

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) citric 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 : CO₂
 (b) A : Tartaric acid : B : O₂
 (c) A : Succinic acid : B : H₂
 (d) A : Tartaric acid : B : CO₂

Ans : (d) A : Tartaric acid : B : CO₂

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 CO₂ gas (B) in the reaction.
 $\text{NaHCO}_3(s) + \text{H}^+(aq) \longrightarrow \text{CO}_2(g) + \text{H}_2\text{O}(l) + \text{sodium salt of acid}$
 (Tartaric acid)

3. When CO₂ is passed through lime water, it turns milky. the milkiness is due to formation of
 (a) CaCO₃ (b) Ca(OH)₂
 (c) H₂O (d) CO₂

Ans : (a) CaCO₃



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 of 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 (Na₂CO₃) reacts with HCl(aq), it gives
 (a) NaOH, H₂(g) and CO₂(g)
 (b) NaCl, H₂O and CO₂(g)
 (c) NaHCO₃, H₂(g) and CO₂(g)
 (d) NaHCO₃, H₂O and CO₂(g)

Ans : (b) NaCl, H₂O and CO₂(g)

It is an example of acid (HCl) and base (Na₂CO₃) reaction, because Na₂CO₃ is basic in nature. Thus, the

reaction gives salt (NaCl), water (H₂O) and CO₂(g).
 $\text{Na}_2\text{CO}_3(aq) + 2\text{HCl}(aq) \longrightarrow 2\text{NaCl}(s) + \text{H}_2\text{O}(l) + \text{CO}_2(g)$

6. Chemical formula of baking soda is-
 (a) MgSO₄ (b) Na₂CO₃
 (c) NaHCO₃ (d) MgCO₃

Ans : (c) NaHCO₃

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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.

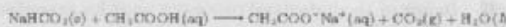
8. $\text{CuO} + (\text{X}) \rightarrow \text{CuSO}_4 + \text{H}_2\text{O}$. Here (X) is-
 (a) CuSO₄ (b) HCl
 (c) H₂SO₄ (d) HNO₃

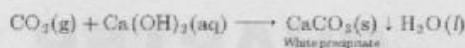
Ans : (c) H₂SO₄



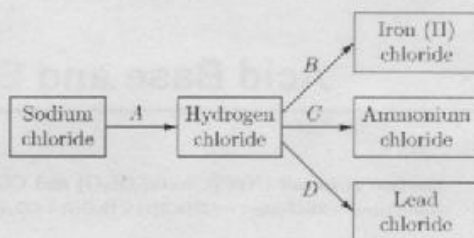
9. Acetic acid was added to a solid X kept in a test tube. A colourless and odourless gas was evolved. The gas was passed through lime water which turned milky. It was concluded that.
 (a) Solid X is sodium hydroxide and the gas evolved is CO₂
 (b) Solid X is sodium bicarbonate and the gas evolved is CO₂
 (c) Solid X is sodium acetate and the gas evolved is CO₂
 (d) Solid X is sodium chloride and the gas evolved is CO₂

Ans : (b) Solid X is sodium bicarbonate and the gas evolved is CO₂





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 = $\text{Pb}(\text{NO}_3)_2$
 (c) A = Conc. H_2SO_4 ; B = Fe; C = NH_3 ; D = $\text{Pb}(\text{NO}_3)_2$
 (d) A = Conc. HCl; B = Fe; C = NH_3 ; D = PbO

Ans : (c) A = Conc. H_2SO_4 ; B = Fe; C = NH_3 ; D = $\text{Pb}(\text{NO}_3)_2$

1. $\text{NaCl} + \text{H}_2\text{SO}_4 \xrightarrow{A < 500^\circ\text{C}} \text{NaHSO}_4 + \text{HCl} \uparrow$
2. $2\text{HCl} + \text{Fe} \longrightarrow \text{FeCl}_2 + \text{H}_2$
3. $\text{HCl}(\text{g}) + \text{NH}_3(\text{g}) \longrightarrow \text{NH}_4\text{Cl}$

11. Antacids contain-

- (a) weak base (b) weak acid
 (c) strong base (d) strong acid

Ans : (a) weak base

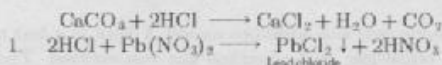
Antacids are weak bases which are given when a patient is suffering from acidity. These antacids neutralise the acid and give relief to patient.

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



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.

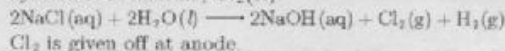
14. In one of the industrial processes used for manufacture

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, $\text{Cl}_2(\text{X})$.



