarrow ZnO + CO_2$	(C)	Photochemical reaction
(iv)	$2Al + Fe_2O_3 \rightarrow 2Fe + Al_2O_3$	(D)	Neutralization reaction

(a) (iv)-(B), (iii)-(D), (ii)-(A), (i)-(C)

(b) (iii)-(A), (i)-(B), (iii)-(C), (iv)-(D)

(c) (ii)-(B), (iv)-(A), (i)-(C), (iii)-(D)

(d) (i)-(D), (ii)-(C), (iii)-(A), (iv)-(B)

55. Which of the following represents the correct order of the acidic strength for equimolar aqueous solutions of HCl, H_2SO_4, NH_4OH and NaOH

(a) $HCl < NH_4OH < NaOH < H_2SO_4$

(b) $NH_4OH < NaOH < H_2SO_4 < HCl$

(c) $HCl < H_2SO_4 < NH_4OH < NaOH$

(d) $NaOH < NH_4OH < HCl < H_2SO_4$

56. P substance a react with another substance Q to produce the product R and a gas S. If a mixture of the gas S. and ammonia is passed through an aqueous solution of R, baking soda is formed. The substances P and Q are

(a) HCl and NaOH

(b) HCl and Na_2CO_3

(c) Na and HCl

(d) Na_2CO_3 and H_2O

57. The reaction that differs from the rest of the reaction given is-

(a) formation of calcium oxide from limestone

(b) formation of aluminium from aluminium oxide

(c) formation of sodium carbonate from sodium hydrogen carbonate

(d) formation of mercury from mercuric oxide

58. An element X reacts with dilute H_2SO_4 as well as with NaOH to produce salt and $H_2(g)$. Hence, it may be concluded that :

1. X is an electro-positive element.
2. oxide of X is basic in nature.
3. oxide of X is acidic in nature.
4. X is an electronegative element.

(a) 1, 2, 3

(b) 4, 1, 2

(c) 3, 4, 1

(d) 2, 3, 4

59. The turmeric solution will turn red by an aqueous solution of-

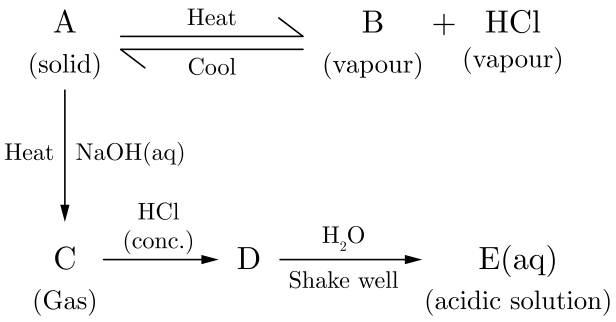
(a) potassium acetate

(b) copper sulphate

(c) sodium sulphate

(d) ferric chloride

60. The schematic diagram is given below :



Which of the following is an incorrect statement?

(a) A and E are chemically same.
(b) A and D are chemically same.
(c) D and E are chemically same.
(d) C and E are chemically same.

61. When an acid reacts with a metal than X gas is liberated. Here X is-

(a) Ammonia gas
(b) Hydrogen gas
(c) Carbon dioxide gas
(d) Methane gas

62. Which of the following is not true for acids?

(a) Acid react with copper (II) oxide to produce a blue solution.
(b) Acid liberate carbon dioxide gas when reacted with sodium carbon-ale
(c) Acid liberate hydrogen gas when reacted with magnesium ribbon.
(d) Acid produces hydrogen molecules when dissolved in water.

63. Which of the following statement is incorrect for acids?

(a) They give pink colour with phenolphthalein.
(b) They give H^+ ions in water.
(c) They are sow in taste.
(d) They turn blue litmus red.

64. Which two substances react to give salt and water only?

(a) Copper (II) oxide and ethanoic acid
(b) Magnesium and sulphuric acid
(c) Sodium oxide and water
(d) Zinc carbonate and hydrochloric acid

65. A solution in test tube 'A' turns red litmus blue, evolves hydrogen gas on reaction with zinc and does not react with sodium carbonate. Whereas, solution in test tube 'B' turns blue litmus red, liberates hydrogen gas on reaction with zinc and evolves carbon dioxide gas with sodium carbonate. Identify 'A' and 'B'.

(a) 'A' is an acid, 'B' is a base.
(b) 'A' is a base, 'B' is an acid.
(c) Both 'A' and 'B' are bases.
(d) Both 'A' and 'B' are acids.

66. Which of the following will turn red litmus to blue?

(a) Vinegar
(b) Banking soda solution
(c) Soft drink

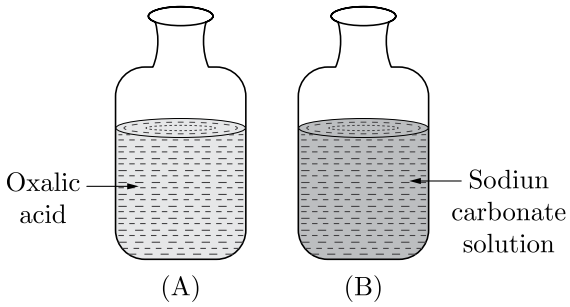
(d) Lemon juice

67. Which gas is evolved when acids react with metal carbonates?
(a) H_2
(b) CO_2
(c) O_2
(d) NH_3

68. The colour of the pH paper turned red when it was dipped in X solution. The X is-
(a) Dilute Hydrochloric acid.
(b) Dilute sodium hydroxide solution.
(c) Tap water
(d) Dilute sodium bicarbonate solution.

69. Which of the following is not a base?
(a) NaCl
(b) KOH
(c) ZnO
(d) $Al(OH)_3$

70. When pH strip is dipped in each bottle, the colour shown by bottle A and B will be respectively:



(a) orange, blue
(b) blue, orange
(c) green, blue
(d) blue, green

71. $2NaOH + Zn \longrightarrow X + H_2$
Here X is
(a) Na_2ZnO_2
(b) $NaZnO_2$
(c) Na_2ZnO
(d) Na_3ZnO_2

72. Which of the following solutions has the lowers pH value?
(a) 0.1 molar NaCl solution
(b) 0.01 molar $NaHCO_3$ solution
(c) 0.001 molar $Na2CO_3$ solution
(d) 0.01 molar NaOH solution

73. On putting a few drops of X liquid on the pH paper the colour of pH paper changes to violet. The liquid X is
(a) Dilute sodium hydroxide

(b) Dilute hydrochloric acid
(c) Dilute acetic acid
(d) Water

74. The term pH stands for:
(a) potential of hydrogen
(b) peak of hydrogen
(c) push of hydrogen
(d) pointed to hydrogen

75. pH of different solution are given in the table below.

