CHAPTER – ACID BASES AND SALTS

I. MULTIPLE TYPE QUESTIONS [MCQ'S 1 MARK EACH]

EASY LEVEL

1. Electrolysis of brine solution produces chlorine gas and hydrogen at
   a. Anode and cathode, respectively. b. Both at cathode
   c. Cathode and anode respectively d. Both at Anode
2. Calcium phosphate is present in tooth enamel. Its nature is (E)
   (a) basic (b) acidic (c) neutral (d) amphoteric
3. pH of H_2O is
   (a) 7 (b) 8 (c) 9 (d) 10
4. The chemical name of bleaching powder is
   (a) calcium hypo oxychloride (b) calcium oxychloride (c) calcium chloride (d) calcium chloro oxide
5. Baking powder is
   (a) sodium carbonate + sodium tartarate (b) sodium bicarbonate + sodium tartarate
   (c) sodium bicarbonate + tartaric acid (d) sodium carbonate + sodium benzoate
6. When base reacts with the non-metal oxide
   (a) it neutralizes each other (b) it creates fire (c) it produces acidic salts (d) it produces basic salts
7. Corrosive effect on the skin is caused by
   (a) acids and bases (b) bases and salts (c) water (d) mercury
8. Which acid is found in bee sting?
   (a) Citric acid (b) Formic acid (c) Tartaric acid (d) Nitric acid
9. Rubbing of which does give relief from pain in the case of bee sting?
   (a) Dilute hydrochloric acid (b) Dilute nitric acid (c) Tooth paste (d) Alkali

II. ASSERTION AND REASON TYPE QUESTIONS [1 MARK EACH]

EASY LEVEL

The following questions consist of two statements — Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

1. Assertion (A) : The aqueous solutions of glucose and alcohol do not show acidic character.
   Reason (R) : Aqueous solutions of glucose and alcohol do not give H^+ ions.

2. Assertion (A) : Soaps would change the colour of red litmus to blue.
Reason (R) : Soaps are acidic in nature.

III. SHORT ANSWER TYPE QUESTIONS [2 MARKS EACH]

EASY LEVEL

1. Give one example of natural indicator.
2. Write some uses of caustic soda?

IV. SHORT ANSWER TYPE QUESTIONS [3 MARKS EACH]

EASY LEVEL

1. Give important properties of bases (alkalies).
(a) Name the raw materials used is the manufacture of sodium carbonate by Solvay process?
(b) How is sodium hydrogen carbonate from a mixture of NH_4Cl and $NaHCO_3$?
2. Write equations for the following reactions
(i) Dilute sulphuric acid reacts with zinc granules
(ii) Dilute hydrochloric acid reacts with magnesium ribbon.
(iii) Dilute sulphuric acid reacts with aluminum powder.
3. (a) An aqueous solution has a PH value of 7.0. Is this solution acidic, basic or neutral?
(b) If H+ concentration of a solution is 1×10^{-2} mol L^{-1} what will be its P4 value?
(c) Which has higher PH value: 1 –M HCl or 1–M NaOH.
4. What will you observe when:
(i) Red litmus is introduced into a solution of sodium sulphate.
(ii) Methyl orange is added to dil HCl.
(iii). Blue litmus is introduced into a solution of ferric chloride
5. A first aid manual suggests that vinegar should be used to treat wasp sting and baking soda for bee stings.
(a) What does this information tell you about the chemical name of the wasp sting?
(b) If there were no baking soda in the house, what other house hold substances would you use to treat as stings?

I. MULTIPLE TYPE QUESTIONS [MCQ'S 1 MARK EACH]

MEDIUM LEVEL

1. Name the substance which on treatment with chlorine yields bleaching powder.
a. CaO b. $Ca(OH)_2$ c. CuO d. $CaCO_3$
2. 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. changed first to red and then to blue
b. changed to red
c. remained blue in both the solutions
d. changed first to red and then to blue

3. Under what soil condition do you think a farmer would spread or treat the soil of his fields with quick lime (CaO) or slaked time?
a. When the pH of the soil increases
b. When the nutrients of the soil is lost
c. When the pH of the soil decreases
d. All of these

4. 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.

