CHAPTER 2

Acid Base and Salt

1. OBJECTIVE QUESTIONS

1. Which of the following acid is present in sour milk?
(a) glycolic acid (b) lactic acid
(c) citrus acid (d) tartaric acid

Ans : (b) lactic acid

Lactic acid present in sour milk or curd.

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

Ans : (d) A : Tartaric acid : B : CO_2

The acid (A) is tartaric acid that reacts with sodium hydrogen carbonate. It makes cakes fluffy and spongy. It is due to the release of CO_2 gas (B) in the reaction.

$$NaHCO_3(s) + \underset{\text{(from any acid)}}{H^+(aq)} \longrightarrow CO_2(g) + H_2O(l) + \text{sodium salt of acid}$$

3. When CO_2 is passed through lime water, it turns milky. the milkiness in due to formation of
(a) $CaCO_3$ (b) $Ca(OH)_2$
(c) H_2O (d) CO_2

Ans : (a) $CaCO_3$

$$Ca(OH)_2 + CO_2 \longrightarrow CaCO_3 + H_2O$$

4. Incorrect statement about acids is/are
(a) they have sour taste
(b) they may change the colour of indicator
(c) they changes the colour or blue litmus to red
(d) they change the colour of red litmus to blue

Ans : (d) they change the colour of red litmus to blue

Acids will change the colour of blue litmus to red but makes no effect on red litmus. Hence, statement (d) is incorrect.

5. When aqueous sodium carbonate (Na_2CO_3) reacts with HCl(aq), it gives
(a) NaOH, H_2(g) and CO_2(g)
(b) NaCl, H_2O and CO_2(g)
(c) $NaHCO_3$, H_2(g) and CO_2(g)
(d) $NaHCO_3$, H_2O and CO_2(g)

Ans : (b) NaCl, H_2O and CO_2(g)

It is an example of acid (HCl) and base (Na_2CO_3) reaction, because Na_2CO_3 is basic in nature. Thus, the reaction gives salt (NaCl), water (H_2O) and CO_2(g).

$$Na_2CO_3(aq) + 2HCl(aq) \longrightarrow 2NaCl(s) + H_2O(l) + CO_2(g)$$

6. Chemical formula of baking soda is-
(a) $MgSO_4$ (b) Na_2CO_3
(c) $NaHCO_3$ (d) $MgCO_3$

Ans : (c) $NaHCO_3$

7. The acid used in making of vinegar is-
(a) formic acid (b) acetic acid
(c) sulphuric acid (d) nitric acid

Ans : (b) acetic acid

6-12% acetic acid is known as vinegar.

8. $CuO + (X) \rightarrow CuSO_4 + H_2O$. Here (X) is-
(a) $CuSO_4$ (b) HCl
(c) H_2SO_4 (d) HNO_3

Ans : (c) H_2SO_4

$$CuO + H_2SO_4 \longrightarrow CuSO_4 + H_2O$$

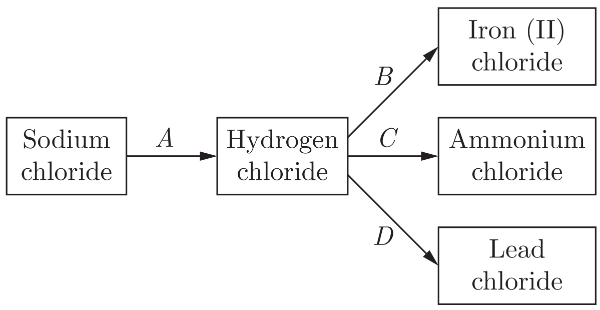
9. Acetic acid was added to a solid X kept in a test tube. A colourless and odourless gas was evolved. The gas was passed through lime water which turned milky. It was concluded that.
(a) Solid X is sodium hydroxide and the gas evolved is CO_2
(b) Solid X is sodium bicarbonate and the gas evolved is CO_2
(c) Solid X is sodium acetate and the gas evolved is CO_2
(d) Solid X is sodium chloride and the gas evolved is CO_2