Solution	**pH**
A	2.4
B	14.0
C	7.5
D	9.0

Arrange the above solution in the increasing order of OH^- ion concentration.
(a) D < C < B < A
(b) A < C < D < B
(c) C < D < B < A
(d) B < D < C < A

76. Which of the following is more acidic in nature?
(a) Baking soda
(b) Lime water
(c) Lemon
(d) Apple

77. Which one of following property of base is incorrect?
(a) Bases are bitter to taste.
(b) Bases are soapy and slippery to touch.
(c) Bases are not a good conductor of electricity.
(d) None of these.

78. On diluting a solution of pH = 4.5 it pH will
(a) increases
(b) decreases
(c) remain same
(d) firstly increases than decreases

79. In an experiment of pH paper four students takes the following observation?

Student	Sample	pH paper colour
A	Water	Blue
B	Dilute HCl	Red
C	Dilute NaOH	Blue
D	Dilute Ethanoic acid	Orange

Which student takes the incorrect observation?
(a) B
(b) C
(c) D
(d) A

80. Which of the following acid is present in the vinegar?
(a) Acetic acid
(b) Tartaric acid

(c) Lactic acid
(d) Citric acid

81. Which of the following is not a acid?
(a) KOH
(b) HNO_3
(c) HCl
(d) H_2SO_4

82. Which of the following is the synthetic indicator?
(a) Methyl orange
(b) Phenolphthalein
(c) China rose
(d) Both (a) and (b)

83. ..... indicator odour changes in acidic or basic media.
(a) Methyl orange
(b) Phenolphthalein
(c) Olfactory
(d) Ozonal

84. Which of the following substance have maximum value of pH?
(a) Lemon
(b) Rain water
(c) Sea water
(d) Apple

85. Consider the following table :

Substance	**pH**
Lemon	2.3
Battery acid	x
Sea water	8.5
Apple	3.1

The value of x in above table is:
(a) 0
(b) 1.3
(c) 2.5
(d) 1.9

86. Which of the following pair is incorrect?

	Substance	**pH**
(a)	Hydrochloric acid	1.0
(b)	Vinegar	2.8
(c)	Lime water	11
(d)	Stomach acid	1

87. Which compound is formed due to the reaction of acid on metal oxides?
(a) Oxygen
(b) Nitrogen
(c) Salt
(d) Ammonia

88. $2NaCl + (dil)\,H_2SO_4 \longrightarrow Na_2SO_4 + Y$
Here Y is.
(a) Cl_2
(b) H_2
(c) 2HCl
(d) SO_2

89. The chemical name of bleaching powder is:
(a) Calcium oxychloride
(b) Calcium chloride
(c) Calcium carbonate
(d) Calcium sulfate

90. ..... is obtained by heating of gypsum.
(a) Bleaching powder
(b) Plaster of paris
(c) Banking soda
(d) Sodium hydroxide

91. ..... is obtained by passing Cl_2 over dry slaked lime.
(a) Plaster of paris
(b) Bleaching powder
(c) Banking soda
(d) Washing soda

92. Washing soda is obtained from ..... carbonate.
(a) Calcium
(b) Sodium
(c) Magnesium
(d) Zinc

93. Read the following statements:
I. When a red litmus paper is dipped into the reaction mixture of a saponification reaction, it turns blue and the reaction is exothermic.
II. When a blue litmus paper is dipped into the reaction mixture of a saponification reaction, its colour does not change and the reaction is exothermic.
III. When a red litmus paper is dipped into the reaction mixture of a saponification reaction, its colour does not change and the reaction is endothermic.
IV. When a blue litmus paper is dipped into the reaction mixture of a saponification reaction, its colour does not change and the reaction is endothermic.
Which of the above statements are correct?
(a) I and II
(b) II and III
(c) III and IV
(d) I and IV

94. A student prepared 20% sodium hydroxide solution in a beaker containing water. The observations noted by him are given below.
I. Sodium hydroxide is in the form of pellets.
II. It dissolves in water readily.
III. The beaker appears cold when touched from outside.
IV. Red litmus paper turns blue when dipped into the solution.
The correct observations are:
(a) I, II and III
(b) II, III and IV
(c) III, IV and I
(d) I, II and IV

95. Hard water required for an experiment is not available in a school laboratory. However, following salts are available in the laboratory. Select the salts which may be dissolved in water to make it hard for

the experiment.
1. Calcium Sulphate
2. Sodium Sulphate
3. Calcium Chloride
4. Potassium Sulphate
5. Sodium Hydrogen Carbonate
6. Magnesium Chloride

(a) 1, 2 and 4
(b) 1, 3 and 6
(c) 3, 5 and 6
(d) 2, 4 and 5

96. In an experiment to study the properties of acetic acid, a student takes about 2 ml of acetic acid in a dry test tube. He adds about 2 ml of water to it and shakes the test tube well. What will he observe ?
(a) The acetic acid dissolves readily in water.
(b) The solution becomes light orange.
(c) Water floats over the surface of acetic acid.
(d) Acetic acid floats over the surface of water.

97. A student takes 2 ml acetic acid in a dry test tube and adds a pinch of sodium hydrogen carbonate to it. He makes the following observations:
I. A colourless and odourless gas evolves with a brisk effervescence.
II. The gas turns lime water milky when passed through it.
III. The gas burns with an explosion when a burning splinter is brought near it.
IV. The gas extinguishes the burning splinter which is brough near it.

The correct observations are:
(a) I, II and III
(b) II, III and IV
(c) III, IV and I
(d) IV, I and II

98. We need 20% aqueous solution of sodium hydroxide for the study of saponification reaction. When we open the lid of the bottle containing solid sodium hydroxide we observe it in which form?
(a) Colourless transparent beads
(b) Small white beads
(c) White pellets/flakes
(d) Fine white powder

99. In a locality, hard water, required for an experiment, is not available. However, the following salts are available in the school laboratory:
1. Sodium sulphate
2. Calcium sulphate
3. Magnesium chloride
4. Sodium chloride
5. Calcium chloride
6. Potassium sulphate

Which of the above may be dissolved in water to obtain hard water for the experiment?
(a) 2, 3 and 5
(b) 1, 2 and 5
(c) 1, 2, 4 and 6
(d) 3 and 5 only

100. What do we observe on pouring acetic acid on red and blue litmuts papers?
(a) Red litmus remains red and blue litmus turns red.
(b) Red litmus turns blue and blue litmus remains blue.

(c) Red litmus turns blue and blue litmus turns red.
(d) Red litmus becomes colourless and blue litmus remains blue.

