2. Acids, Bases and Salts

Very Short Answer Type Questions-Pg-66

1. Question

What colour do the following indicators turn when added to a base or alkali (such as sodium hydroxide)?

(a) methyl orange

(b) litmus

(c) red cabbage extract

Answer

(a) Methyl orange- It is a synthetic indicator of orange color. Turns yellow with base or alkali.

(b) Litmus- A base turns red litmus paper into blue.

(c) Red cabbage extract- Originally purple in color. Turns greenish with base or alkali.

2. Question

What colour do following indicators turn when added to an acid (hydrochloric acid)?

(a) litmus

(b) methyl orange

Answer

(a) Litmus- An acid turns blue litmus paper into red.

(b) Methyl orange- it is a synthetic indicator of orange color. Turns red with acid.

3. Question

Name an indicator which is red in acid solution but turn blue in basis solution.

Answer

Litmus, the natural indicator.

4. Question

Name an indicator which is pink in alkaline solution but turns colourless in acidic solution.

Answer

Phenolphthalein; it is a colourless liquid.

5. Question

When a solution is added to a cloth strip treated with onion extract, then the smell of onion cannot be detected. State whether the given solution contains an acid or a base.

Answer

Base; Onion paste or juice loses its smell when added to a base, but its smell does not change when added to acid.

6. Question

When a solution is added to vanilla extract, then the characteristic smell of vanilla cannot be detected. State whether the given solution is an acid or a base.

Answer

Base; The smell of vanilla extract vanishes with base, whereas it's smell does not vanishes with an acid.

7. Question

How will you test for the gas which is liberated when hydrochloric acid reacts, with an active metal?

Answer

Hydrogen(H2) gas is evolved during above reaction and it can be tested by taking a candle near the test tube. If the gas burns with a pop, then its presence is confirmed.

8. Question

Name the gas evolved when dilute HCL reacts with sodium hydrochloric. How is it recognized?

Answer

The gas evolved when sodium hydrogen carbonate reacts with HCl is Carbon dioxide.

$NaHCO3 + HCl \text{ ----> } NaCl + H2O + CO2$

The gas can be identified by passing through the lime water. when carbon dioxide passes through the lime water, it turns milky due to the formation of calcium carbonate which is insoluble in water.

$Ca(OH)2 + CO2 \text{ ----> } CaCO3 + H2O.$

9. Question

Give the names and formulae of two strong acids and two weak acids.

Answer

Strong acids- Hydrochloric acid(HCl) and Nitric acid(HNO3).

Weak acids- Acetic acid(CH3COOH), Carbonic Acid(H2CO3), Citric acid(C6H8O7).

10. Question

Name one natural source of each of the following acids:

(a) Citric acid (b) Oxalic acid

(c) Lactic acid (d) Tartaric acid

Answer

(a) Citric acid- Lemons and berries.

(b) Oxalic acid- Beets and Tomatoes

(c) Lactic acid- Milk and milk products such as yogurt and sour cream.

(d) Tartaric acid- Grapes and Tamarind.

11. Question

Name one animal and one plant whose stings contain formic acid (or methanoic acid).

Answer

Animal- Some of ant species.

Plant- Secretions from stinging nettles.

12. Question

How is the concentration of hydronium ions (H_3O^+) affected when the solution of an acid is diluted?

Answer

Dilution of an acid results in the decrease of concentration of hydronium ions(H3O+).

13. Question

Write word equations and then balanced equations for the reactions taking place when:

(a) dilute sulphuric acid reacts with zinc granules.

(b) dilute hydrochloric acid reacts with magnesium ribbon.

(c) dilute sulphuric acid reacts with aluminum powder.

(d) dilute hydrochloric acid reacts with iron fillings.

Answer

(a)	Sulphuric acid	+	Zinc	⟶	Zinc sulphate	+	Hydrogen
	H_2SO_4	+	Zn	⟶	$ZnSO_4$	+	H_2
(b)	Hydrochloric acid	+	Magnesium	⟶	Magnesium chloride	+	Hydrogen
	2HCl	+	Mg	⟶	$MgCl_2$	+	H_2
(c)	Sulphuric acid	+	Aluminium	⟶	Aluminium sulphate	+	Hydrogen
	$3H_2SO_4$	+	2Al	⟶	$Al_2(SO_4)_3$	+	$3H_2$
(d)	Hydrochloric acid	+	Iron	⟶	Iron (II) chloride	+	Hydrogen
	2HCl	+	Fe	⟶	$FeCl_2$	+	H_2

14. Question

Complete and balance the following chemical equations:

$(a)\ Zn(s) + HCI(aq) \rightarrow$

$(b)\ Na_2CO_3(s)HCI(aq) \rightarrow$

$(c)\ NaHCO_3(s) + HCI(aq) \rightarrow$

$(d)\ NaOH(aq) + HCI(aq) \rightarrow$

$(e)\ CuO(s) + HCI(aq) \rightarrow$

Answer

(a) $Zn\ (s) + 2HCl\ (aq) \rightarrow ZnCl_2 + H_2$

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

(c) $NaHCO_3\ (s) + HCl\ (aq) \rightarrow NaCl\ (aq) + CO_2\ (g) + H_2O\ (l)$

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

(e) $CuO\ (s) + 2HCl\ (aq) \rightarrow CuCl_2\ (aq) + H_2O\ (l)$

15. Question

Fill in the blanks in the following sentences:

(a) Acid have a --------tasks and they turn -------litmus to --------

(b) Substance do not show their acidic properties without ----------

(c) Acids produce ------- ions on dissolving in water.

(d) Those substance whose smell (or odour) changes in acidic or basic solutions are called ------indicators.

(e) Onion and vanilla extract are ------ indicators.

Answer

(a) sour; blue; red

(b) Water; acids produce hydrogen(H+) ions in water which determines their acidic nature.

(c) Hydrogen ions; concentration of hydrogen ions determines the strength of acids.

(d) Olfactory; examples- onion and vanilla.

(e) Olfactory; indicates by odour change.

Short Answer Type Questions-Pg-67

16 A. Question

What is an indicator? Name three common indicators.

Answer

Those chemical substances (dyes) which behave differently in acidic and basic medium and indicate by physical changes(colour, odour). Three common indicators are litmus, phenolphthalein and methyl orange.

16 B. Question

Name the acid-base indicator extracted from lichen.

Answer

litmus is a natural indicator extracted from lichen.

16 C. Question

What colour does the turmeric paper turn when put in an alkaline solution?

Answer

The yellow colour of turmeric changes into red colour when it reacts with alkaline solution.

17. Question

What is an olfactory indicator? Name two olfactory indicators. What is the effect of adding sodium hydroxide solution to these olfactory indicators?

Answer

Those indicators whose odour(smell) changes in acidic or basic medium are called olfactory indicators. Onion(juice or extract) and Vanilla are the two examples of olfactory indicators. On adding sodium hydroxide(alkali), the odour of onion and vanilla diminishes.

18 A. Question

What happens when an acid reacts with a metal? Give chemical equation of the reaction involved.

Answer

(a) Hydrogen gas is liberated when an acid reacts with a metal. Chemical equation of the reaction involved is as follows-

$H_2SO_4 + Zn \rightarrow ZnSO_4 + H_2\uparrow$

18 B. Question

Which gas is usually liberated when an acid reacts with a metal? How will you test for the presence of this gas?

Answer

Hydrogen gas is usually liberated when an acid reacts with a metal. To test the presence of this gas, take few pieces of zinc granules and add 5 ml of dilute H_2SO_4. Shake it and pass the gas produced, into a soap solution. The bubbles of the soap solution get formed. These soap bubbles contain hydrogen gas.

To test the evolved hydrogen gas, a candle is brought near the soap bubbles, the gas burns producing a pop sound confirming the presence of hydrogen gas.

19. Question

While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid?

Answer

The process of adding water to an acid is highly heat releasing (exothermic). It causes splashing of mixture and hence results in serious burns. Hence, acid should be added to large amount of water (heat absorbing).

20. Question

What happens when an acid reacts with a metal hydrochloric acid is added to sodium carbonate? Write equation of the reaction which takes place.

Answer

When hydrochloric acid is added to sodium carbonate, brisk effervescence of CO_2 occurs, along with the formation of sodium chloride and water.

$Na2CO3 + 2HCl = 2NaCl + CO_2 + H2O$

21 A. Question

What happens when dilute hydrochloric acid is added to sodium carbonate? write a balanced chemical equation of the reaction involved.

Answer

When hydrochloric acid is added to sodium carbonate, brisk effervescence of CO2 occurs, along with the formation of sodium chloride and water.

$Na2CO3 + 2HCl = 2NaCl + CO2 + H2O$

21 B. Question

Which gas is liberated when dilute hydrochloric acid reacts with sodium carbonate? How will you test for the presence of this gas?

Answer

When dilute hydrochloric acid reacts with sodium hydrogen carbonate, Carbon dioxide gas is liberated.

We recognize the presence of carbon dioxide by passing it through lime water which turns milky or a white precipitate of calcium carbonate is formed. If excessive carbon dioxide is passed through the milkylime water, the solution becomes clear after sometime.

22. Question

What happens when an acid reacts with a base? Explain by taking the example of hydrochloric acid and sodium hydroxide. Give equation of the chemical reaction which takes place. What is the special name of such a reaction?

Answer

An acid reacts with a base to form salt and water. The reaction involving hydrochloric acid and sodium hydroxideresults in formation of sodium chloride and water.

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

Since in the reaction between acid and base, both neutralize each other, hence it is also called neutralization reaction.

23. Question

What happens when an acid reacts with a metal oxide? Explain with the help of an example. Write a balanced equation for the reaction involved.

Answer

Metal oxides are basic in nature. Hence, when an acid reacts with a metal oxide both neutralize each other. In this reaction, respective salt and water are formed.

Example: Calcium oxide is a metallic oxide, which is basic in nature. When an acid, such as hydrochloric acid, reacts with calcium oxide, neutralization reaction takes place. Calcium chloride and water is formed.