Ans : (b) Solid X is sodium bicarbonate and the gas evolved is CO_2

$$NaHCO_3(s) + CH_3COOH(aq) \longrightarrow CH_3COO^-Na^+(aq) + CO_2(g) + H_2O(l)$$

$$CO_2(g) + Ca(OH)_2(aq) \longrightarrow \underset{\text{White precipitate}}{CaCO_3(s)} \downarrow H_2O(l)$$

10. Consider the following reaction:



Here, A, B, C and D respectively are :
(a) $A =$ Conc. HCl; $B = Fe$; $C = NH_4OH$; $D = PbO$
(b) $A =$ Conc. H_2SO_4; $B = Fe$; $C = NH_4OH$; $D = Pb(NO_3)_2$
(c) $A =$ Conc. H_2SO_4 $B = Fe$; $C = NH_3$; $D = Pb(NO_3)_2$
(d) $A =$ Conc. HCl; $B = Fe$; $C = NH_3$; $D = PbO$

Ans : (c) $A =$ Conc. H_2SO_4 $B = Fe$; $C = NH_3$; $D = Pb(NO_3)_2$

1. $NaCl + H_2SO_4 \xrightarrow{\Delta < 200^\circ C} NaHSO_4 + HCl \uparrow$
2. $2HCl + Fe \longrightarrow FeCl_2 + H_2$
3. $HCl(g) + NH_3(g) \longrightarrow NH_4Cl$

11. Antacids contain-
(a) weak base (b) weak acid
(c) strong base (d) strong acid

Ans : (a) weak base

Antacids are weak bases which are given when a patient is suffering from acidity. These antacids neutralises the acid and give relief to patient.

12. 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

Ans : (b) HCl

The egg-shells are made up of calcium carbonate. When it reacts with HCl it liberates CO_2 gas which turns lime water milky

$$CaCO_3 + 2HCl \longrightarrow CaCl_2 + H_2O + CO_2$$

1. $2HCl + Pb(NO_3)_2 \longrightarrow \underset{\text{Lead chloride}}{PbCl_2} \downarrow + 2HNO_3$

13. You are having five solutions A, B, C, D and E with pH values as follows:
$A = 1.8$, $B = 7$, $C = 8.5$, $D = 8$ and $E = 5$
Which solution would be most likely to liberate hydrogen with magnesium powder?
(a) Solution A and B (b) Solution A
(c) Solution C (d) All of the above

Ans : (b) Solution A

Solution A would liberate hydrogen with magnesium because pH value is least for A solution i.e. 1.8. Hence, it is the most acidic among all the solutions.

14. In one of the industrial processes used for manufacture of sodium hydroxide, a gas X is formed as by-product. The gas X reacts with lime water to give a compound Y which is used as a bleaching agent in chemical industry. The compound X and Y could be
(a) H_2 and $NaHCO_3$ respectively
(b) CO_2 and $CaOCl_2$ respectively
(c) Cl_2 and $CaOCl_2$ respectively
(d) Cl_2 and $NaHCO_3$ respectively

Ans : (c) Cl_2 and $CaOCl_2$ respectively

The gas released during the manufacture of sodium hydroxide is chlorine, $Cl_2(X)$.
$2NaCl(aq) + 2H_2O(l) \longrightarrow 2NaOH(aq) + Cl_2(g) + H_2(g)$
Cl_2 is given off at anode.
$Cl_2(X)$ when reacts with lime water (Y), a compound called bleaching powder, $CaOCl_2$ is obtained.
$Ca(OH)_2(aq) + Cl_2(g) \longrightarrow CaOCl_2(s) H_2O(l)$

15. Plaster of pairs is made from-
(a) lime stone (b) slaked lime
(c) quick lime (d) gypsum

Ans : (d) gypsum

Plaster of pars is prepared by heating gypsum at 373 K.
$CaSO_4 \cdot 2H_2O \xrightarrow{373k} CaSO_4 \cdot 1/2H_2O + \frac{3}{2}H_2O$