101. A student takes about 6 ml of distilled water in each of the four test tubes A, B, C and D, then dissolves in equal amount four different salts name sodium chloride in A Potassium Chloride in B, Calcium Chloride in C and magnesium chloride in D. He then adds 10 drop of soap solution to each test tube and shakes its contents. The test tube(s) in which he would observe a good amount of lather is:
(a) A and B
(b) Only A
(c) C and D
(d) Only B

102. Hard water is not available for an experiment in the school and its vicinity. However, some salts as given below are available in the school laboratory.
1. Sodium Chloride
2. Sodium Sulphate
3. Calcium Chloride
4. Calcium Sulphate
5. Potassium Chloride
6. Magnesium Sulphate

Select form the following a group of these salts, each member of which may be dissolved in water to make it hard.
(a) 1, 2, 5
(b) 1, 3, 5
(c) 3, 4, 6
(d) 2, 4, 6

103. The pH of soft drink is ..... and they are ..... .
(a) less than 7, acidic
(b) more than 7, basic
(c) equal to 7, neutral
(d) less than 7, basic

104. When acidified potassium dichromate solution is added to a jar containing sulphur dioxide gas, the solution becomes:
(a) colourless
(b) brown
(c) dark orange
(d) green

105. When you add a few drops of acetic acid to a test-tube containing sodium bicarbonate powder, which one of the following is your observation?
(a) No reaction takes place.
(b) A colourless gas with pungent smell is released with brisk effervescence.
(c) A brown coloured gas is released with brisk effervescence.
(d) Formation of bubbles of a colourless and odourless gas.

106. A student require hard water for an experiment in his laboratory which is not available in the neighbouring area. In the laboratory there are some salts, which when dissolved in distilled water can convert it into hard water. Select from the following groups of salts, a group, each salt of which when dissolved in distilled water will make it hard.
(a) Sodium chloride, Potassium chloride

(b) Sodium sulphate, Potassium sulphate
(c) Sodium sulphate, Calcium sulphate
(d) Calcium sulphate, Calcium chloride

107. To a sample of turmeric adulterated with metanil yellow, concentrated hydrochloric acid was added. The colour of the reaction mixture
(a) became green
(b) became blue
(c) remained the same
(d) disappeared

108. Which one of the following is used in manufacturing of ammonia?
(a) Washing soda
(b) Bleaching powder
(c) Plaster of paris
(d) Hydrogen gas

109. Which of the following acid present in curd?
(a) Acetic acid
(b) Citric acid
(c) Oxalic acid
(d) Lactic acid

110. Metal carbonate + acid → salt + Y + water
Here Y is:
(a) carbon dioxide
(b) carbon monoxide
(c) carbon chloride
(d) metal oxide

111. When acid and base is mixed together than which of the following is formed?
(a) Salt
(b) Base
(c) Acid
(d) Hydrogen

112. Mixing of an acid or base with water is known as ..... .
(a) dilution
(b) neutralisation
(c) indicators
(d) offertory inductors

113. Which one of the following is used for bleaching cotton and linen in textile industry?
(a) Caustic soda
(b) Bleaching powder
(c) Baking soda
(d) Washing soda

114. When electricity is passed through an aqueous solution of sodium chloride than ..... is formed.
(a) Sodium hydroxide
(b) Sodium sulphate
(c) Sodium chloride
(d) Sodium bicarbonate

115. When a few drops of liquid X were added to distilled water. It was observed that the pH of water decreased. The liquid sample

X is:
(a) acid
(b) base
(c) salt
(d) mixture of salt and acid

116. Which of following solution have a higher concentration of H^+ ions?
(a) 1 M HCl solution
(b) 1 M CH_3COOH solution
(c) 0.5 M CH_3COOH solution
(d) None of these

117. Arrange the following in the increasing order of pH values.
A. NaOH solution
B. Blood
C. Lemon juice
D. Milk of magnesia
(a) C < B < D < A
(b) A < B < C < D
(c) D < C < B < A
(d) A < B < D < C

118. Which of following tablets are used by a person suffering from acidity?
(a) Antacid
(b) Antabuse
(c) Antasalt
(d) None of these

119. When 2 mL of sodium hydioxide solution is added to a few pieces of granulated zinc metal taken in test tube. When the contents are warmed, a gas evolves which is bubbled through a soap solution before testing.
The name of the gas is:
(a) Hydrogen
(b) Oxygen
(c) Nitrogen
(d) Helium

120. A student take a small amount of copper oxide in a beaker and dilute hydrochloric acid slowly while stirring.
Which of the following product is formed in above process?
(a) $CuCl_2$
(b) CuCa
(c) $CuMg_2$
(d) CuCOH

121. Which of the following property is incorrect for acid?
(a) Acid have sour taste.
(b) Acid are corrosive to metals.
(c) Acid change red litmus paper to blue.
(d) Acid become less acidic on mixing with bases.

122. Which of the following pair is incorrect?

	Acid	**Source**
(a)	Ascorbic acid	All citrus fruits
(b)	Malic acid	Pears
(c)	Formic acid	Ant stings
(d)	Acetic acid	Milk

123. Which of the following is the organic acids?
(a) HCl
(b) HNO_3
(c) H_2SO_4
(d) CH_3COOH

124. Arrange the following acids on their basicity in the table:
A = HCl, B = HNO_3, C = H_3PO_4

	Type of acid	Acid
1.	Monobasic	
2.	Dibasic	
3.	Tribasic	

(a) 1-A, 2-B, 3-C
(b) 1-C, 2-B, 3-A
(c) 1-A, 2-C, 3-B
(d) 1-B, 2-C, 3-A

125. ..... is used in bathing soaps.
(a) Sodium hydroxide
(b) Potassium hydroxide
(c) Magnesium hydroxide
(d) Ammonium hydroxide

126. Which of following in not a natural indicator?
(a) Red cabbage
(b) China rose
(c) Turmeric
(d) Onion

127. An acid produces ..... ions in water.
(a) Hydrogen
(b) Helium
(c) OH^-
(d) None of these

128. Which of the following is the strong acid?
(a) CH_3COOH
(b) HCN
(c) HBr
(d) HF

129. Which of the following pair is not correct?

	Acid	**Example**
(a)	Monobasic acid	HNO_3
(b)	Dibasic acid	H_3PO_3
(c)	Tribasic acid	H_3PO_4
(d)	Monobasic acid	H_2SO_4

130. ..... acid is used in car battery.
(a) Nitric
(b) Sulpharic
(c) Carbonic
(d) Tartaric

131. A body wanted to remove the grease strain from our shirt. So he used a X solution. Here X solution is:
(a) Ammonium hydroxide
(b) Magnesium hydroxide
(c) Calcium hydroxide
(d) Sodium hydroxide

132. Which of the following is the correct for dilution of acid and base?
(a) Acid or base added to water.
(b) Water is added to acid or base.
(c) Water is added drop by drop to acid or base.
(d) Water cannot be added in acid or base.