$2HCl + CaO \Rightarrow CaCl_2 + H_2O$

24 A. Question

(a) What are organic acids and mineral acids?

Answer

Acids which are obtained from natural sources such as plants and animals are called natural acid or organic acid. Acids which are derived from mineral of the earth are known as mineral acids.

24 B. Question

Give two examples each of organic acids and mineral acids.

Answer

Examples of organic acids- Acetic acid(derived from vinegar), Citric acid(citrus fruits) and Lactic acid(sour milk). Examples of mineral acids- Hydrochloric acid, nitric acid and sulphuric acid.

24 C. Question

State some of the uses of mineral acids in industry.

Answer

(i) Sulphuric acid is used in the manufacture of fertilizers, paints,detergents etc.

(ii) Nitric acid is used for making fertilizers, explosives, dyes and plastics.

(iii) Hydrochloric acid is used for de-greasing steel objects, in textile, food and leather industries.

25. Question

What is meant by strong acids and weak acids? Classify the following into strong acids and weak acids :

$HCI, CH_3COOH, H_2SO_4, HNO_3, H_2CO_3, H_2SO_3$

Answer

An acid that completely dissociates in water to release a large amount of hydrogen ions is called a strong acid. An acid that gets partially dissociates in water and release lesser amount of hydrogen ions is called weak acid.

HCl, H_2SO_4, HNO_3 are strong acids; $CH_3COOH, H_2CO_3, H_2SO_3$ are weak acids.

26. Question

Why do HCI, H_2SO_4, HNO_3, etc., show acidic character in aqueous solutions while solutions of compounds like $C_6H_{12}O_6$ (glucose) and C_2H_5OH (alcohol) do not show acidic character?

Answer

Whenever acids react with water, they get dissociated, producing hydrogen (H+) ions in the solution. The presence of hydrogen ions determines the acidic character. It does not happen in case of compound like glucose and alcohol. They do not get dissociated and hence cannot show acidic character

27. Question

What is a neutralization reaction? Explain with an example. Give the chemical equation of the reaction which takes place.

Answer

The reaction between acid and base in which both neutralize each other is called neutralization reaction.

The reaction involving hydrochloric acid and sodium hydroxide results in formation of sodium chloride and water.

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

28. Question

Why should curd and other sour foodstuffs (like lemon juice, etc) not be kept in metal containers (such as copper and brass vessels)?

Answer

Presence of acids such as lactic acid and citric acid in curd and lemon juice respectively will cause reaction with metals in copper and brass containers. This results in the formation of poisonous(toxic) substances which can lead to food poisoning and other ill effects on health.

29 A. Question

What is produced if an acid is added to a base?

Answer

(a) When an acid reacts with a base, salt and water are formed.

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

29 B. Question

Why does dry HCI gas not change the colour of dry litmus paper?

Answer

The colour of litmus paper changes only in the presence of ions like hydrogen (H^+) ions. HCl can produce these ions only in the form of aqueous solution. Hence dry HCl gas does not change the colour of dry litmus paper.

29 C. Question

What colour does phenolphthalein indicator turn when added to an alkali (such as sodium hydroxide)?

Answer

Phenolphthalein indicator is colourless in nature. It turns into pink colour when added to alkali.

30 A. Question

What do acids not show acidic behavior on the absence of water?

Answer

Acids do no show acidic behavior in absence of water because dissociation of acid results in formation of hydrogen ions which occurs in presence of water only. Hydrogen ions are responsible for acidic behavior

30 B. Question

Why does an aqueous solution of an acid conduct electricity?

Answer

When acids are dissolved in water, they dissociate to form ions. Presence of these ions are responsible for electrical conductivity

30 C. Question

Why does distilled water not conduct electricity whereas rain water does?

Answer

Distilled water is neither acidic nor basic in nature. It does not contain any ions. Electric conductivity requires presence of free ions and so distilled water cannot conduct electricity. On the other hand, rain water contains many acidic ions (Hydrogen and carbonate) and hence conducts electricity.

Long Answer Type Questions-Pg-68

31 A. Question

(a) What happens when an acid reacts with a metal carbonate? Explain with the help of an example. Write chemical equation of the reaction involved.

Write equations of the reactions involved.

Answer

Acids give carbon dioxide gas and respective salts along with water when they react with metal carbonates.

Metal carbonate + Acid ⇨ Salt + Carbon dioxide + Water Example- Hydrochloric acid gives carbon dioxide gas, sodium chloride along with water when reacts with sodium carbonate.

$Na_2CO_3 + 2HCl \Rightarrow 2NaCl + CO_2 + H_2O$

31 B. Question

What happens when carbon dioxide gas is passed through lime water:

(i) for a short time?

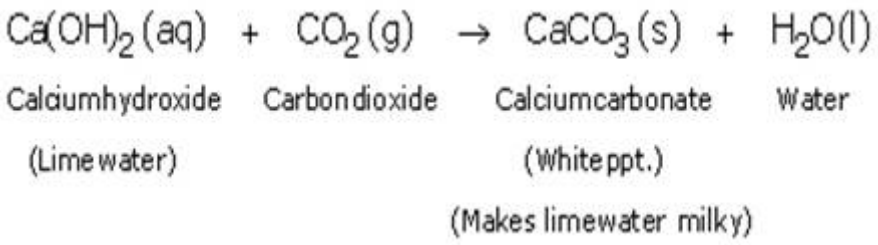
(ii) for a considerable time?

Write equations of the reactions involved.

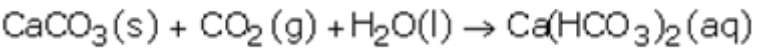
Answer

When CO2 is passed through lime water

(i) for a short time, it turns the lime water into milky white due to the formation of calcium carbonate.



(ii) for a considerable time, the whiteness of the lime water disappears and it becomes clear again due to the formation of carbonic acid.



32. Question

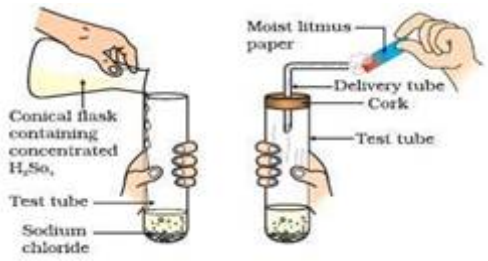
With the help of labeled diagrams, describes an activity to show that acids produce ions only in aqueous solutions.

Answer

Activity to show that acids produce ions only in aqueous solutions: Experiment- (i) Take about 1g solid NaCl in a clean and dry test tube.

(ii) Add some concentrated sulphuric acid to the test tube.

(iii) Fit a rubber cork with a small delivery tube in the mouth of the test tube. Concentrated sulphuric acid reacts with sodium chloride to form hydrogen chloride gas. The hydrogen chloride gas starts coming out of the open end of the glass tube.



Observations- we will test the gas evolved successively holding a blue and red litmus paper above test tube containing HCl gas. There is no change in colour of the blue litmus paper. This shows that HCl gas does not behave as an acid in the absence of water. However, when we hold blue litmus paper in HCl gas, we will see that the blue litmus paper turns red.

Conclusion- The above experiment suggests that hydrogen ions in HCl are produced in the presence of water. The separation of H^+ ion from HCl molecules cannot occur in the absence of water. $HCl + H_2O \rightarrow H_3O^+ + Cl^-$

Hydrogen ions cannot exist alone, but they exist after combining with water molecules. Thus hydrogen ions must always be shown as $H^+(aq)$ or hydronium ion (H_3O^+). $H^+ + H_2O \rightarrow H_3O^+$ This indicates that HCl gas shows acidic behavior in the presence of water as hydrogen ions are formed.

33 A. Question

Which element is common to all acids?

Answer

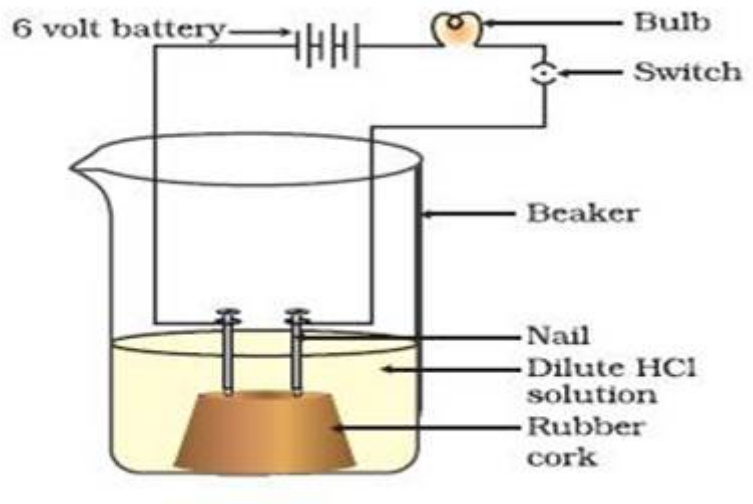
Hydrogen is the common element present in all acids.

33 B. Question

Compounds such as alcohol and glucose also contain hydrogen but are not categorized as acids. Describe an activity to prove it.

Answer

Experiment- Two nails are fitted on a cork and are kept in a 100 mL beaker. The nails are then connected to the two terminals of a 6-volt battery through a bulb and a switch. Now pour some dilute HCl in the beaker and the current is switched on. The same experiment is then performed with glucose solution and alcohol solution.



Observations- It will be observed that the bulb glows in the HCl solution and does not glow in the glucose solution and alcohol solution. Result- HCl dissociates into H+and Cl−ions. These ions conduct electricity in the solution resulting in the glowing of the bulb. On the other hand, the glucose and alcohol solution does not dissociate into ions. Therefore, it does not conduct electricity.

Conclusion- From this activity, it can be concluded that all acids contain hydrogen but not all compounds containing hydrogen are acids. That is why, although alcohols and glucose contain hydrogen, they are not categorised as acids.

Multiple Choice Questions (MCQs)-Pg-68

34. Question

10 mL of a solution of NaOH is found to be completely neutralized 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

Answer

16mL Explanation: Since 10 mL of NaOH solution requires 8 mL of HCl solution. Therefore, 20 mL of NaOH solution will require 8 x 2 = 16 mL of HCl solution.