16. On prolong supply of $CO_2(g)$ in lime solution (lime-water), it is observed that
(a) lime solution changes to gaseous state
(b) the milkiness of lime water disappears
(c) the milkiness of lime water changes from white to red.
(d) the colour of lime water becomes black

Ans : (b) the milkiness of lime water disappears

On prolong supply of $CO_2(g)$ in lime solution, the milky solution becomes colourless due to formation of $CaCO_3(s)$.
$$\underset{\text{Lime water}}{Ca(OH)_2(aq)} + \underset{\text{in excess}}{CO_2(g)} \longrightarrow \underset{\text{Salt}}{CaCO_3(s)} + H_2O(l)$$

17. 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

Ans : (b) basic

$CaCO_3$ is basic in nature, as it is the salt of strong base $Ca(OH)_2$ (calcium hydroxide) and a weak acid, H_2CO_3 (carbonic acid).

18. The correct statement regarding universal indicator is
(a) it is an indicator having pH $= 7$
(b) it gives blue colour at pH $= 3$
(c) it becomes colourless at pH $= 7$
(d) it gives orange colour at pH $= 3$

Ans : (d) it gives orange colour at pH $= 3$

Universal indicator is mixture of many indicators. Its colour is orange at pH $= 3$.

19. 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 to red

(b) changed first to red and then to blue
(c) changed blue to colourless
(d) remains blue in both the solutions

Ans : (b) changed first to red and then to blue

In acid blue litmus changes to red and in basic solution red litmus changes to blue. Hence blue litmus first changes its colour to red and then to blue.

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

Ans : (b) lime present in it

Bleaching powder is actually a mixture of calcium hypochlorite $CaOCl_2$ and the basic chloride $CaCl_2$ with some slaked, $Ca(OH)_2$.

21. Reaction of an acid with a base is known as-
(a) decomposition
(b) combination
(c) redox reaction
(d) neutralization

Ans : (d) neutralization

In a neutralization reaction an acid reacts with a base and forms salt and water.

22. Which of the following acid does not react with metals-
(a) sulphuric acid
(b) phosphoric acid
(c) carbonic acid
(d) nitric acid

Ans : (c) carbonic acid

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

Ans : (b) gives chlorine on exposure to atmosphere

$$CaOCl_2 + CO_2 \longrightarrow CaCO_3 + Cl_2(g)$$

24. 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

Ans : (a) the formation of salt $+H_2O$

When NaOH and HCl are mixed in equal molar quantities, acid-base reaction takes place and we get salt (NaCl) and water.

$NaOH + HCl \longrightarrow \underset{\text{Salt}}{NaCl} + H_2O$

25. Acid turn blue litmus-
(a) green
(b) red
(c) yellow
(d) orange

Ans : (b) red

26. Washing soda has the formula-
(a) $Na_2CO_3 \cdot 7H_2O$
(b) $Na_2CO_3 \cdot 10H_2O$
(c) $Na_2CO_3 \cdot H_2O$
(d) Na_2CO_3

Ans : (b) $Na_2CO_3 \cdot 10H_2O$

27. 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

Ans : (d) Hydrochloric acid

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

Ans : (a) oxalic acid

The organic acid present in tomato is oxalic acid.

29. Which of the following is acidic in nature-
(a) apple juice
(b) soap solution
(c) slaked lime
(d) lime

Ans : (a) apple juice

The pH of varies from 3-35 to 4. The lesser the pH the more the acidity. Hence apple juice is , acidic in nature and all other are in basic nature.

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

Ans : (b) NaOH

Iron (II) chloride is dissolved in water and then sodium hydroxide is added. A dirty green precipitate is obtained which confirms the presence of iron (II) chloride.

$$FeCl_2 + 2NaOH \longrightarrow Fe(OH)_2 + 2NaCl$$

Iron (III) chloride is also dissolved in water and then sodium hydroxide solution is added. A reddish brown precipitate is obtained, which confirms the presence of iron (III) chloride.