133. The acidic solution is the one in which the concentration of ..... is grater than that of ..... ions.
(a) H^+, OH^-
(b) DH^-, H^+
(c) H_3O^+, H^+
(d) H^+, H_3O^+

134. The hydrogen ion concentration of solution is 0.001 M. The pH of solution is?
(a) 3
(b) 2
(c) 1
(d) 1.5

135. The hydrogen ion concentration of a solution is 1.0×10^{-9} M. The pH of the solution is:
(a) 10
(b) 9
(c) 11
(d) 8

136. The hydroxyl ion concentration of a solution is 0.001 M. The pH of the solution is:
(a) 11
(b) 12
(c) 13
(d) 14

137. The hydroxyl ion concentration of a solution is 1.0×10^{-9} M. The pH of the solution is:
(a) 4
(b) 5
(c) 6
(d) 7

138. Which of the following statement is incorrect about acids?
(a) they change the colour of red litmus to blue
(b) they have sour taste
(c) they may change the colour of indicator
(d) they changes the colour or blue litmus to red

139. When $Ca(OH)_2$ reacts with $CO_2(g)$, it will give $CaCO_3(s)$ and $H_2O(l)$. The nature of $CaCO_3$ is
(a) acidic
(b) basic
(c) neutral
(d) All are possible

140. The correct statement regarding universal

indicator is
(a) it gives orange colour at pH = 3
(b) it becomes colourless at pH = 7
(c) it is an indicator having pH = 7
(d) it gives blue colour at pH = 3

141. When NaOH and HCl are mixed in equal molar quantities, the result is
(a) the formation of salt $+H_2O$
(b) the formation of salt $+H_2(g)$
(c) the formation of salt $+O_2(g)$
(d) All above are correct

142. Aqueous solution of copper sulphate reacts with aqueous ammonium hydroxide solution to give.
(a) green precipitate
(b) brown precipitate
(c) pale blue precipitate
(d) white precipitate

143. The organic acid present in tomato is
(a) oxalic acid
(b) lactic acid
(c) malic acid
(d) tartaric acid

144. You are having five solutions P, Q, R, S and T with pH values as follows:
$P = 1.8$, $Q = 7$, $R = 8.5$, $S = 8$ and $T = 5$
Which solution would be most likely to liberate hydrogen with magnesium powder?
(a) Solution P and Q
(b) Solution P
(c) Solution R
(d) All of the above

145. The reagent used to distinguish iron (II) chloride and iron (III) chloride is
(a) Warm water
(b) distilled water
(c) NaOH
(d) dil. HCl

146. An acid (P) with sodium hydrogen carbonate is used in making the cakes fluffy and spongy. It is due to the release of (Q) gas in the reaction. Here, P and Q are
(a) P : Tartaric acid : Q : CO_2
(b) P : Succinic acid : Q : H_2
(c) P : Tartaric acid : Q : O_2
(d) P : Oxalic acid : Q : CO_2

147. The pH of a solution is 4.5. What should be the change in the hydrogen ion concentration of the solution, if its pH is to increased to 6.
(a) increases by 10 times
(b) doubled
(c) halved
(d) decreases to 1/10 of its original concentration

148. The pH of a solution is 6. Its hydrogen ion concentration is decreased by 100 times, the solution will be :
(a) more acidic

(b) basic
(c) neutral
(d) unaffected

149. Bleaching powder is soluble in cold water giving a milky solution due to-
(a) The absorption of carbon dioxide from atmosphere
(b) available chlorine
(c) lime present in it
(d) calcium carbonate formation

150. A blue litmus paper was first dipped in dil. HCl and then in dil. NaOH solution. It was observed that the colour of the litmus paper-
(a) remains blue in both the solutions
(b) changed to red
(c) changed first to red and then to blue
(d) changed blue to colourless

151. Bleaching powder gives smell of chlorine because it-
(a) contains excess of chlorine
(b) is a mixture of chlorine and slaked lime
(c) is unstable
(d) gives chlorine on exposure to atmosphere

152. A solution reacts with crushed egg-shells to give a gas that turns lime-water milky. The solution contains
(a) KCl
(b) NaCl
(c) HCl
(d) LiCl

153. **Assertion :** Olfactory indicators are those whose colour changes in acidic and basic medium.
Reason : They react with acidic and basic solutions.
(a) Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion.
(c) Assertion is true but the Reason is false.
(d) Both Assertion and Reason are false.

154. **Assertion :** Active metals react with acids to liberate Hydrogen gas.
Reason : It is an example of displacement reaction.
(a) Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion.
(c) Assertion is true but the Reason is false.
(d) Both Assertion and Reason are false.

155. **Assertion :** Acids contain H^+ ions.
Reason : H^+ ions neutralise acids.
(a) Both Assertion and Reason are true and Reason is the correct explanation

of the Assertion.

(b) Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion.

(c) Assertion is true but the Reason is false.

(d) Both Assertion and Reason are false.

156. Assertion : The process of dissolving an acid or a base in water is a highly exothermic one.

Reason : A large amount of heat is produced.

(a) Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

(b) Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion.

(c) Assertion is true but the Reason is false.

(d) Both Assertion and Reason are false.

157. Assertion : On heating, colour of hydrated copper sulphate changes from blue to white.

Reason : Copper sulphate is a crystalline salt.

(a) Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

(b) Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion.

(c) Assertion is true but the Reason is false.

(d) Both Assertion and Reason are false.

158. Assertion : Plaster of Paris is obtained on heating gypsum at 373K.

Reason : On heating gypsum at 373K, it loses water molecules.

(a) Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

(b) Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion.

(c) Assertion is true but the Reason is false.

(d) Both Assertion and Reason are false.

159. Assertion : Salts of strong acids and weak bases are basic in nature.

Reason : pH value of such salt are mare than 7.

(a) Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

(b) Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion.

(c) Assertion is true but the Reason is false.

(d) Both Assertion and Reason are false.

160. Assertion : When acid rain flows into the river, it lowers the pH of the river water.

Reason : The survival of aquatic life in such river becomes difficult.

(a) Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

(b) Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion.

(c) Assertion is true but the Reason is false.

(d) Both Assertion and Reason are false.

161. Assertion : Limestone, chalk and marble react with acids to form salt, carbon dioxide and water.
Reason : Limestone, chalk and marble are different forms of calcium carbonate.
(a) Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion.
(c) Assertion is true but the Reason is false.
(d) Both Assertion and Reason are false.