35. Question

Which of the following types of medicine is used for treating indigestion caused by over-eating? A. antibiotic

B. analgesic

C. antacid

D. antiseptic

Answer

Antacid Explanation: Because of over eating our stomach produce more acid, which igenerally results in indigestion. Hence, to neutralize excess acid produced by stomach, antacid is taken as medicine.

36. Question

A solution reacts with marble chips to produce a gas which turns lime water milky. The solution contains: A. Na_2SO_4

B. $CaSO_4$

C. H_2SO_4

D. K_2SO_4

Answer

Explanation- Marble is made of calcium carbonate. When calcium carbonate reacts with sulphuric acid, it produces carbon dioxide gas. When this carbon dioxide gas is passed through lime water, lime water turns milky.

37. Question

One of the following is not an organic acid. This is: A. ethanoic acid

B. formicacid

C. citric acid

D. carbonic acid

Answer

Carbonic acid, as it is a mineral acid.

38. Question

The property which is not shown by acids is: they have sour taste

B. they feel soapy

C. they turn litmus red

D. their pH is less than seven

Answer

Acids are not soapy in nature whereas alkali are soapy in nature.

39. Question

The indicators which turn red in acid solution are: A. turmeric and litmus

B. phenolphthalein and methyl orange

C. litmus and methyl orange

D. phenolphthalein and litmus

Answer

litmus and methyl orange turns into red when reacting with acid.

40. Question

The discomfort caused by indigestion due to overeating can be cured by taking: A. vinegar

B. lemon juice

C. baking soda

D. caustic soda

Answer

Baking soda; being alkaline, it neutralises excess acid in the stomach and provides relief.

41. Question

The property which is common between vinegar and curd is that they: A. have sweet taste

B. have bitter taste

C. are tasteless

D. have sour taste

Answer

Both of them has sour taste.

42. Question

The indicator which produces a pink colour in an alkaline solution is: A. methyl orange

B. turmeric paper

C. phenolphthalein

D. litmus paper

Answer

Phenolphthalein is colourless in nature. It turns into pink colour when added to an alkaline solution.

43. Question

A solution reacts with zinc granules to give a gas which burns with a 'pop' sound. The solution contains A. $Mg(OH)_2$

B. Na_2CO_3

C. $NaCl$

D. HCl

Answer

HCl, When HCl reacts with zinc granules, it releases hydrogen gas which produces ‘pop’ sound.

Questions Based on High Order Thinking Skills (HOTS)-Pg-68

44. Question

When a piece of limestone reacts with dilute HO, a gas X is produced. When gas X is passed through water then a white precipitate Y is formed. On passing excess of gas X, the white precipitate dissolve forming a soluble compound Z.

(a) What are X, Y and Z?

(b) Write equations for the reactions which take place:

(i) when limestone reacts with dilute HCl

(ii) when gas X reacts with lime water to form white precipitate Y

(iii) when excess of gas X dissolves white precipitate Y to form a soluble compound Z

Answer

(a) X is carbon dioxide;

Y is calcium carbonate;

Z is calcium hydrogen carbonate.

(b) (i) $CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$

(ii) $Ca(OH)_2\ (aq) + CO_2(g) \rightarrow CaCO_3(s) + H_2O(l)$

(iii) $CaCO_3\ (s) + H_2O(l) + CO_2\ (g) \rightarrow Ca[HCO_3]_2\ (aq)$.

45. Question

If someone is suffering from the problem of acidity after overeating, which of the following would y suggest as remedy?

Lemon juice, Vinegar, Baking soda solution

Give reason for your choice.

Answer

Baking soda; being alkaline, it neutralises excess acid in the stomach and provides relief.

46. Question

On adding dilute hydrochloric acid to copper oxide powder, the solution formed is blue-green.

(a) Predict the new compound formed which imparts a blue-green colour to solution.

(b) Write a balanced chemical equation of the reaction which takes place.

(c) On the basis of the above reaction, what can you say about the nature of copper oxide?

Answer

(a) The new compound formed is cuprous chloride. It imparts a blue-green colour to the solution.

(b) $CuO\ (s) + 2HCl\ (aq) \rightarrow CuCl_2\ (aq) + H_2O$

(c) On observing the above reaction, it can be inferred that copper oxide is basic in nature. when limestone reacts with dilute HCl

47. Question

A white shirt has a yellow stain of curry. When soap is rubbed on this shirt during washing, the yellow stain turns reddish-brown. On rinsing the shirt with plenty of water, the reddish- brown stain turns yellow again.

(a) Name the natural indicator present in curry stain.

(b) Explain the changes in colour of this indicator which take place during washing and rinsing the shirt.

(c) What is the nature of soap (acidic/basic) as shown by the indicator present in curry stain?

Answer

(a) The natural indicator present is turmeric.

(b) Soap being basic in nature turns the colour of the turmeric from yellow to reddish-brown. After washing with lots of water, the soap is removed and the turmeric returns to its yellow colour.

(c) Soap is basic in nature.

48. Question

You have been provided with three test-tubes. One of these test-tubes contains distilled water and the other two contain an acidic and a basic solution respectively. If you are given only blue litmus paper, how will you identify the contents of each test- tube?

Answer

If the colour of blue litmus does not change, then it is alkali. If the colour of blue litmus changes to red, then it is base. If there is no change in the colour of blue litmus/red litmus then it is distilled water due to the absence of ions.

49. Question

A substance X which is used as an antacid reacts with dilute hydrochloric acid to produce a gas Y which is used in one type of fire-extinguisher. Name the substance X and gas Y. Write a balanced equation for the chemical reaction which takes place.

Answer

The chemical name of the substance X is sodium hydrogencarbonate ($NaHCO_3$). It reacts with with dilute hydrochloric acid to produce gas y which is carbon dioxide.

$NaHCO_3 + HCl \rightarrow CO_2 + H_2O + NaCl$

50. Question

How is the neutralization of a carbonate with an acid different from the neutralization of an oxide or a hydroxide?

Answer

Neutralization of carbonate with acid will lead to formation of salt, water and evolution of carbon-di-oxide gas. However, neutralization of oxide or hydroxide with acid will lead to formation of salt and water only.

51. Question

What happens to

(a) the H^+ ions, and

(b) temperature of the solution, when an acid is neutralized?

Answer

(a) H^+ ions of acid combine with OH^- ions of alkali to form water, H_2O (b) Temperature of the solution rises.

Very Short Answer Type Questions-Pg-79

1. Question

Name the gas evolved when zinc granules are treated/heated with:

(a) hydrochloric acid solution

(b) sodiumhydroxide solution

Answer

(a) $2HCl + Zn \rightarrow ZnCl_2 + H_2$

Hydrogen gas is formed.

(b) $2NaOH + Zn \rightarrow Na_2ZnO_2 + H_2$

Hydrogen gas is formed in the reaction.

2. Question

What is the common name of water soluble bases?

Answer

Bases which are soluble in water are called alkalis.

3. Question

What is common in all the water soluble bases (or alkalis)?

Answer

Bases generate hydroxide (OH^-) ions in water.

4. Question

Why does tooth decay start when the pH of mouth is lower than 5.5?

Answer

Tooth decay starts when the pH of the mouth is lower than 5.5. Tooth enamel is made up of calcium phosphate It does not dissolve in water, but is corroded when the pH in the mouth is below 5.5.

5. Question

What is the pH of a neutral solution?

Answer

The pH of a neutral solution is 7.

6. Question

Which is more acidic: a solution of pH = 2 or a solution of pH = 6?

Answer

A solution of pH=2; higher the hydrogen ion concentration, lower is the pH value.

7. Question

Which is more basic (or more alkaline): a solution of pH = 8 or a solution of pH = 11?

Answer

A solution of pH = 11; as the pH value increases from 7 to 14, it represents an increase in OH^- ion concentration in the solution, that is, increase in the strength of alkali.

8. Question

Name the scientist who developed the pH scale.

Answer

Sorenson developed the pH scale.

9. Question

Name the indicator which can give us an idea of how strong or weak an acid or base is.

Answer

Universal indicator can give the idea of strength of acid or base by measuring the pH.

10. Question

The pH of soil A is 7.5 while that of soil B is 4.5. Which of the two soils, A or B, should be treated with powdered chalk to adjust its pH and why?

Answer

Soil B The pH of Soil B is below 7. Hence it is acidic in nature so it should be treated with powdered chalk to reduce its acidity.

11. Question

What is the name of the indicator which can be used for testing the pH of a solution?

Answer

Universal indicator can give the idea of strength of acid or base by measuring the pH.

12. Question

What colour will universal indicator show if you add it to the following substances?

(a) potassium hydroxide, pH = 12

(b) sodawater, pH = 5

(c) sulphuric acid, pH = 2

Answer

(a) Dark purple; strong alkali. (b) Orange yellow; weak acid. (c) Red; strong acid.

13. Question

A beaker of concentrated hydrochloric acid has a pH of 1. What colour will full range universal indicator tum if it is added to this beaker? Is it a strong or a weak acid?

Answer

As pH is very low, it will impart red colour to universal indicator. It is a strong acid.

14. Question

Two solutions X and Y are tested with universal indicator. Solution X turns orange whereas solution Y turns red. Which of the solutions is a stronger acid?

Answer

Solution Y is a stronger acid as it imparts red colour to universal indicator which depicts that it is a strong acid.

15. Question

Two solutions A and B have pH values of 3.0 and 9.5 respectively. Which of these will tum litmus solution from blue to red and which will tum phenolphthalein from colourless to pink?

Answer

Solution A will turn blue litmus into red, as it has low pH indicating it as a strong acid.

Solution B will turn phenolphthalein into pink as the pH is between 7 and 14, indicating it as alkali.

16. Question

Two drinks P and Q gave acidic and alkaline reactions, respectively. One has a pH value of 9 and the other has a pH value of 3. Which drink has the pH value of 9?

Answer

Q has pH value of 9, as the pH is between 7 and 14, indicating it as alkali.