$\text{Cl}_2(\text{X})$ when reacts with lime water (Y), a compound called bleaching powder, CaOCl_2 is obtained.

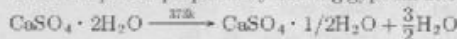


15. Plaster of Paris is made from-

- (a) lime stone (b) slaked lime
 (c) quick lime (d) gypsum

Ans : (d) gypsum

Plaster of Paris is prepared by heating gypsum at 373 K.



16. On prolong supply of $\text{CO}_2(\text{g})$ 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 $\text{CO}_2(\text{g})$ in lime solution, the milky solution becomes colourless due to formation of $\text{CaCO}_3(\text{s})$.



17. When $\text{Ca}(\text{OH})_2$ reacts with $\text{CO}_2(\text{g})$, it will give $\text{CaCO}_3(\text{s})$ and $\text{H}_2\text{O}(\text{l})$. 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 $\text{Ca}(\text{OH})_2$ (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

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- (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, $\text{Ca}(\text{OH})_2$.

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

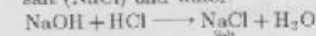
Ans : (b) gives chlorine on exposure to atmosphere



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 + $\text{H}_2(\text{g})$
(c) the formation of salt + $\text{O}_2(\text{g})$
(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



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

Ans : (b) red

26. Washing soda has the formula-
(a) $\text{Na}_2\text{CO}_3 \cdot 7\text{H}_2\text{O}$ (b) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

- (c) $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$ (d) Na_2CO_3

Ans : (b) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

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.



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.

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

32. $2\text{NaOH} + \text{MgSO}_4 \longrightarrow ?$

- (a) $\text{MgO} + \text{Na}_2\text{SO}_4$ (b) $\text{Mg}(\text{OH})_2 + \text{Na}_2\text{SO}_4$
(c) $\text{Mg}(\text{OH})_2 + \text{Na}_2\text{O}$ (d) $\text{MgO} + \text{Na}_2\text{O}$

Ans : (b) $\text{Mg}(\text{OH})_2 + \text{Na}_2\text{SO}_4$



33. The reaction of metal with acid results in the formation of

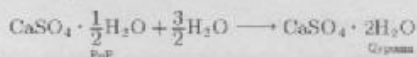
- (a) only hydrogen gas
(b) only salt
(c) both salt and hydrogen gas
(d) none of these

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

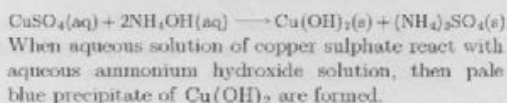
Ans : (c) combining with water



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



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

$$\text{pH} = -\log \text{H}^+$$

$$5 = -\log \text{H}^+$$

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

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

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

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

$$10^{-7} = [\text{H}^+]$$

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. $\text{Zn}(\text{OH})_2$ 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

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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 kiln.

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)	$[\text{OH}^-] = 10^{-9}$
(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 ₂ SO 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 · 2H ₂ O
(B)	Bleaching powder	(q)	Na ₂ CO ₃ · 10H ₂ O
(C)	Washing soda	(r)	CaSO ₄ · $\frac{1}{2}$ H ₂ O
(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 : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

- Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
- Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
- Assertion (A) is true but reason (R) is false.
- Assertion (A) is false but reason (R) is true.
- 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 is 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 H₂SO₄ 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 H₂SO₄ 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 form 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 (H₃O⁺) and chloride ions (Cl⁻) in aqueous solution.

Reason : In presence of water, acids 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 H₃O⁺.

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:

$$\text{Zn(s)} + 2\text{NaOH(aq)} \longrightarrow \text{Na}_2\text{ZnO}_2\text{(aq)} + \text{H}_2\text{(g)}$$
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 nor 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 hydrochloric 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.

$$\text{H}_3\text{PO}_4 \rightleftharpoons \text{H}_2\text{PO}_4^- + \text{H}^+$$

$$\text{H}_2\text{PO}_4^- \rightleftharpoons \text{H}^+ + \text{HPO}_4^{2-}$$

$$\text{HPO}_4^{2-} \rightleftharpoons \text{H}^+ + \text{PO}_4^{3-}$$
 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).

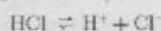
Plaster of Paris when mixed with water and applied around the fractured limbs, it sets in to a hard mass and keeps the bone joints in a fixed position. So, it is commonly used for setting fractured bones.

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.



It donate proton in water.

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