162. Assertion : In a neutralisation reaction, metal and non-metal react to form salt.
Reason : Metal contains H^+ ions and non-metal OH^- ions.
(a) Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion.
(c) Assertion is true but the Reason is false.
(d) Both Assertion and Reason are false.

163. Assertion : Non-metallic oxides are acidic is nature.
Reason : Non-metallic oxides react with base to form salt and water just like an acid reacts with a base.
(a) Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion.
(c) Assertion is true but the Reason is false.
(d) Both Assertion and Reason are false.

164. Assertion : HCl produces hydronium ions (H_3O^+) and chloride ions (Cl^-) in aqueous solution.
Reason : In presence of water, base give H^+ ions.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Assertion is false but Reason is true.

165. Assertion : If the pH inside the mouth decreases below 5.5, the decay of tooth enamel begins.
Reason : The bacteria present in mouth degrades the sugar and left over food particles and produce acids that remains in the mouth after eating.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Assertion is false but Reason is true.

166. Assertion : H_2CO_3 is a strong acid.
Reason : A strong acid dissociates completely or almost completely in water.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Assertion is false but Reason is true.

167. Assertion : Salts are the products of an acid-base reaction.
Reason : Salt may be acidic or basic.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Assertion is false but Reason is true.

168. Assertion : On adding H_2SO_4 to water the resulting aqueous solution get corrosive.
Reason : Hydronium ions are responsible for corrosive action.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Assertion is false but Reason is true.

169. Assertion : pH of ammonium chloride solution is in acidic range.
Reason : Solution of a salt of weak base and strong acid is acidic.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Assertion is false but Reason is true.

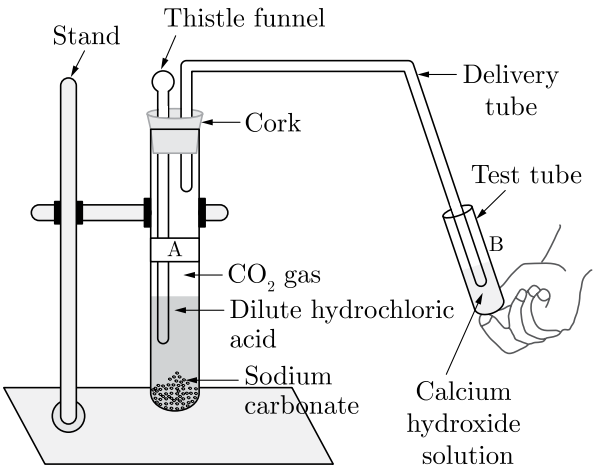
170. Assertion : Baking soda does not creates acidity in the stomach.
Reason : Baking soda is not alkaline.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Assertion is true but Reason is false

171. Assertion : Plaster of Paris is used by doctors by setting fractured bones.
Reason : When Plaster of Paris is mixed with water and applied around the fractured limbs, it sets into a hard mass.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Assertion is false but Reason is true.

172. **Assertion :** Sodium hydroxide reacts with zinc to produce hydrogen gas.
Reason : Acids reacts with active metals to produce hydrogen gas.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Assertion is false but Reason is true.

COMPETENCY BASED QUESTIONS

173. A student takes two test tube *A* and *B* and arrange the test tubes according to the figure:



Student takes about 0.5 g of sodium carbonate (Na_2CO_3) in test tube *A* and about 0.5 g of sodium hydrogen carbonate ($NaHCO_3$) in test tube *B*. After this student add about 2 ml of dilute HCl to both the test tubes.
Which of following gas is evolved in the about experiment?
(a) Carbon dioxide
(b) Carbon monoxide
(c) Oxygen
(d) Carbon chloride

Direction For Questions (175-176)

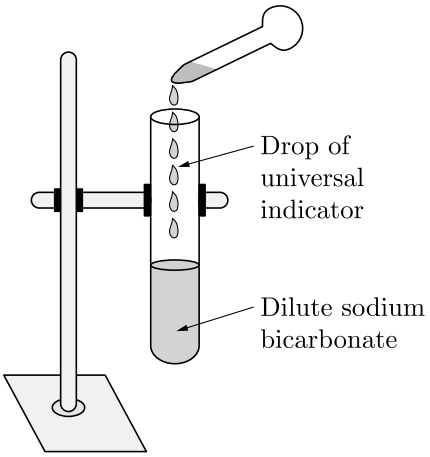
Take about 2 ml of dilute NaOH solution in a test tube and add two drops of phenolphthalein solution.

174. The colour of solution is:
(a) Pink
(b) Blue
(c) Red
(d) Green

175. In the previous question, hydrochloric acid is mixed drop by drop. The colour of this solution is:
(a) Pink
(b) Blue
(c) Red
(d) Green

176. A student adds a few drops of the universal indicator to a dilute solution of sodium

bicarbonate taken in a test tube.



The colour of mixture of universal indicator and dilute sodium bicarbonate is:

(a) Green
(b) Yellow
(c) Violet
(d) Blue

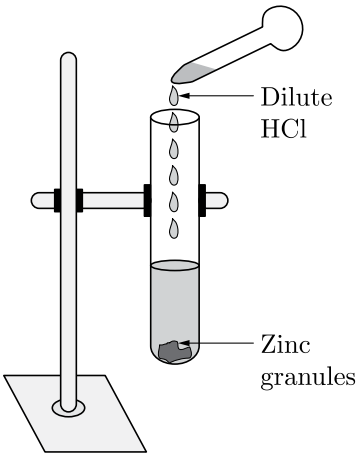
177. A student placed a few drops of a liquid over a portion of the blue litmus paper as shown in figure. He observed that the blue litmus paper turned red. The liquid could be:

(a) water
(b) dilute sodium bicarbonate solution
(c) dilute hydrochloric acid
(d) dilute sodium hydroxide

178. A student was provided with a pH chart by the teacher and asked to observe the colours corresponding to pH 1 and 14 respectively. The correct answer would be

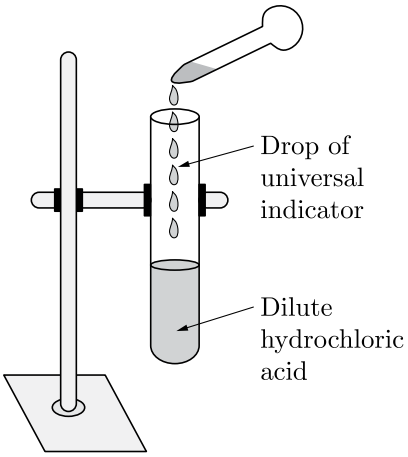
(a) yellow, green
(b) violet, orange
(c) red, blue
(d) blue, mustard