17. Question

Two solutions X and Y have pH = 4 and pH = 8, respectively. Which solution will give alkaline reaction and which one acidic?

Answer

Solution X will give acidic reaction as pH lies between 1-7.

Solution Y will give alkaline reaction as pH lies between 7-14.

18. Question

Fill in the following blanks with suitable words:

(a) Acids have a pH.....than 7.

(b) Alkalis have a pH..... than 7.

(c) Neutral substances have a pH of .....

(d) The more acidic a solution, the ..... the pH.

(e) The more alkaline a solution, the..... the pH.

Answer

(a) lower (b) higher (c) 7 (d) lower (e) higher

Short Answer Type Questions-Pg-79

19. Question

Fresh milk has a pH of 6. When it changes into curd (yogurt), will its pH value increase or decrease? Why?

Answer

When fresh milk changes into its sour version(curd), the ph value will decrease because of the formation of lactic acid.

20 A. Question

(a) What is a universal indicator? For what purpose is it used?

Answer

(a) Universal indicator is a mixture of several indicators. It shows different colours at different concentrations of hydrogen ions in a solution. It is used to measure the pH.

20 B. Question

How does a universal indicator work?

Answer

Universal indicator works by determining different colours at different concentrations of hydrogen ions in a solution.

20 C. Question

Water is a neutral substance. What colour will you get when you add a few drops of universal indicator to a test-tube containing water?

Answer

Universal indicator will show green colour as water is a neutral substance having pH=7.

21. Question

Which chemical is injected into the skin of a person:

(a) during an ant's sting?

(b) duting the nettle leaf hair sting?

How can the effect of these stings be neutralized?

Answer

(a) Ant-sting leaves methanoic acid which causes pain and irritation.

(b) Nettle leaf hair stings inject methanoic acid.

Use of a mild base like baking soda on the stung area gives relief.

22 A. Question

Explain the pH change as the cause of tooth decay. How can tooth decaycaused by pH change be prevented?

Answer

Bacteria present in the mouth produce acids by degradation of sugar and food particles remaining in the mouth after eating,which lowers the pH. Tooth decay starts when the pH of the mouth is lower than 5.5. Tooth enamel, made up of calcium phosphate gets corroded below this pH. The best way to prevent this is to use toothpastes, which are generally basic, for cleaning the teeth as they neutralize the excess acid and prevent tooth decay.

22 B. Question

Explain how pH change in the lake water can endanger the lives of aquatic animals (like fish). What can be done to lessen the danger to the lives of aquatic animals in the lake?

Answer

Living organisms can survive only in a narrow range of pH change. When pH of rain water is less than 5.6, it is called acid rain. When acid rain flows into the lakes, it lowers the pH of the lake water. The survival of aquatic life in such lakes becomes difficult.

23 A. Question

What happens during a bee sting? What is its remedy?

Answer

Bee-sting leaves methanoic acid which causes pain and irritation. Use of a mild base like baking soda on the stung area gives relief.

23 B. Question

What happens during a wasp sting? What is its remedy?

Answer

Wasp stings leaves an alkaline liquid into the skin. Rubbing a mild acid like vinegar on the stung area of the skin gives relief.

24 A. Question

Why is it wrong to treat a bee sting with vinegar?

Answer

Bee-sting leaves methanoic acid in the skin. Since vinegar is acetic acid so it can't be used to treat bee sting.

24 B. Question

Why is it wrong to treat a wasp sting with baking soda solution?

Answer

Wasp stings leaves an alkaline liquid into the skin. Since baking soda is also basic in nature so it can't be used to treat wasp sting.

25 A. Question

What does the pH of a solution signify? Three solutions A, B and C have pH values of 6, 4 and 10 respectively. Which of the solutions is highly acidic?

Answer

pH of a solution signifies as a number which indicates the acidic or basic nature of a solution. Higher the hydronium ion concentration, lower is the pH value.

25 B. Question

A farmer has found that the pH of soil in his fields is 4.2. Name any two chemical materials which he can mix with the soil to adjust its pH.

Answer

According to pH of soil, the soil is acidic in nature. A farmer should treat the soil of his fields with quick lime (calcium oxide) or slaked lime (calcium hydroxide) or chalk (calcium carbonate) to neutralize the physical conditions of soil.

26 A. Question

(a) The pH values of six solutions A to F are given below :

A = 0, B = 11, C = 6, D = 3, E = 13, F = 8

Which of the above solutions are

(i) acids

(ii) alkalis?

Answer

(i) Acids- Solutions A,C and D are acids as the pH lies between 0 to 7.

(ii) Alkalis- Solutions B,E and F are alkalis as the pH lies between 7 to 14

26 B. Question

Name the acids or alkalis used to make (i) car batteries (ii) explosives (iii) soaps (iv) fertilizers.

Answer

(i) Car batteries- Sulphuric acid is present in car batteries making its ph around 0.8.

(ii) Explosives- The acid-base reaction of ammonia with nitric acid produces ammonium nitrate which is commonly used in explosives.

(iii) Soaps- Washing soda is a chemical substance used in soaps. It is derived from HCl and NaOH.

(iv) Fertilizers- Acid HCl is present in fertilizers which then reacts with water in field to impart H + ions which act as fertilizers.

27 A. Question

The pH of a cold drink is 5. What will be its action on blue and red litmus solutions?

Answer

According to pH value, cold drink is acidic in nature. It will turn blue litmus into red colour.

27 B. Question

The pH values of three acids A, B and having equal molar concentrations are 5.0, 2.8 and 3.5 respectively.

Arrange these acids in order of the increasing acid strengths.

Answer

Higher the hydronium ion concentration, lower is the pH value, more acidic is the solution. Hence, the correct order is: A < C < B.

28. Question

Under what soil conditions do you think a farmer would treat the soil of his fields with quicklime (calcium oxide), or slaked lime (calcium hydroxide) or chalk (calcium carbonate)?

Answer

As quicklime, slaked lime and chalk are basic in nature. Hence they must be added to neutralize the soil which is acidic in nature.

29. Question

Which acid is produced in our stomach? What happens if there is an excess of acid in the stomach? How can its effect be cured?

Answer

Our stomach produces hydrochloric acid. It helps in the digestion of food without harming the stomach. During indigestion, the stomach produces too much acid, which causes pain and irritation. To get rid of this pain, some of the basic compounds called antacids are used. These antacids neutralize the excess acid. Magnesium hydroxide (Milk of magnesia), a mild base, is often used for this purpose.

30. Question

The soil in a field is highly acidic. Name two materials which can be added to this soil to reduce its acidity. Give the reason for your choice.

Answer

Quicklime (calcium oxide), or slaked lime (calcium hydroxide) or chalk (calcium carbonate) are basic in nature. Hence they must be added to neutralize the soil which is acidic in nature.

31. Question

What is meant by strong bases and weak bases? Classify the following into strong bases and weak bases:

NH_4OH, $Ca(OH)_2$, NaOH, KOH, $Mg(OH)_2$

Answer

Bases in which complete dissociation of hydroxide ions takes place are considered as strong bases. Bases in which the incomplete dissociation of hydrogen ions or hydroxide ions takes place are known as weak bases.

Strong bases: NaOH, KOH; Weak bases: NH_4OH, $Ca(OH)_2$, $Mg(OH)_2$

32. Question

What ions are present in the solutions of following substances? (write the symbols only)

(i) Hydrochloric acid (ii) Nitric acid (iii) Sulphuric acid (iv) Sodium hydroxide (v) Potassium hydroxide (vi) Magnesium hydroxide

Answer

(i) Hydrochloric acid- H^+, Cl^- (ii) Nitric acid- H^+, NO_3^{2-} (iii) Sulphuric acid- H^+, SO_4^{2-} (iv) Sodium hydroxide- Na^+, OH^- (v) Potassium hydroxide-K^+, OH^- (vi) Magnesium hydroxide- Mg2+, OH^-

33 A. Question

What would you expect the pH of pure water to be?

Answer

A neutral solution, such as distilled water has value of hydrogen ion concentration equal to 7 on pH scale.

33 B. Question

What colour would the universal indicator show in an aqueous solution of sugar? Why?

Answer

Universal indicator will show green colour in aqueous solution of sugar as it is a pH-neutral substance, meaning that its pH value is usually near 7.

33 C. Question

A sample of rain water turned universal indicator paper yellow. What would you expect its pH to be? Is it a strong or a weak acid?

Answer

As indicator shows yellow colour, it can be inferred that pH is between 5 and 6. It shows the presence of weak acid in the rain water.

34 A. Question

What do you think will be the pH in the stomach of a person suffering from indigestion : less than 7 or more than 7?

Answer

During indigestion, the stomach produces too much acid. Hence pHwill be less than 7.

34 B. Question

What do you think will be the pH of an antacid solution: less than 7 or more than 7?

Answer

Antacid is basic in nature, hence its pH is more than 7.

34 C. Question

How does an antacid work?

Answer

Antacid is basic in nature. It will neutralize the excess acid produced in stomach and relieve the pain.

34 D. Question

Name two common antacids.

Answer

Milk of magnesia and Baking soda are the common antacids.

35. Question

Separate the following into substances having pH values above and below 7. How do these influence litmus paper?

(i) Lemon juice

(ii) Solution of washing soda

(iii) Toothpaste

(iv) Vinegar

(v) Stomach juices

Answer

Solutions having pH values above 7 : Solution of Washing soda and Toothpaste. They are basic in nature. They tum red litmus paper blue. Solutions having pH values less than 7 : Lemon juice, Vinegar and Stomach juices. They are acidic in nature. They tum blue litmus paper red.

36 A. Question

Do basic solutions also have H^+ (aq) ions? If yes, then why are they basic?

Answer

Yes, basic solutions also have H^+ ions. However, their concentration is less as compared to the OH^- ions that makes the solution basic.

36 B. Question

When a solution becomes more acidic, does the pH get higher or lower?

Answer

When a solution becomes more acidic, the concentration of hydrogen ions increase, hence the pH gets lower.

Long Answer Type Questions-Pg-80

37 A. Question

Define an acid and a base. Give two examples of each.