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

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

7. Ag_2S reacts with H_2SO_4 to form
(a) $AgSO_4$ (b) $Ag_2SO_4 + H_2S$ (c) $Ag_2O + H_2S$ (d) $AgOH + H_2S$

8. NaOH is obtained by electrolysis of
(a) Aq. solution of NaCl (b) Aq. Na2CO3 (c) Aq. NaHCO3 (d) Molten NaCl

9. The ratio of the water molecule in Plaster of Paris and Gypsum is
(a) 3:1 (b) 1:3 (c) 1:4 (d) 4:3

10. Gastric juice contains HCl which is one example of
(a) inorganic acid (b) organic acid (c) soft organic acid (d) strong inorganic acid

11. When milk of magnesia reacts with acetic acid it produces
(a) basic salt (b) acidic salt (c) neutral salt (d) complex salt

12. Which of the following phenomena will occur when a small amount of acid is added to water?
(i) dilution (ii) neutralisation (iii) salt formation (iv) ionization
(a) (i) and (iii) (b) (i) and (iv) (c) (ii) and (iii) (d) (ii) and (iv)

13. The acid used for the manufacture of fertilizers and explosives is
(a) nitric acid (b) sulphuric acid (c) phosphoric acid (d) hydrochloric acid

14. Which statement is correct?
(a) Organic acids are obtained from natural sources.
(b) Inorganic acids are prepared in laboratory.
(c) Bee sting contains formic acid.
(d) All of the above.

15. What happens when acid is mixed with water?
(a) Heat is evolved
(b) Heat is absorbed
(c) Concentration of acid increases
(d) All of the above

16. What happens when an alkali is mixed with water?
(a) Heat is evolved
(b) Heat is absorbed
(c) Concentration of acid increases
(d) All of the above

17. Which of the following is alkali?
(a) Sodium hydroxide (b) Calcium carbonate (c) Copper carbonate (d) Carbonic acid

18. Which of the following is called alkali?

(a) Water soluble base (b) Water insoluble base (c) Carbonate of metals (d) Oxides of metals

II. ASSERTION AND REASON TYPE QUESTIONS [1 MARK EACH]

MEDIUM LEVEL

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(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

1. Assertion (A) : The acid must always be added to water with constant stirring.

   Reason (R) : Mixing of an acid with water decreases the concentration of H+ ions per unit volume.

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

   Reason (R) : HCl gas dissolves in the water present in wet litmus paper to form H+ ions.

3. Assertion (A) : Pure water is neither acidic nor basic.

   Reason (R) : The pH of a solution is inversely proportional to the concentration of hydrogen ions in it.

III. SHORT ANSWER TYPE QUESTIONS [2 MARKS EACH]

MEDIUM LEVEL

1. Although acetic acid is highly soluble in water but still it is a weak acid. Explain why?
2. Why is sodium hydrogen carbonate an essential ingredient in most antacids?
3. i. A chemical compound X is used in the glass and soap industry. Identify the compound and give its chemical formula.

   ii. How many molecules of water of crystallisation are present in compound X?

IV. LONG ANSWER TYPE QUESTIONS [5 MARKS EACH]

MEDIUM LEVEL

1. 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.

VI. CASE BASED QUESTIONS

MEDIUM LEVEL

Read the following and answer any four questions from (i) to (v).

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.

(i) 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

(ii) 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

(iii) The basic salt that gives relief on the stung area is

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

(iv) 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

(v) 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

I. MULTIPLE TYPE QUESTIONS [MCQ'S 1 MARK EACH]

DIFFICULT LEVEL

1. Which one of the following is not required to find the pH of a solution?

a. Litmus paper b. Standard pH value chart c. pH paper d. Universal indicator

2. $NaHCO_3$, formed by reaction of

(a) $NaOH + H2CO_3$ (b) $NaCl + H2CO_3$ (c) $Na_2CO_3 + HCl$ (d) $NaOH + Na_2CO_3$

3. Which of the following is used for dissolution of gold ?

(a) Hydrochloric acid (b) Sulphuric acid (c) Nitric acid (d) Aqua regia

4. Lime water reacts with chlorine to form

(a) $CaCl_2$ (b) $CaOCl_2$ (c) $Ca(ClO_3)_2$ (d) CaO_2Cl_2

5. Brine is used for industrial production of

(a) NaOH (b) KOH (c) bleaching powder (d) none of the above

II. ASSERTION AND REASON TYPE QUESTIONS [1 MARK EACH]

DIFFICULT LEVEL

The following questions consist of two statements — Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

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(c) A is true but R is false.

(d) A is false but R is true.

1. Assertion (A) : Copper sulphate crystals are wet because it contains water of crystallisation.

   Reason (R) : Water of crystallisation is the fixed number of molecules of water present in one formula unit of salt.

2. Assertion (A) : Weak acids have low electrical conductivity.

   Reason (R) : Strong acids and weak acids have equal concentration of hydrogen ions in their solutions.