179. A student added dilute HCl to Zn granules taken in a test tube as shown in figure. The correct observation would be:



(a) no change
(b) evolution of gas
(c) Zn granules turned green
(d) formation of a precipitate

180. A student adds a few drops of the universal indicator to a solution of dilute hydrochloric acid in the way shown in the figure.
He would observe that the colour of the solution changes from colourless to:

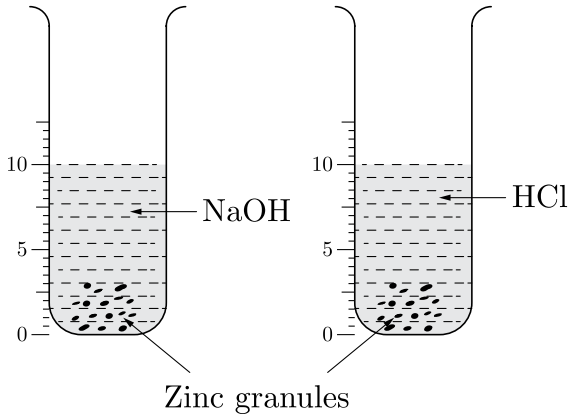


(a) red
(b) yellow
(c) violet
(d) green

181. A student takes some zinc granules in a test tube and adds dilute hydrochloric acid to it. He would observe that the colour of the zinc granules changes to
(a) Red
(b) Black
(c) Green
(d) Yellow

182. On putting few drops of an unknown liquid on pH strip, the colour of pH strip changed to green. The liquid taken is likely to be:
(a) dilute sodium hydroxide solution
(b) lemon juice
(c) dilute hydrochloric acid
(d) water

183. 10 mL of HCl and 10 mL of NaOH solutions are contacted in two separate beakers, labelled I and II respectively. On adding zinc granules to both as shown in figure, it is observed that at room temperature.

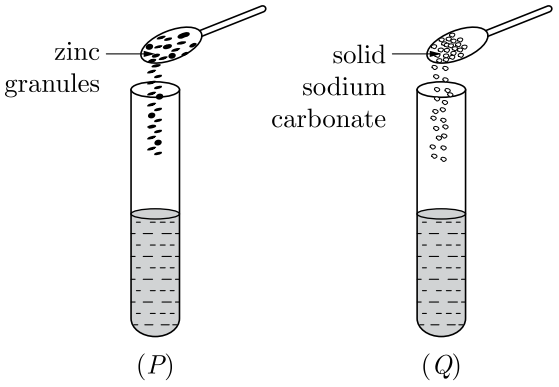


(a) no gas is evolved in either of the two beakers.
(b) gas is evolved in beaker II but not in beaker I.
(c) gas is evolved vigorously in both.
(d) gas is evolved vigorously in beaker I but not in beaker II.

184. You have four test tubes, P, Q, R, and S containing sodium carbonate, sodium chloride, lime water and blue litmus solutions respective. Out of these the material of which test tube/test tubes would be suitable for the correct test of acetic/ethanoic acid.
(a) Only P
(b) P and Q
(c) R and S
(d) P and S

185. A student took two test tubes containing 2 mL of dilute hydrochloric acid and added zinc granules to test tube (P) and solid sodium carbonate to test tube (Q) as

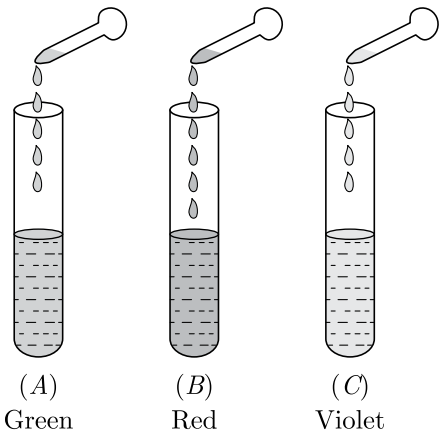
shown below.



The correct observation would be

(a) no reaction in any of the test tube
(b) rapid reaction in both the test tubes
(c) slow reaction in (P) and rapid reaction in (Q)
(d) rapid reaction in (P) but a slow reaction in (Q)

186. On adding a few drops of universal indicator to three unknown colourless solutions (A), (B) and (C), taken separately in three test tubes shown in the following diagrams, a student observed the changes in colour as green in (A), red in (B) and violet in (C).

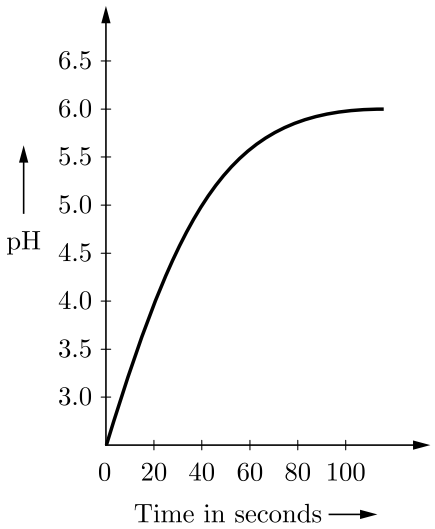


The decreasing order of pH of the solutions taken is

(a) $A > B > C$
(b) $C > A > B$
(c) $B > A > C$
(d) $C > B > A$

Direction For Questions (188-192)

Mr. Ashok assumed that the time taken for $10\,cm^3$ of CO_2 to be formed from a reaction between equal volume of acid solutions and 1.0 g of calcium carbonate is affected by the pH of acid solution. Mr. Rajesh tested his hypothesis and represented his results is shown in the graph.