31. The pH of a solution is 4.0. What should be the change in the hydrogen ion concentration of the solution, if its pH is to increased to 5.0.
(a) decreases to 1/10 of its original concentration
(b) halved
(c) doubled
(d) increases by 10 times

Ans : (a) decreases to 1/10 of its original concentration

The pH of a solution is 4.0. When pH of a solution increases, the hydrogen ion concentration decreases to 1/10 of its original concentration.

$$PH = -\log[H^+]$$

32. $2NaOH + MgSO_4 \longrightarrow ?$
(a) $MgO + Na_2SO_4$
(b) $Mg(OH)_2 + Na_2SO_4$
(c) $Mg(OH)_2 + Na_2O$
(d) $MgO + Na_2O$

Ans : (b) $Mg(OH)_2 + Na_2SO_4$

$$2NaOH + MgSO_4 \longrightarrow Mg(OH)_2 + Na_2SO_4$$

33. The reaction of metal with acid results in the formation of-
(a) only hydrogen gas
(b) only salt
(c) both salt and hydrogen gas
(d) none of these

Ans : (c) both salt and hydrogen gas

34. Plaster of Paris hardens by-
(a) giving of CO_2 (b) changing into $CaCO_3$
(c) combining with water (d) giving out water

Ans : (c) combining with water

$$\underset{\text{PoP}}{CaSO_4 \cdot \frac{1}{2}H_2O} + \frac{3}{2}H_2O \longrightarrow \underset{\text{Gypsum}}{CaSO_4 \cdot 2H_2O}$$

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

Ans : (b) pale blue precipitate

$$CuSO_4(aq) + 2NH_4OH(aq) \longrightarrow Cu(OH)_2(s) + (NH_4)_2SO_4(s)$$

When aqueous solution of copper sulphate react with aqueous ammonium hydroxide solution, then pale blue precipitate of $Cu(OH)_2$ are formed.

36. The pH of a solution is 5.0. Its hydrogen ion concentration is decreased by 100 times, the solution will be :
(a) more acidic (b) basic
(c) neutral (d) unaffected

Ans : (c) neutral

$$pH = -\log H^+$$
$$5 = -\log H^+$$
$$10^{-5} = [H^+]$$

When hydrogen ion concentration is decreased by 100 times, then solution will be neutral

$$10^{-5} = \frac{[H^+]}{10^{-2}}$$
$$10^{-5} \times 10^{-2} = [H^+]$$
$$10^{-7} = [H^+]$$

2. FILL IN THE BLANK

1. When an acid reacts with a metal carbonate or metal hydrogen carbonate, it gives the corresponding salt, ... gas and ....

Ans : carbon dioxide, water

2. The salts of a strong acid and strong base are .... with pH value of 7. On the other hand, salts of strong base and weak acid are .... with pH value .... than 7 and those of a strong acid and weak bases are .... in nature with pH value .... than 7.

Ans : neutral, basic, more, acidic, less

3. Anhydrous sodium carbonate is commonly known as ....

Ans : soda ash

4. Binary acid contain .... atom.

Ans : hydrogen

5. ENO contains .... and is .... in nature.

Ans : sodium hydrogen carbonate, basic

6. Alkali reacts with ammonium salts to produce corresponding salt, water and evolve ....

Ans : ammonia

7. $Zn(OH)_2$ is .... base.

Ans : diacidic

8. The strength of acids and bases depends on the number of .... ions and .... ions produced respectively, when dissolved in water. Acids like $HClO_4$ which dissociate almost completely in water are called .... acids.