Answer

Those substances which are sour in taste and produces H + ions in aqueous solutions are called acids.

Examples- Hydrochloric acid and Sulphuric acid.

Those substances which are bitter in taste and produce hydroxide ions in aqueous solutions are called bases.

Examples- sodium hydroxide and potassium hydroxide.

37 B. Question

Give the names and formulae of two strong bases and two weak bases.

Answer

Strong bases - Sodium hydroxide, NaOH, potassium hydroxide (KOH). Weak bases - Calcium hydroxide, $Ca(OH_2)$, ammonium hydroxide, NH_4OH.

37 C. Question

What type of ions are formed:

(i) when an acid is dissolved in water?

(ii) when a base (or alkali) is dissolved in water?

Answer

(i) when an acid is dissolved in water, hydrogen ions are produced.

(ii) when a base is dissolved in water, hydroxide ions are produced.

37 D. Question

Write the neutralization reaction between acids and bases in terms of the ions involved.

Answer

A reaction in which an acid and base react with each other to give a salt and water is termed as neutralization reaction. Reaction involving ions in acids and bases- H^+ (aq) + OH^- (aq) → H_2O(l)

37 E. Question

Write any two important uses of bases.

Answer

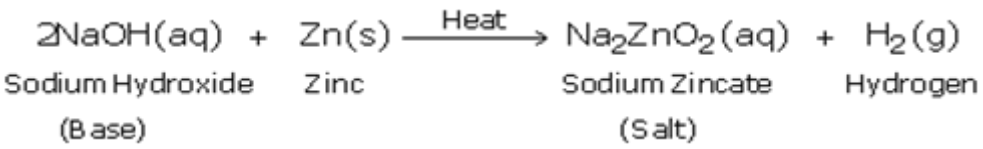
Sodium hydroxide is used to make paper, detergents and soap. Potassium hydroxide is used in farming to make acidic soil more alkaline so that plants will grow better in it.

38 A. Question

What happens when zinc granules are heated with sodium hydroxide solution? Write equation of the reaction which takes place.

Answer

Sodium hydroxide gives hydrogen gas and sodium zincate when reacts with zinc granules.



38 B. Question

What happens when bases react with non-metal oxides? Explain with the help of an example. What does this reaction tell us about the nature of non-metal oxides?

Answer

When a base reacts with non-metal oxide both neutralize each other resulting respective salt and water are produced. This confirms that non-metal oxides are acidic in nature. Example-Sodium hydroxide gives sodium carbonate and water when it reacts with carbon dioxide.

$2NaOH + CO_2 \Rightarrow Na_2CO_3 + H_2O$

39 A. Question

(a) What effect does the concentration of H^+ (aq) ions have on the nature of a solution?

Answer

More the concentration of H^+ (aq) ions in a solution, more acidic it will become and vice versa.

39 B. Question

What effect does the concentration of OH^- ions have on the nature of a solution?

Answer

More the concentration of OH^- ions in a solution, more basic it will become and vice versa.

39 C. Question

Someone put some universal indicator paper into vinegar. The pH is 3. What does this tell you about the vinegar?

Answer

Lesser the pH, more the concentration of H^+ (aq) ions. Hence vinegar is acidic in nature.

39 D. Question

Someone put some universal indicator paper onto wet soap. The pH is 8. What does this tell you about the soap?

Answer

More the pH, more the concentration of OH^- ions. Hence soap is basic in nature.

39 E. Question

State whether a solution is acidic, alkaline or neutral if its pH is:

(i) 9 (ii) 4 (iii) 7 (iv) 1 (v) 10 (vi) 3

Answer

(i) 9-Basic (ii) 4-Acidic (iii) 7-Neutral (iv) 1-Acidic (v) 10-Basic (vi) 3-Acidic.

Multiple Choice Questions (MCQs)-Pg-81

40. Question

One of the following is a medicine for indigestion. This is: A. sodiumhydroxide

B. manganese hydroxide

C. magnesium hydroxide

D. potassium hydroxide

Answer

Magnesium hydroxide (Milk of magnesia) is a mild base. It is used as an antacid as it neutralizes the excessive acid present in stomach.

41. Question

Bee sting contains: A. an acidic liquid

B. a salt solution

C. an alkaline liquid

D. an alcohol

Answer

Bee sting contains methanoic acid.

42. Question

Wasp sting contains: A. a sugar solution

B. an acidic liquid

C. a salt solution

D. an alkaline liquid

Answer

Wasp sting contains an alkaline liquid.

43. Question

One of the following does not inject an acidic liquid into the skin through its sting. This is: A. honey bee

B. ant

C. wasp

D. nettle leaf hair

Answer

Wasp sting contains an alkaline liquid.

44. Question

A solution turns red litmus blue. Its pH is likely to be: A. 1

B. 4

C. 5

D. 10

Answer

An alkali/base turns red litmus blue. pH of an alkali lies between 7 and 14.

45. Question

A solution turns blue litmus red. Its pH is likely to be: A. 7

B. 5

C. 8

D. 14

Answer

An acid turns blue litmus red. pH of an acid lies between 0 and 7.

46. Question

A solution turns phenolphthalein indicator pink. The most likely pH of this solution will be: A. 6

B. 4

C. 9

D. 7

Answer

An alkali/base turns phenolphthalein indicator pink. pH of an alkali lies between 7 and 14.

D. Question

The colour of methyl orange indicator in a solution is yellow. The pH of this solution is likely to be: A. 7

B. less than 7

C. 0

D. more than 7

Answer

An alkali/base turns methyl orange indicator pink. pH of an alkali lies between 7 and 14.

48. Question

Bee stings can be treated with: A. vinegar

B. sodium hydrogen carbonate

C. potassium hydroxide

D. lemon juice

Answer

Baking soda/sodium hydrogen carbonate is alkaline in nature and it will neutralize the effect of methanoic acid present in bee sting.

49. Question

Wasp stings can be treated with: A. baking soda

B. vinegar

C. washing soda

D. milk of magnesia

Answer

Wasp sting is alkaline in nature. Hence its effect can be neutralized by vinegar(acetic acid).

50. Question

It has been found that rubbing vinegar on the stung area of the skin of a person gives him relief. The person has been stung by: A. wasp

B. ant

C. honey bee

D. nettle leaf hair

Answer

Wasp sting is alkaline in nature. Hence its effect can be neutralized by vinegar(acetic acid).

51. Question

Fresh milk has a pH of 6. When milk changes into curd, the pH value will: A. become 7

B. become less than 6

C. become more than 7

D. remain unchanged

Answer

The pH of milk is 6. As it changes to curd, the pH will reduce because curd is acidic in nature. The acids present in it decrease the pH.

52. Question

The acid produced naturally in our stomach is: A. acetic acid

B. citric acid

C. hydrochloric acid

D. sulphuric acid

Answer

our stomach produces hydrochloric acid. It helps in the digestion of food without harming the stomach.

53. Question

The daffodil plants grow best in a soil having a pH range of 6.0 to 6.5. If the soil in a garden has a pH of 4.5, which substance needs to be added to the soil in order to grow daffodils? A. salt

B. lime

C. sand

D. compost

Answer

No Answers

Questions Based on High Order Thinking Skills (HOTS)-Pg-82

54. Question

A milkman adds a very small amount of baking soda to fresh milk.

(a) Why does he shift the pH of the fresh milk from 6 to slightly alkaline?

(b) Why does this milk take a long time to set as curd?

Answer

(a) The milkman shifts the pH of the fresh milk from 6 to alkaline so that in basic form, it will not spoil easily.

(b)This milk takes a long time to set as curd because the lactic acid produced reacts with the baking soda and gets neutralized.

55. Question

Which of the following elements would form oxides which would indicate pH values less than seven, using moist pH paper?

Magnesium, Carbon, Sulphur, Hydrogen, Copper.

Answer

Carbon and sulphur form acidic oxides which would indicate pH values less than seven.

56. Question

The pH values of five solutions A, B, C, D and E are given below:

A 1

B 5

C 7

D 11

E 13

Which solution is (i) weakly alkaline (ii) neutral (iii) strongly acidic (iv) strongly alkaline, and (v) weakly acidic?

Answer

(i) weakly alkaline-D (ii) neutral-C (iii) strongly acidic-A (iv) strongly alkaline-E (v) weakly acidic-B.

Explanation- If pH lies between 0-7, then it is acidic solution. If pH is 7, then it is a neutral solution. If pH lies between 7-14, then it is alkaline solution.

57. Question

Potatoes grow well on Anhad's farm which has soil with a pH of 5.5. Anhad decides to add lot of lime to soil so that he can grow broccoli in the same farm:

(a) Do potatoes grow better in acidic or alkaline soil?

(b) Does broccoli grow better in acidic or alkaline soil?

Answer

(a) pH 5.5 indicates that potatoes grow better in acidic soil.

(b) Adding lime to this soil will increase the pH of the soil by making it alkaline. Hence broccoli grow better in alkaline soil.

58. Question

Here are some results of solutions tested with universal indicator paper Sulphuric acid : Red

Metal polish : Dark blue

Washing-up liquid : Yellow

Milk of magnesia : Light blue

Oven cleaner : Purple

Car battery acid : Pink

Arrange the solutions in order of their increasing pH values (starting with the one with the lowest pH).

Answer

Sulphuric acid(Acidic) < Car battery acid(Acidic) < Washing-up liquid(Slightly acidic) < Milk of magnesia(Basic) < Metal polish(Basic)< Oven cleaner(Basic).

59. Question

Solution A turns universal indicator blue to purple whereas solution B turns universal indicator orange to red.

(a) What will be the action of solution A on litmus?

(b) What will be action of solution B on litmus?

(c) Name any two substances which can give solutions like A.

(d) Name any two substances which can give solutions like B.

(e) What sort of reaction takes place when solution A reacts with solution B?

Answer

(a) As Solution A turns universal indicator from blue to purple, it is determined that it is basic in nature. It will turn litmus into blue.

(b) As Solution B turns universal indicator from orange to red, it is determined that it is acidic in nature. It will turn litmus into red.