187. What will happen at pH 6.5?

(a) No reaction
(b) Reaction occur very fast
(c) Slow reaction
(d) CO_2 will evolve

188. What is the nature of $CaCO_3$?

(a) Acidic salt
(b) Basic salt

(c) Amphoteric
(d) Can't predict

189. According to graph, a more acidic solution will produce the gas:
(a) can't predict
(b) more quickly
(c) less quickly
(d) at the same rate

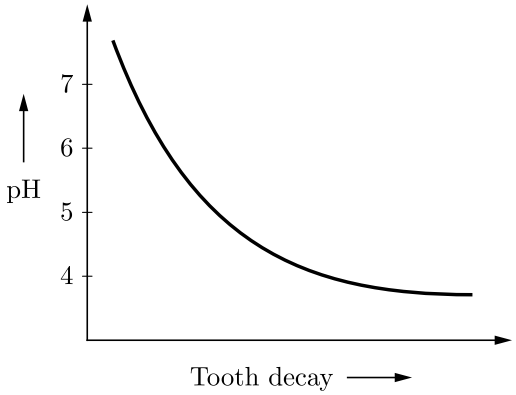
190. What will be time taken to collect $10\,cm^3$ of CO_2at pH = 5.0?
(a) 20 seconds
(b) 40 seconds
(c) 50 seconds
(d) 50 seconds

191. Which of the following statements is correct about an aqueous solution of an acid and of a base?
1. Lower the pH, weaker the base
2. Lower the pH, stronger the base
3. Higher the pH, weaker the acid
4. Higher the pH, stronger the acid

(a) 1 and 3
(b) 2 and 3
(c) 1 and 4
(d) 2 and 4

Direction For Questions (193-197)

Tooth decay starts when the pH of the mouth is lower than 5.5. Tooth enamel, made up of calcium phosphate is the hardest substance in the body. It does not dissolve in water, but is corroded 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. The best way to prevent this 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.



192. The tooth decay be prevented:
(a) By rinsing mouth with excess of water after eating.
(b) By using basic toothpaste.
(c) Both (a) and (b)
(d) Preventing use of acidic substances like lemon etc.

193. Teeth enamel is made of a substance called:
(a) Aluminium
(b) Calcium phosphate
(c) Iron
(d) Diamond

194. Tooth decay in the mouth starts when:
(a) pH of mouth is below 5.5
(b) pH of mouth is 7.6

(c) pH of mouth is 7.5
(d) pH of mouth is 7

195. The acidity in the mouth is due to:
(a) Undigestion of food.
(b) Degradation of sugar and food particles remaining in mouth by bacteria.
(c) Drinkin8g of Mosambi juice.
(d) Eating of acidic substances like tomatoes, orange etc.

196. The hardest substance in the body is:
(a) Tooth enamel
(b) Lungs
(c) Mouth
(d) Trachea

Direction For Questions (198-202)

Acidic solutions have excess of hydrogen ions. Even the acidic solutions contain hydroxide ions which come form the ionisation of water but the concentration of hydroxide ions in acidic solutions is much less than that of hydrogen ions.
The basic solution have excess of hydroxide ions. Even the basic solutions have hydrogen ions in them which come form the ionisation of water but the concentration of hydrogen ions in basic solutions is much less than that of hydroxide ions.
In 1909 Sorenson devised a scale (known as pH scale) on which the strength of acid solutions as well as basic solutions could be represented by making use of the hydrogen ion concentrations in them. Sorensen linked the hydrogen ion concentrations of acid and base solutions to the simple numbers 0 to 14 on his pH scale. The pH of a solution is inversely proportional to the concentration of hydrogen ions in it.
In everyday life, pH plays an important role on daily basis like in gardening and farming, the best crops are usually obtained with neutral or slightly acidic soil (pH 6.5 to 7.0), tooth decay starts when the pH of mouth is lower than 5.5. Bee-sting leaves an acid which causes pain and irritation etc.

197. Which of the following substance(s) is added by farmers if the soil is acidic?
(a) Common salt
(b) Slaked lime
(c) Vinegar
(d) Limestone

198. Rain is called an acid rain when the pH is
(a) above 8.5
(b) below 6.5
(c) below 5.6
(d) between 7-8

199. During indigestion, which acid is produced by the stomach that causes irritation and pain?
(a) Hydrochloric acid
(b) Sulphuric acid
(c) Nitric acid
(d) Phosphoric acid

200. The basic salt that gives relief on the stung area is
(a) washing soda

(b) caustic soda
(c) baking soda
(d) bleaching powder

201. Which of the following type of medicines is used for the treatment of hyperacidity in the stomach?
(a) Antiseptic
(b) Antibiotic
(c) Analgesic
(d) Antacid

Direction For Questions (203-207)

The acids are sour in taste while bases are bitter in taste. Tasting a substance is not a good way of finding out if it is an acid or a base. Acids and bases can be better distinguished with the help of indicators. Indicators are substances that undergo a change of colour with a change of acidic, neutral or basic medium. Many of these indicators are derived from natural substances such as extracts from flower petals and barrier. Some indicators are prepared artificially. For example, methyl orange and phenolphthalein.

202. When a few drops of phenolphthalein is added to a solution having pH 8.5, then the colour
(a) changes to blue
(b) changes to red
(c) changes to pink
(d) does not change

203. The colour observed when methyl orange is added to an acid is
(a) pinkish red
(b) blue
(c) orange
(d) yellow

204. Which of the following statement(s) is incorrect about the litmus paper?
(a) It is a most commonly used indicator.
(b) In acidic solution, blue litmus paper turns red.
(c) In neutral solution, no colour change is observed.
(d) Litmus solution is a yellow dye, which is extracted from the lichen plant.

205. Which solution will change blue litmus to red?
(a) NaOH(aq)
(b) NH_4OH(aq)
(c) KCl(aq)
(d) H_2SO_4(aq)

206. Which of the following solutions will turn phenolphthalein pink?
(a) HCl(aq)
(b) CO_2(aq)
(c) KOH(aq)
(d) H_2SO_4(aq)

Direction For Questions (208-212)

Baking soda is also called sodium bicarbonate. This is the major constituent

of baking powder.
Sodium chloride is used as one of the raw materials in the production of baking soda. Baking soda is commonly used to make crispy pakoras, etc., in the kitchen. It is also added for faster cooking. It is also used in the preparation of effervescent drinks and fruit salts and it is used as an antacid, it neutralises excess acid in the stomach.

207. The chemical name of baking soda is
(a) sodium hydrogen carbonate
(b) sodium hydroxide
(c) sodium carbonate decahydrate
(d) calcium oxychloride

208. Which of the following statements is correct regarding properties of baking soda?
(a) It is a yellow crystalline substance.
(b) It is non-corrosive in nature.
(c) It reacts with acids evolving hydrogen gas.
(d) All are correct

209. The temperature above which sodium bicarbonate decomposes to give sodium carbonate is
(a) 283 K
(b) 309 K
(c) 373 K
(d) 575 K

210. Baking powder is a mixture of
(a) sodium carbonate and ethanoic acid
(b) sodium hydrogen carbonate and ethanoic acid
(c) sodium carbonate and tartaric acid
(d) sodium hydrogen carbonate and tartaric acid

211. The chemical formula of baking soda is
(a) $NaHCO_3$
(b) NaOH
(c) $Na_2CO_3 \cdot 10H_2O$
(d) $CaOCl_2$

Direction For Questions (213-217)

The pH of a solution is a measure of its hydrogen ion (H^+) concentration. It is measured generally using pH scale. The values on pH scale ranges from 0 to 14.
A pH of 1 is very acidic and corresponds to a high concentration of H^+ ions. A pH of 14 is very basic and corresponds to a low concentration of H^+ ions. The pH of a neutral solution is 7. The table given below shows the pH and H^+ ion concentration of some common aqueous solutions. The leftmost column shows the number of moles of H^+ ions in 1 mole of liquid.