Ans : hydrogen, hydroxide, strong

9. Acids are .... in taste and change the colour of blue litmus to ....

Ans : sour, red

10. An acid that contains more than one acidic hydrogen atom is called a ....

Ans : polyprotic acid

11. Bases are .... in taste and change the colour of red litmus to ....

Ans : bitter, blue

12. .... is a natural indicator whereas .... is a synthetic indicator. A .... indicator is a mixture of several indicators.

Ans : Litmus, phenolphthalein, universal

13. Oxy acids contains .... atoms in addition to hydrogen atom.

Ans : oxygen

14. .... is the fixed number of water molecules chemically attached to each formula unit of a salt in its crystalline form.

Ans : Water of crystallisation

15. When an acid reacts with a metal, ... gas is evolved and a corresponding .... is formed.

Ans : hydrogen, salt

16. Soda-acid fire extinguisher contains a solution of

sodium hydrogen carbonate and ....
Ans : sulphuric acid

17. All alkali are bases but all bases are .... alkali.
Ans : not

3. TRUE/FALSE

1. Hydrogen chloride gas turns the blue litmus red.
Ans : False

2. Neutral solutions have a pH of 0.
Ans : True

3. Acids and bases neutralise each other to form corresponding salts and water.
Ans : True

4. When a base reacts with a metal, along with the evolution of hydrogen gas a salt is formed which has a positive ion composed of the metal and oxygen.
Ans : False

5. Baking powder is used in baking cakes.
Ans : True

6. Mixing concentrated acids or bases with water is a highly endothermic process.
Ans : False

7. Acidic nature of a substance is due to the formation of $H^{+}(aq)$ ions in solution.
Ans : True

8. Solution of sodium hydrogen carbonate is acidic in nature.
Ans : False

9. Sodium hydrogen carbonate is used in fire extinguisher.
Ans : True

10. Washing soda on strong heating gives sodium oxide and carbon dioxide.
Ans : False

11. Hydrogen chloride gas turns blue litmus red.
Ans : False

12. Plaster of Paris is obtained by heating gypsum at 373K in a klin.
Ans : True

13. The colour of caustic soda turns pink when phenolphthalein is added.
Ans : True

14. Acidic or basic solutions in water conduct electricity as they produce hydrogen and hydroxide ions respectively.
Ans : True

15. Bleaching powder is used for disinfecting drinking water.
Ans : True

16. Solution of sodium hydrogen carbonate is alkaline in nature.
Ans : True

17. There are a variety of strengths when you study acids and bases.
Ans : True

18. An aqueous solution is one that has compounds dissolved in water.
Ans : True

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column I have to be matched with statements (p, q, r, s) in column II.

1. Column II gives nature of acids and bases mention in column I, match them correctly.

Column I		Column II	
(A)	HCl	(p)	strong acid
(B)	HCN	(q)	weak acid
(C)	NaOH	(r)	weak base
(D)	NH_4OH	(s)	strong base

Ans : A-p, B-q, C-s, D-r

2. Column II give acid and base from which salt mention in column I, match them correctly.

Column I		Column II	
(A)	KNO_3	(p)	Nitric acid, silver hydroxide
(B)	$AgNO_3$	(q)	Hydrochloric acid, Magnesium hydroxide
(C)	$MgCl_2$	(r)	Carbonic acid, Ammonium hydroxide
(D)	$(NH_4)_2CO_3$	(s)	Nitric acid, potassium hydroxide

Ans : A-s, B-p, C-q, D-r

3. Column II gives type of reaction mention in column I, match them correctly.

Column I		Column II	
(A)	$NaHCO_3$	(p)	Baking soda
(B)	NaOH	(q)	Alkaline
(C)	$KHSO_4$	(r)	Acidic salt

Column I		Column II	
(D)	$Ca(OH)_2$	(s)	Bitter taste

	A	B	C	D
(a)	p, q, r	q, s	q, r	q, s
(b)	p	q, s	s	r
(c)	q	s	p	r
(d)	r	q	s	p

Ans : (a) A-p, q, r, B-q, s, C-q, r, D-q, s

4.