(c) Milk of magnesia and Sodium hydroxide solution

(d) Lemon juice and Hydrochloric acid

(e)When acid reacts with base, it neutralizes each other and forms salt and water,the reaction is called Neutralization reaction.

60. Question

A first-aid manual suggests that vinegar should be used to treat wasp stings and baking soda for bee stings.

What does this information tell you about the chemical nature of:

(a) wasp stings?

(b) bee stings?

Answer

(a)Wasp sting is alkaline in nature. Hence its effect can be neutralized by vinegar(acetic acid), which is acidic in nature.

(b) Baking soda/ sodium hydrogen carbonate is alkaline in nature and it will neutralize the effect of methanoic acid present in bee sting.

61 A. Question

Explain why the pH in a person's mouth becomes lower after each meal.

Answer

Bacteria present in the mouth produce acids by degradation of sugar and food particles remaining in the mouth after eating. This lowers the pH of the mouth of the person.

61 B. Question

What damage could be caused while the pH is low?

Answer

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.

61 C. Question

How could the person change his eating habits to lessen chances of suffering from tooth decay?

Answer

The best way to prevent this is to clean the mouth after eating every meal. Using toothpastes, which are generally basic, for cleaning the teeth can neutralize the excess acid and prevent tooth decay.

62. Question

A group of students measured the pH of some substances they found in their homes. Their results are given in the following table:

Substance	pH
Apples	3.0
Salt	7.0
Baking soda	8.5
Sugar	7.0
Black coffee	5.0
Toothpaste	9.0
Household ammonia	12.0
Vinegar	3.0
Lemon juice	2.5
Washing soda	11.5
Milk	6.5

(a) What would the students have used to measure the pH?

(b) Which solution is the most acidic?

(c) Which solution is the most alkaline?

(d) Which solutions are neutral?

(e) Which solution can be used to treat wasp stings?

(f) Which solution can be used to treat bee stings?

Answer

(a) Universal indicator paper is used to measure the pH. The universal indicator shows different colours at different concentrations of hydrogen ions in a solution.

(b) According to the records, Lemon juice with lowest pH of 2.5 is most acidic.

(c) According to results, household ammonia has highest pH indicating it as most alkaline.

(d) Solutions having pH 7 are the neutral solutions such as salt and sugar solutions.

(e) Wasp sting is alkaline in nature. Hence its effect can be neutralized by vinegar(acetic acid), which is acidic in nature.

(f) Baking soda/ sodium hydrogen carbonate is alkaline in nature and it will neutralize the effect of methanoic acid present in bee sting.

63. Question

Hydrochloric acid reacts with a metal X to form a gas Y which burns with a 'pop' sound. Sodium hydroxide solution also reacts with the same metal X (on heating) to

form the same gas Y.

(a) Name X and Y

(b) Write the chemical equation of the reaction of metal X with

(i) hydrochloric acid, and

(ii) sodium hydroxide solution.

Answer

(a) Metal X is zinc; Gas Y is hydrogen.

(b) (i) When hydrochloric acid reacts with Zn, hydrogen gas and zinc chloride are formed $Zn + 2HCl \Rightarrow ZnCl_2 + H_2$

(ii) Sodium hydroxide gives hydrogen gas and sodium zincate when reacts with zinc metal.

$2NaOH + Zn \Rightarrow Na_2ZnO_2 + H_2$

Very Short Answer Type Questions-Pg-96

1. Question

What is the chemical formula of

(a) baking soda, and

(b) washing soda?

Answer

(a) Baking soda- $NaHCO_3$. (b) Washing soda- Na_2CO_3.

2. Question

Write the chemical formula of (i) soda ash, and

(ii) sodium carbonate decahydrate.

Answer

(i) Soda ash- Na_2CO_3. (ii) Sodium carbonate decahydrate-$Na_2CO_3.10H_2O$.

3. Question

State whether the following statement is true or false:

Copper sulphate crystals are always wet due to the presence of water of crystallization in them.

Answer

The given statement is false. Copper sulphate is not wet. It is an hydrated salt as it contains water molecules which imparts blue colour to it.

4. Question

Which of the following salt has a blue colour and why?

$CuSO_4.5H_2O$ or $CuSO_4$

Answer

$CuSO_4.5H_2O$/ copper sulphate. It is an hydrated salt as it contains water molecules which imparts blue colour to it.

5. Question

What would be the colour of litmus in a solution of sodium carbonate?

Answer

Sodium carbonate would impart blue colour to limus as it is alkaline in nature.

6. Question

State the common and chemical names of the compound formed when plaster of Paris is mixed with water.

Answer

The common name of compound formed by mixing of plaster of paris with water is Gypsum and the chemical name is calcium sulphatedihydrate.

7. Question

With which substance should chlorine be treated to get bleaching powder?

Answer

Bleaching powder is produced by the action of chlorine on dry slaked lime $[Ca(OH)_2$

8. Question

What is the commercial name of calcium sulphatehemihydrate?

Answer

Plaster of Paris.

9. Question

Name the product formed when CI_2 and H_2produced during the electrolysis of brine are made to combine.

Answer

Hydrogen and chloride ions will combine to produce hydrochloric acid(HCl).

10. Question

Name a calcium compound which hardens on wetting with water.

Answer

Plaster of Paris is a white powder and on mixing with water, it changes to gypsum, a hard solid mass.

11. Question

Name a sodium compound which is a constituent of many dry soap powders.

Answer

Sodium carbonate/ Washing soda is used in many dry soaps and detergents.

12. Question

Name a metal carbonate which is soluble in water.

Answer

Sodium carbonate/ Washing soda is soluble in water.

13. Question

Name an acid which is present in baking powder.

Answer

The chemical name of baking powder is sodium hydrogencarbonate ($NaHCO_3$). It is produced using sodium chloride as one of the raw materials. Sodium chloride is a salt produced by reaction of HCl(acid) and NaOH(base). Hence HCl is the acid present in baking powder.

14. Question

Name the metal whose carbonate is known as washing soda.

Answer

Washing soda($Na_2CO_3.10H_2O$) is obtained from sodium.

15. Question

Which compound is used as an antacid in medicine: $NaHCO_3$ or Na_2CO_3?

Answer

$NaHCO_3$; Sodium hydrogencarbonate is an ingredient in antacids. Being alkaline, it neutralises excess acid in the stomach and provides relief.

16. Question

What is the common name of

(a) $NaHCO_3$ or $Na_2CO_3.10H_2O$?

Answer

(a) Baking soda.

(b) Washing soda.

17. Question

Write the chemical name and formula of (a) common salt, and

(b) caustic soda.

Answer

(a) Common salt- Chemical name is sodium chloride. Chemical formula is NaCl.

(b) Caustic soda- Chemical name is Sodium hydroxide Chemical formula is NaOH.

18. Question

What are the two main ways in which common salt (sodium chloride) occurs in nature?

Answer

Common salt occurs naturally in sea water and as rock salt.

19. Question

Name the major salt present in sea- water.

Answer

Common salt (sodium chloride) is present in sea water in major quantities.

20. Question

How is common salt obtained from sea-water?

Answer

The seawater or brine is fed into large ponds and water is drawn out through natural evaporation which allows the salt to be subsequently harvested.

21. Question

Why is sodium chloride required in our body?

Answer

Salt helps maintain the fluid in our blood cells and is used to transmit information in our nerves and muscles.it also helps in relaxation of muscles.

22. Question

Name three chemicals made from common salt (or sodium chloride).

Answer

(i) **Sodium Hydroxide (NaOH):** Sodium hydroxide is a strong base obtained from sodium chloride. It is also known as caustic soda or Iye.

(ii)Baking soda is another important product which can be obtained from sodium chloride.

(iii)Washing soda($Na_2CO_3.10H_2O$)/Sodium carbonate is also manufactured from sodium chloride.

23. Question

Give any two uses of common salt (sodium chloride).

Answer

(i) Sodium chloride is used to enhance the taste of food. (ii) Sodium chloride is used in manufacturing of many chemicals such as baking soda and washing soda.

24. Question

What name is given to the common salt which is mined from underground deposits? How was this salt formed?

Answer

Deposits of solid salt which are mined like coal are called rock salt. Beds of rock salt were formed when seas of bygone ages dried up.

25. Question

Name the salt which is used as a preservative in pickles, and in curing meat and fish.

Answer

Common salt also act as preservative in pickles as well as, in curing meat and fish.

26. Question

Name the raw material used for the production of caustic soda.

Answer

Caustic soda is obtained by the electrolytic decomposition of solution of sodium chloride (NaCl).

27. Question

The electrolysis of an aqueous solution of sodium chloride gives us three products. Name them.

Answer

In the process of electrolytic decomposition of aqueous solution of sodium chloride, it decomposes to form sodium hydroxide(near cathode), chlorine(at anode)and hydrogen gas(at cathode). This whole process is known as Chlor-Alkali process.

$2NaCl + 2H_2O \Rightarrow 2NaOH + Cl_2 + H_2$

28. Question

During the electrolysis of a saturated solution of sodium chloride, where is:

(a) chlorine formed?

(b) hydrogen formed?

(c) sodium hydroxide formed?

Answer

In the process of electrolytic decomposition of aqueous solution of sodium chloride, it decomposes to form three products-

(i) chlorine is formed at anode.

(ii) hydrogen gas at cathode.

(iii) sodium hydroxide is formed near cathode.

29. Question

Fill in the following blanks:

(a) Common salt is obtained from sea-water by the process of .....:

(b) Rock salt is mined just like. .....

(c) Chemical formula of washing soda is.....

(d) Sodium hydrogen carbonate is.....soda whereas sodium carbonate is.....soda.

(e) The chemical formula of plaster of Paris is.....

Answer

(a) evaporation

(b) coal

(c) $Na_2CO_3 .10H_2O$

(d) baking; washing

(e) $CaSO_4\frac{1}{2}H_2O$.