The pH and Hydrogen ion (H^+) Concentration of Some Solutions

H^+ Concentration (Moles)	**pH**	**Solution**
10^{-1}	1	
10^{-2}	2	Gastric (stomach) juice, cola, lemon juice
10^{-3}	3	Vinegar
10^{-4}	4	Tomato juice
10^{-5}	5	Black coffee, rain water

The pH and Hydrogen ion (H^+) Concentration of Some Solutions

H^+ Concentration (Moles)	**pH**	**Solution**
10^{-6}	6	Urine
10^{-7}	7	Pure water
10^{-8}	8	Sea water
10^{-9}	9	Baking soda
10^{-10}	10	
10^{-11}	11	Milk of magnesia
10^{-12}	12	Household bleach
10^{-13}	13	Oven cleaner
10^{-14}	14	

212. How is the hydrogen ion concentration and pH related to each other?
(a) They are inversely proportional
(b) They are directly proportional
(c) They are equal
(d) They have no relation

213. Among the given solutions in the above table, the most basic in nature is
(a) pure water
(b) oven cleaner
(c) household bleach
(d) gastric juice

214. The acid having highest hydrogen ion concentration is one with
(a) pH = 2.5
(b) pH = 1.8
(c) pH = 7
(d) pH = 10

215. Which of the following acids is used in making of vinegar?
(a) Nitric acid
(b) Sulphuric acid
(c) Formic acid
(d) Acetic acid

216. A basic solution could have a pH of
(a) 11
(b) 7
(c) 1
(d) 2

Direction For Questions (218-222)

A student takes the there solutions P, Q and R and make the reaction of all these solution with phenolphthalein indicator and methyl orange indicator. He get the following result:

Solutions	**Colour change with phenolphthalein indicator**	**Colour change with methyl orange indicator**
P	Pink	Yellow
Q	Colourless	Orange
R	Colourless	Red

217. The acidic solution is
(a) P
(b) Q
(c) R
(d) None of these

218. The increasing of pH of solution P, Q and R is
(a) $P < Q < R$
(b) $R < P < Q$
(c) $R < Q < P$
(d) $Q < R < P$

219. Solutions P and Q could be
(a) HCl and NaOH
(b) NaOH and NaCl
(c) CH_3COOH and CH_3COONa
(d) HCl and Na_2CO_3

220. When solution P added to the China rose indicator, the colour of the solution P changes to
(a) Green
(b) Dark red
(c) Pink
(d) Colourless

221. The solution which give pink colour after reaction with phenolphthalein indicator is
(a) P
(b) Q
(c) R
(d) None of these

Direction For Questions (**223-227**)

In pure water, the concentrations of hydrogen ions and hydroxide ions are equal. Due to this, pure water is neither acidic nor basic, it is neutral.
Acidic solutions have excess of hydrogen ions. Even the acidic solutions contain hydroxide ions which come form the ionisation of water but the concentration of hydroxide ions in acidic solutions is much less than than that of hydrogen ions.
The basic solution have excess of hydroxide ions. Even the basic solutions have hydrogen ions in them which come form the ionisation of water but the concentration of hydrogen ions in basic solutions is much less than that of hydroxide ions.
In 1909 Sorenson devised a scale (known as pH scale) on which the strength of acid solutions as well as basic solutions could be represented by making use of the hydrogen ion concentrations in them. Sorensen linked the hydrogen ion concentrations of acid and base solutions to the simple numbers 0 to 14 on his pH scale. The pH of a solution is inversely proportional to the concentration of hydrogen ions in it.
pH may be defined as a number by which negative power of 10 has to be raised in order to express the concentration of hydrogen ion of the solution i.e., $[H^+] = 10^{-pH}$ where the concentration of H^+ ions is expressed as moles/litre and is written as $[H^+]$.

S. No.	Solution	pH limit
1.	Saliva	6.5-7.5
2.	Lemon juice	2.2-2.4
3.	Tomato juice	4.0-4.4
4.	Coffee	4.5-5.5

222. When drops of tomato juice are dropped on litmus paper than litmus paper will turn
(a) red
(b) yellow
(c) green
(d) black

223. The nature of saliva in given table is
(a) acidic
(b) basic
(c) Neither acidic nor basic
(d) cannot be define

224. The effect of acid on litmus paper is
(a) blue to red in colour
(b) red to blue in colour
(c) red to green in colour
(d) green to red on colour

225. The effect of base on litmus paper is
(a) Turns red litmus to blue in colour
(b) Turns blue litmus to blue in colour
(c) Turns red litmus to orange
(d) None of these

226. The pH limit of coffee is
(a) 4.5-5.5
(b) 6.5-7.5
(c) 1.4-2.5
(d) 2.9-3.9

Direction For Questions (228-232)

For making baking powder, which is a mixture of baking soda (sodium hydrogen carbonate) and a mild edible acid such as tartaric acid. When baking powder is heated or mixed in water, the following reaction takes place:

$$\underset{\text{(From any acid)}}{NaHCO_3 + H^+} \longrightarrow CO_2 + H_2O +$$

Sodium salt of acid

Carbon dioxide produced during the reaction causes bread or cake to rise making them soft and spongy.

Sodium hydrogen carbonate is also an ingredient in antacids. Being alkaline, it neutralises excess acid in the stomach and provides relief.

It is also used in soda-acid fire extinguishers.

227. Which of the following compound is used in soda-acid fire extinguishers?
(a) Plaster of Paris
(b) Baking soda
(c) Washing soda
(d) Bleaching powder

228. ..... is the chemical name of baking soda.
(a) Calcium hydrogen carbonate
(b) Sodium hydrogen carbonate
(c) Calcium carbonate
(d) Sodium carbonate

229. Baking powder is a mixture of the following compounds:
(a) Bleaching powder and citric acid
(b) Baking soda and oxalic acid
(c) Washing soda and citric acid
(d) Baking soda and tartaric acid

230. Which ingredient is used in anti-acids which gives relief in stomach by neutralising excess acid?
(a) Magnesium hydroxide

(b) Sodium carbonate
(c) Aluminium hydroxide
(d) Sodium hydrogen carbonate

231. What is the nature of baking soda?
(a) It is amphoteric
(b) It is acidic
(c) It is alkaline
(d) It is neutral

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