Column I		Column II	
(A)	Solution of pH 5.5	(p)	Neutral
(B)	Solution of pH 5	(q)	Acidic
(C)	Solution of pH 4	(r)	$[OH^-] = 10^{-3}$
(D)	Solution of pH 7	(s)	Basic

Ans : (d) A-s, B-p, C-q, D-r, s

	A	B	C	D
(a)	s	q, s	p	r
(b)	s, r	q, s	p	r
(c)	p, s	q	r, s	p
(d)	s	p	q	r, s

5.

Column I		Column II	
(A)	Mono basic	(p)	KOH
(B)	Dibasic	(q)	$Ca(OH)_2$
(C)	Diacidic	(r)	H_2SO_4
(D)	Mono acidic	(s)	HNO_3

	A	B	C	D
(a)	s	r	q	p
(b)	p	q	s	r
(c)	q	s	p	r
(d)	r	q	s	p

Ans : (a) A-s, B-r, C-q, D-p

6.

	Column I		**Column II**
(A)	Plaster of Paris	(p)	$CaSO_4 \cdot 2H_2O$
(B)	Bleaching powder	(q)	$Na_2CO_3 \cdot 10H_2O$
(C)	Washing soda	(r)	$CaSO_4 \cdot \frac{1}{2}H_2O$
(D)	Baking soda	(s)	$CaOCl_2$
(E)	Gypsum	(t)	$NaHCO_3$

Ans : A-r, B-s, C-q, D-t E-p

5. ASSERTION AND REASON

DIRECTION : n the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.
(e) Both Assertion and Reason are false.

1. **Assertion :** While dissolving an acid or base in water, the acids must always be added slowly to water with constant stirring.
Reason : Dissolving an acid on a base in water in highly exothermic reaction.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

2. **Assertion :** On adding H_2SO_4 to water the resulting aqueous solution get corrosive.
Reason : Hydronium ions are responsible for corrosive action.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Because H_2SO_4 is a strong acid, it readily forms hydronium ions when dissolved in water which are responsible for its corrosive action.

3. **Assertion :** Phenolphthalein gives pink colour in basic solution.
Reason : Phenolphthalein is a natural indicator.
Ans : (c) Assertion (A) is true but reason (R) is false.

4. **Assertion :** HCl gas does not change the colour of dry blue litmus paper.
Reason : HCl gas dissolves in the water present in wet litmus paper to from H^+ ions.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

5. **Assertion :** HCl produces hydronium ions (H_3O^+) and chloride ions (Cl^-) in aqueous solution.
Reason : In presence of water, basic give H^+ ions.
Ans : (c) Assertion (A) is true but reason (R) is false.

HCl produces H^+ ions in aqueous solution because in presence of water, acids give H^+ ions. As H^+ ions cannot exist alone so it combines with water molecules and form H_3O^+.

6. **Assertion :** H_2CO_3 is a strong acid.
Reason : A strong acid dissociates completely or almost completely in water.
Ans : (d) Assertion (A) is false but reason (R) is true.
H_2CO_3 carbonic acid is a weak acid.

7. **Assertion :** Sodium hydroxide reacts with zinc to produce hydrogen gas.
Reason : Acids reacts with active metals to produce hydrogen gas.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
Sodium hydroxide being an strong base, reacts with active metal (zinc) to product H_2 gas. The reaction is given as follows:
$Zn(s) + 2NaOH(aq) \longrightarrow Na_2ZmO_2(aq) + H_2(g)$

8. **Assertion :** Salts are the products of an acid-base reaction.
Reason : Salt may be acidic or basic.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

9. **Assertion :** Ammonia solution is an alkali.
Reason : Ammonia solution turns blue litmus paper red.
Ans : (c) Assertion (A) is true but reason (R) is false.
Ammonia gas, which is alkaline, turn the red litmus paper blue.