30. Question

Complete and balance the following chemical equations:

$(a)\ NaCI(aq) + H_2O(1) \xrightarrow{Electricity}$

$(b)\ NaHCO_3 \xrightarrow{Heat}$

$(c)\ Nacl + NH_3 + H_2O + CO_2 \rightarrow$

$(d)\ Ca(OH)_2 + CI_2 \rightarrow$

Answer

$(a)\ NaCl\ (aq) + H_2O\ (l) \xrightarrow[Electrolysis]{Electricity} 2NaOH\ (aq) + Cl_2\ (g) + H_2\ (g)$

$(b)\ 2NaHCO_3 \xrightarrow{Heat} Na_2CO_3 + CO_2 + H_2O$

$(c)\ NaCl + NH_3 + H_2O + CO_2 \rightarrow NaHCO_3 + NH_4Cl$

$(d)\ Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$

Short Answer Type Questions-Pg-97

31. Question

What is washing soda? State two properties and two uses of washing soda.

Answer

Washing soda is sodium carbonate decahydrate. It can be obtained by recrystallisation of sodium carbonate.

$Na_2CO_3 + 10\ H_2O \rightarrow Na_2CO_3.10\ H_2O$

Two properties- (i) It is basic in nature. (ii) It is soluble in nature.

Uses - (i) Sodium carbonate (washing soda) is used in glass, soap and paper industries. (ii) Sodium carbonate can be used as a cleaning agent for domestic purposes. (iii) It is used for removing permanent hardness of water.

34. Question

What is baking soda? Write the chemical name of baking soda. Give the important uses of baking soda.

How does baking soda differ chemically from washing soda?

Answer

The soda commonly used in the kitchen for faster cooking is called baking soda. It is produced using sodium chloride as one of the raw materials. The chemical name of the compound is sodium hydrogencarbonate ($NaHCO_3$).

Uses- (i) Sodium hydrogencarbonate is an ingredient in antacids. Being alkaline, it neutralises excess acid in the stomach and provides relief. (ii) It is also used in soda-acid fire extinguishers

35. Question

Describe how sodium hydrogen carbonate (baking soda) is produced on a large scale. Write equation of the reaction involved.

Answer

Baking soda is obtained by the reaction of cold and concentrated solution of sodium chloride with carbon dioxide and ammonia. This is known as Solvay process. $NaCl + CO_2 + NH_3 + H_2O \Rightarrow NH_4Cl + NaHCO_3$ In this process, calcium carbonate is used as the source of CO_2 and the resultant calcium oxide is used to recover ammonia from ammonium chloride.

36. Question

What happens when a cold and concentrated solution of sodium chloride reacts with ammonia and carbon dioxide? Write the chemical equation of the reaction which takes place.

Answer

Baking soda is obtained by the reaction of cold and concentrated solution of sodium chloride with carbon dioxide and ammonia. This is known as Solvay process. $NaCl + CO_2 + NH_3 + H_2O \Rightarrow NH_4Cl + NaHCO_3$ In this process, calcium

carbonate is used as the source of CO_2 and the resultant calcium oxide is used to recover ammonia from ammonium chloride.

37 A. Question

What is meant by "water of crystallization" in a substance? Explain with an example.

Answer

Water of crystallization: Many salts contain water molecule and are known as hydrated salts. The water molecule present in salt structure is known as water of crystallization. Example- $CuSO_4.5H_2O$

37 B. Question

How would you show that blue copper sulphate crystals contain water of crystallization?

Answer

Blue colour of copper sulphate is due to presence of 5 molecules of water. When copper sulphate is heated, it loses water molecules and turns into grey-white colour, which is known as anhydrous copper sulphate. $CuSO_4.5H_2O$ + heat ⇨ $CuSO_4$

37 C. Question

Explain how anhydrous coppersulphate can be used to detectthe presence of moisture (water) in a liquid.

Answer

On adding water; anhydrous copper sulphate which is white in colour, becomes blue again.

39 A. Question

What will happen if heating is not controlled while preparing plaster of Paris?

Answer

If heating is not controlled while preparing Plaster of Paris, then all the water of crystallisation of gypsum is eliminated and it turns into a dead burnt plaster.

39 B. Question

Write an equation to show the reaction between plaster of Paris and water.

Answer

$$CaSO_4.½H_2O + 1½H_2O \rightarrow CaSO_4.2H_2O$$

40 A. Question

What happens when copper sulphate crystals are heated strongly? Explain with the help of an equation.

Answer

On strong heating, blue copper sulphate crystals turn white.

40 B. Question

What happens when a few drops of water are added to anhydrous copper sulphate? Explain with the help of an equation.

Answer

After adding water, anhydrous copper sulphate becomes blue again.
CuSO4.5H2O + heat ⇨ CuSO4

41 A. Question

Name two constituents of baking powder.

Answer

Sodium hydrogencarbonate and tartaric acid are the two constituents of baking soda.

41 B. Question

How does baking powder differ from baking soda?

Answer

Baking powder is a mixture of baking soda and tartaric acid whereas baking soda is only sodium hydrogencarbonate.

41 C. Question

Explain the action of baking powder in the making of cake (or bread). Write equation of the reaction involved.

Answer

When baking powder (mixture of baking soda and an edible acid) is heated, the sodium carbonate formed because of heating of baking soda neutralizes after reacting with tartaric acid and sodium tartarate salt is formed. The smell of sodium tartarate is pleasant and taste is good. This makes the cake or any other food tasty. Carbon dioxide produced during the reaction causes bread or cake to rise making them soft and spongy.

42 A. Question

What is the chemical name of bleaching powder?

Answer

Calcium oxychloride is the chemical name of bleaching powder.

42 B. Question

What is the chemical formula of bleaching powder?

Answer

$CaOCl_2$

42 C. Question

What are the materials used for the preparation of bleaching powder?

Answer

When calcium hydroxide (slaked lime) reacts with chlorine, it gives calcium oxychloride (bleaching powder) and water is formed.

$Ca(OH)_2 + Cl_2 \Rightarrow CaOCl_2 + H_2O$

42 D. Question

State one use of bleaching powder (other than bleaching).

Answer

Bleaching powder is used as disinfectant to clean water, moss remover, weed killers, etc.

44 A. Question

Name a sodium compound used for softening hard water.

Answer

Sodium carbonate is used for softening hard water.

44 B. Question

Which compound of calcium is used for disinfecting drinking water supply

Answer

Bleaching powder is used for disinfecting drinking water supply

44 C. Question

Name a metal compound which has detergent properties (cleansing properties).

Answer

Sodium carbonate has detergent properties (cleansing properties).

44 D. Question

Name one compound of calcium which is used for removing the colour of a coloured cloth.

Answer

Bleaching powder.

44 E. Question

State a peculiar (or remarkable) property of plaster of Paris.

Answer

Plaster of Paris is a white powder and on mixing with water, it changes to gypsum once again giving a hard solid mass.

44 F. Question

Name the substance obtained by the action of chlorine on solid (dry) slaked lime.

Answer

When calcium hydroxide (slaked lime) reacts with chlorine, it gives calcium oxychloride (bleaching powder).

45 A. Question

What is gypsum? What happens when gypsum is heated to 100°C (373 K)?

Answer

Gypsum is a salt, which possesses two water molecules as water of cyrstallisation. It has the formula $CaSO_4.2H_2O$. On heating gypsum at 373 K, it loses water molecules and becomes calcium sulphate hemihydrate ($CaSO_4 . 1/2H_2O$). This is called Plaster of Paris.

45 B. Question

Name a sodium compound which is used for making borax and glass.

Answer

Sodium carbonate is u used for making borax and glass.

45 C. Question

Name the compound whichis used in hospitals for setting fractured bones.

Answer

Plaster of Paris is the compound which is used in hospitals for setting fractured bones.

45 D. Question

Which is the real bleaching agent present in bleaching powder?

Answer

Chlorine in the bleaching powder is responsible for bleaching effect.

46 A. Question

What is "baking powder"? How does it make the cake soft and spongy?

What is the role of substance X in the baking powder?

Answer

Baking powder is a mixture of baking soda and tartaric acid. When baking powder mixes with water, then sodium hydrogencarbonate reacts with tartaric acid to evolve carbon dioxide gas which gets trapped in the wet dough and bubbles out slowly making the cake soft and spongy.

46 B. Question

In addition to sodium hydrogen carbonate, baking powders contain a substance X. Name the substance X.

What is the role of substance X in the baking powder?

Answer

Substance X is tartaric acid. It can react with any sodium carbonate formed and neutralize it otherwise cakes and bread will taste bitter.

47. Question

State two uses each of the following compounds:

(a) Sodium hydroxide

(b) Chlorine

(c) Hydrogen

(d) Hydrochloric acid

Answer

(a) Sodium hydroxide - (i) it is used in de-greasing metals. (ii) it is involved in the production of soaps and detergents.

(b) Chlorine (i) It is used in the production of bleaching powder. (ii) It is used in the production of hydrochloric acid.

(c) Hydrogen: (i) It is used in the production of hydrochloric acid. (ii) It is used in the hydrogenation of oils.

(d) Hydrochloric acid: (i) It is used in medicines and cosmetics.

48 A. Question

What is the common name of the compound $CaOCI_2$?

Answer

Bleaching powder.

49 B. Question

Name the raw material used for the preparation of plaster of Paris.

Answer

Gypsum.

48 C. Question

Which property of plaster of Paris is utilized in making casts for broken limbs in hospitals?

Answer

Plaster of Paris is a white powder and on mixing with water, it changes to gypsum once again giving a hard solid mass.

48 D. Question

Explain why chlorine is used for sterilizing drinking water supply.

Answer

Chlorine is used for sterilizing drinking water supply because it is a disinfectant which kills germs or bacteria.

(ii) It is used in textile/dyeing and tanning industries.

32. Question

Write the formulae of sodium chloride and sodium carbonate. Explain why an aqueous solution of sodium chloride is neutral but an aqueous solution of sodium carbonate is basic (or alkaline). Write chemical equations of the reactions involved.