3. Assertion (A) : During electrolysis of concentrated aqueous solution of sodium chloride, hydrogen is produced at anode and chlorine gas is produced at cathode.

   Reason (R) : Ions get attracted to oppositely charged electrodes.

III. SHORT ANSWER TYPE QUESTIONS [2 MARKS EACH]

DIFFICULT LEVEL

1. An aqueous solution turns red litmus solution blue. Excess addition of which solution would reverse the change?
2. 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?
3. Why acids are not stored in metal containers?
4. How will you prepare the above compound starting from sodium chloride? Write all relevant equations involved in the process.

IV. LONG ANSWER TYPE QUESTIONS [5 MARKS EACH]

DIFFICULT LEVEL

1. 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.

2. Identify the acids and bases from which the above salts may be obtained. How many families can you identify among these salts?

V. CASE BASED QUESTIONS

DIFFICULT LEVEL

I. Read the following and answer any four questions from (i) to (v).

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.

(i) The chemical name of baking soda is

(a) sodium hydrogen carbonate (b) sodium hydroxide

(c) sodium carbonate decahydrate (d) calcium oxychloride

(ii) 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

(iii) The temperature above which sodium bicarbonate decomposes to give sodium carbonate is

(a) 283 K (b) 309 K (c) 373 K (d) 575 K

(iv) 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

(v) The chemical formula of baking soda is

(a) $NaHCO_3$ (b) NaOH (c) $Na_2CO_3.10H_2O$ (d) $CaOCl_2$

II. Read the following and answer any four questions from (i) to (v).

Acids, bases and salts are three main categories of chemical compounds. These have certain definite properties which distinguish one class from the other. 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. Litmus, a purple dye is extracted from the lichen plant. Some indicators are prepared artificially. For example, methyl orange and phenolphthalein.

Given below is a table of indicators and their colour change in acidic and basic medium.

Indicator	Colour in Acid	Colour in Alkali
Litmus	Red	Blue
Methyl orange	Pinkish red	Yellow
Phenolphtalein	Colourless	Pink

(i) Which of the following is an example of natural indicator?

(a) Turmeric (b) Methyl orange (c) Phenolphthalein (d) Methyl red

(ii) An aqueous solution turns blue litmus solution red. Excess addition of which solution would reverse the change?

(a) HCl (b) H_2SO_4 (c) NaOH (d) HNO_3

(iii) Universal indicators impart _____ colour in neutral solution.

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

(iv) An aqueous solution 'A' turns phenolphthalein solution pink. On addition of an aqueous solution 'B' to 'A', the pink colour disappears. Which of the following statement is true for solution 'A' and 'B'?

(a) A is strongly basic and B is a weak base.
(b) A is strongly acidic and B is a weak acid.
(c) A has pH greater than 7 and B has pH less than 7.
(d) A has pH less than 7 and B has pH greater than 7.

(v) If 10 mL of H_2SO_4 is mixed with 10 mL of $Mg(OH)_2$ of the same concentration, the resultant solution will give the following colour with universal indicator:

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

III. Read the following and answer the questions from (i) to (iv).

Frothing in Yamuna The primary reason behind the formation of the toxic foam is high phosphate content in the wastewater because of detergents used in dyeing industries, dhobi ghats and households. Yamuna's pollution level is so bad that parts of it have been labelled 'dead' as there is no oxygen in it for aquatic life to survive.

(i) Predict the pH value of the water of river Yamuna if the reason for froth is high content of detergents dissolved in it.

(a) 10-11 (b) 5-7 (c) 2-5 (d) 7

(ii) Which of the following statements is correct for the water with detergents dissolved in it?

(a) low concentration of hydroxide ion (OH^-) and high concentration of hydronium ion (H_3O^+)
(b) high concentration of hydroxide ion (OH^-) and low concentration of hydronium ion (H_3O^+)
(c) high concentration of hydroxide ion (OH^-) as well as hydronium ion (H_3O^+)
(d) equal concentration of both hydroxide ion (OH^-) and hydronium ion (H_3O^+).

(iii) High content of phosphate ion in river Yamuna may lead to:

(a) decreased level of dissolved oxygen and increased growth of algae
(b) decreased level of dissolved oxygen and no effect of growth of algae
(c) increased level of dissolved oxygen and increased growth of algae
(d) decreased level of dissolved oxygen and decreased growth of algae

(iv) If a sample of water containing detergents is provided to you, which of the following methods will you adopt to neutralize it?

(a) Treating the water with baking soda
(b) Treating the water with vinegar
(c) Treating the water with caustic soda
(d) Treating the water with washing soda