10. **Assertion :** Weak acids have low electrical conductivity.
Reason : Strong acids and weak acids have equal concentration of hydrogen ions in their solutions.
Ans : (c) Assertion (A) is true but reason (R) is false.

11. **Assertion :** Baking soda creates acidity in the stomach.
Reason : Baking soda is alkaline.
Ans : (d) Assertion (A) is false but reason (R) is true.
Baking soda, being alkaline, neutralises the acidity in the stomach and removes it.

12. **Assertion :** During electrolysis of concentrated aqueous solution of sodium chloride, hydrogen is produced at anode and chlorine gas is produced at cathode.
Reason : Ions get attracted to oppositely charged electrodes.
Ans : (d) Assertion (A) is false but reason (R) is true.

13. **Assertion :** To dilute concentrated sulphuric acid water is added to the acid slowly.
Reason : A lot of heat energy will be given out in the dilution of concentrated sulphuric acid.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
Water is never added to concentrated sulphuric acid as it is an exothermic reaction and releases a large amount of heat energy. It also results in spurting of the acid, which can burn your skin. Concentrated sulphuric acid is added to water in small amounts and that too with constant stirring and cooling.

14. **Assertion :** Pure water is neither acidic not basic.
Reason : The pH of a solution is inversely proportional to the concentration of hydrogen ions in it.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

15. **Assertion :** When common salt is kept open, it absorbs moisture from the air.
Reason : Common salt contains magnesium chloride.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
Magnesium chloride present in common salt is deliquescent i.e., it absorbs moisture from the air when kept in open.

16. **Assertion :** Gas bubbles are observed when sodium carbonate is added to dilute hydrochloride acid.
Reason : Carbon dioxide is given off in the reaction.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

17. **Assertion :** pH of ammonium chloride solution is in acidic range.
Reason : Solution of a salt of weak base and strong acid is acidic.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
Ammonium chloride is formed by NH_4OH (weak base) and HCl (strong acid)

18. **Assertion :** When zinc is added to dilute hydrochloric acid, hydrogen is given off.
Reason : Hydrogen chloride molecules contain hydrochloric acid and hydrogen atoms.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
The metal zinc readily reacts with hydrochloric acid to produce hydrogen gas (H_2) and zinc chloride $(ZnCl_2)$.

19. **Assertion :** H_3PO_4 and H_2SO_4 are known as polybasic acids.
Reason : They have two or more than two protons per molecule of the acid.
Ans : (a) Both A and R are true and R is the correct explanation of A.

$$H_3PO_4 \rightleftharpoons H_2PO_4^- + H^+$$
$$H_2PO_4^- \rightleftharpoons H^+ + HPO_4^{2-}$$
$$HPO_4^{2-} \rightleftharpoons H^+ + PO_4^{3-}$$

Similarly bases which give two or more than two hydroxyl ions per molecule are known as polyacidic bases.

20. **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.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

21. **Assertion :** pH = 7 signifies pure water.
Reason : At this pH, $[H^+] = [OH^-] = 10^{-7}$.

Ans : (d) Assertion (A) is false but reason (R) is true.

$$pH = 7,$$

signifies neutral solution.

22. **Assertion :** The aqueous solutions of glucose and alcohol do not show acidic character.
Reason : Aqueous solutions of glucose and alcohol do not give H^+ ions.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

23. **Assertion :** The acidity of $Mg(OH)_2$ is two.
Reason : The acidity of a base is equal to the number of hydroxyl ions.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

24. **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.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Plaster of Paris when mixed with water and applied around the fractured limbs, it sets in to a hard mass and keeps the bone joints in a fixed position. So, it is commonly used for setting fractured bones.

25. **Assertion :** In water, Hydrochloric acid behaves as a weak monobasic acid.
Reason : In water, Hydrochloric acid acts as a proton donor.

Ans : (d) Assertion (A) is false but reason (R) is true.

HCl (Hydrochloric) is a strong acid.

$$HCl \rightleftharpoons H^+ + Cl^-$$

It donate proton in water.