Answer

Sodium chloride - NaCl. Sodium carbonate - Na_2CO_3. When sodium chloride is dissolved in water, its ions dissociate, meaning that they separate. As the sodium ion is positive and a chloride ion is negative, the aqueous solution is neutral. No hydronium ions (that cause acidic behavior) or hydroxide ions (that cause alkaline behavior) are formed. In case of sodium carbonate, it is basic because it gets hydrolysed to some extent and forms sodium hydroxide which is a strong base and carbonic acid which is a weak acid.

33. Question

Write the chemical formula of ammonium chloride. Explain why an aqueous solution of ammonium chloride is acidic in nature? Illustrate your answer with the help of a chemical equation.

Answer

The chemical formula of ammonium chloride is NH_4Cl. It is the salt of a strong acid, HCl and a weak base, NH4OH, so an aqueous solution of ammonium chloride is acidic in nature. When dissolved in water, it gets hydrolysed to some extent to form HCl and NH4OH. HCl being a strong acid is fully ionised and gives a large amount of hydrogen ions whereas NH4OH being a weak base, gets slightly ionised. So, NH4Cl contains more of hydrogen ions than hydroxide ions and hence acidic in nature.

$$NH_4Cl\,(s) + H_2O\,(l) \xrightarrow{\text{Hydrolysis}} NH_4OH\,(aq) + HCl\,(aq)$$

38 A. Question

What is the common name of sodium hydrogencarbonate?

Answer

Baking soda.

38 B. Question

What happens when a solution of sodium hydrogencarbonate is heated? Write equation of the reaction involved.

Answer

When sodium hydrogencarbonate is heated or mixed in water, the following reaction takes place –

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

Carbon dioxide is produced during the reaction.

38 C. Question

Explain why, sodium hydrogencarbonate is used as an antacid.

Answer

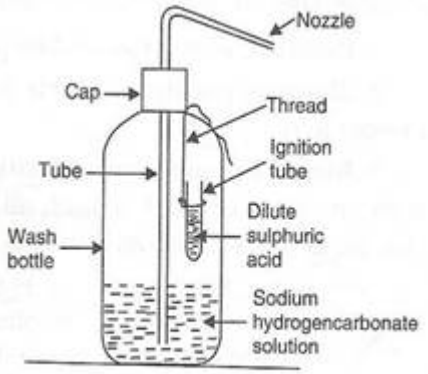
Being alkaline, it neutralises excess acid in the stomach and provides relief.

43. Question

What does a soda-acid type fire extinguisher contain? How does it work? Explain the working of a soda – acid fire extinguisher with the help of a labelled diagram.

Answer

A soda-acid type fire extinguisher contains a solution of sodium hydrogencarbonate and sulphuric acid in separate containers in separate containers inside them. When the knob of the fire extinguisher is pressed, then sulphuric acid mixes with sodium hydrogencarbonate solution to produce carbon dioxide gas which forms a blanket around the burning substance and cuts off the supply of air to burning substance; this stops the process of burning and fire gets extinguished.



Making a soda-acid fire extinguisher.

Long Answer Type Questions-Pg-98

49 A. Question

What happens when a concentrated solution of sodium chloride (brine) is electrolyzed? Write the equation of the reaction involved.

Answer

When a concentrated solution of sodium chloride is electrolyzed, it decomposes to form sodium hydroxide, chlorine and hydrogen.

49 B. Question

Why is the electrolysis of a concentrated solution of sodium chloride known as chlor-alkali process?

Answer

Because of the products formed: Chlor for chlorine and alkali for sodium hydroxide.

49 C. Question

Name three products of the chlor-alkali process. State two uses of each of these products.

Answer

Sodium hydroxide, chlorine and hydrogen. Uses of Sodium hydroxide:

(i) It is used for making soaps and detergents.

(ii) It is used in the manufacture of paper. Uses of chlorine:

(i) It is used in the production of bleaching powder.

(ii) It is used in the production of hydrochloric acid.

Uses of hydrogen:

(i) It is used in the production of hydrochloric acid.

(ii) It is used in the hydrogenation of oils.

53 A. Question

What is a salt? Give the names and formulae of any two salts. Also name the acids and bases from which these salts may be obtained.

Answer

A salt is a compound formed from an acid by the replacement of the hydrogen in the acid by a metal. Example: Sodium chloride - NaCl; It is obtained from hydrochloric acid and sodium metal. Ammonium chloride – NH4CI; It is obtained from ammonia and hydrochloric acid.

53 B. Question

What is meant by 'a family of salts'? Explain with examples.

Answer

The salts having the same positive ions are said to belong to a family of salts. Example: Sodium chloride and sodium sulphate belong to the same family of salts called sodium salts.

53 C. Question

What is meant by 'hydrated' and 'anhydrous' salts? Explain with examples.

Answer

The salts which contain water of crystallisation are called hydrated salts. Example: Copper sulphate crystals contain 5 molecules of water of crystallisation. The salts which have lost their water of crystallisation are called anhydrous salts. Example: On strong heating, copper sulphate crystals lose all the water of crystallisation and form anhydrous copper sulphate which is white in colour.

53 D. Question

Write the names, formulae and colours of any two hydrated salts.

Answer

Copper sulphatepentahydrate salt - Its chemical formula is $CuSO_4.5H_2O$. It is blue in colour. Iron sulphateheptahydrate salt - Its chemical formula is $FeSO_4.7H_2O$. It is green in colour.

53 E. Question

What will be the colour of litmus in an aqueous solution of ammonium chloride salt?

Answer

The aqueous solution of ammonium chloride salt turns blue litmus red.

50 A. Question

Describe how washing soda is produced starting from sodium chloride(common salt). Write equations of all the reactions involved.

Answer

Sodium carbonate is manufactured by the thermal decomposition of sodium hydrogen carbonate.

$NaCl + CO_2 + NH_3 + H_2O \Rightarrow NH_4Cl + NaHCO_3$

The sodium carbonate obtained in this process is dry. It is called soda ash or anhydrous sodium carbonate. Washing soda is obtained by rehydration of anhydrous sodium carbonate.

$Na_2CO_3 + 10H_2O \Rightarrow Na_2CO_3.10H_2O$

Since there are 10 water molecules in washing soda, hence it is known as Sodium bicarbonate decahydrate.

50 B. Question

State whether an aqueous solution of washing soda is acidic or alkaline? Give reason for your answer.

Answer

An aqueous solution of washing soda is alkaline because it turns red litmus to blue.

(c) Washing soda has detergent properties because it can remove dirt and grease from dirty clothes.

(d) (i) It is used as cleansing agent for domestic purposes.

(ii) It is used for removing permanent hardness of water.

50 C. Question

What is meant by saying that washing soda has detergent properties?

Answer

Washing soda has detergent properties because it can remove dirt and grease from dirty clothes.

50 D. Question

Give two important uses of washing soda (or sodium carbonate).

Answer

(i) It is used as cleansing agent for domestic purposes.

(ii) It is used for removing permanent hardness of water.

51 A. Question

What is bleaching powder? How is bleaching powder prepared? Write chemical equation of the reaction involved in the preparation of bleaching powder.

Answer

Bleaching powder is produced by the action of chlorine on dry slaked lime [Ca(OH)2]. Bleaching powder is represented as CaOCl2, though the actual composition is quite complex.

$Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$

51 B. Question

What happens when bleaching powder reacts with dilute sulphuric acid? Give equation of the reaction involved.

Answer

Aqueous solution of bleaching powder is basic in nature. When bleaching powder reacts with dilute sulphuricacid, it produces chlorine gas.

51 C. Question

State two important uses of bleaching powder.

Answer

For bleaching cotton and linen in the textile industry, for bleaching wood pulp in paper factories and for bleaching washed clothes in laundry;

(ii) As an oxidising agent in many chemical industries; and

(iii) For disinfecting drinking water to make it free of germs.

52 A. Question

What is plaster of Paris? Write the chemical formula of plaster of Paris.

Answer

The chemical name of Plaster of Paris is calcium sulphate hemihydrate. Its chemical formula is: CaSO4.1/2H2O.

52 B. Question

How is plaster of Paris prepared? Write chemical equation of the reaction involved.

Answer

Plaster of Paris is obtained by heating of gypsum, a hydrated salt of calcium.

$$\underset{\text{Gypsum}}{CaSO_4.2H_2O} \xrightarrow[(373K)]{\text{Heat to } 100^\circ C} \underset{\text{Plaster of paris}}{CaSO_4.\tfrac{1}{2}H_2O} + \underset{\text{Water}}{1\tfrac{1}{2}H_2O}$$

52 C. Question

Explain why plaster of Paris should be stored in a moisture-proof container.

Answer

On mixing with water, it changes to gypsum once again giving a hard solid mass.

$CaSO_4.\ 1/2\ H_2O + 3/2\ H_2O \rightarrow CaSO_4\ .2H_2O$

52 D. Question

State two important uses of plaster of Paris.

Answer

Plaster of Paris is used for making toys, materials for decoration and for making surfaces smooth.

Doctors use Plaster of Paris to set the fractured bone.

Multiple Choice Questions (MCQs)-Pg-99

54. Question

The salt which will give an acidic solution on dissolving in water is:

A. KCl

B. NH_4CI

C. Na_2CO_3

D. CH_3COONa

Answer

ammonium chloride salt is formed of strong acid and weak base. Hence in presence of water, it will give large concentration of H^+ ions.

55. Question

One of the following salts will give an alkaline solution on dissolving in water. This is:

A. Na_2CO_3

B. Na_2SO_4

C. NaCl

D. $(NH_4)_2SO_4$

Answer

sodium bicarbonate salt is formed of strong base and weak acid. Hence in presence of water, it will give large concentration of OH- ions.

56. Question

The salt which will give a neutral solution on dissolving in water will be:

A. CH_3COONa

B. NH_4CI

C. KCl

D. Na_2CO_3

Answer

potassium chloride salt is formed of strong base and strong acid. Hence in presence of water, it will neutralize each other.

57. Question

The products of chlor-alkali process are:

A. NaCl, Cl_2 and H_2

B. H_2, $Cl_2$and NaOH

C. Cl_2, Na_2CO_3 and H_2O

D. NaOH, $Cl_2$and HCl

Answer

Because of the products formed: Chlor for chlorine and alkali for sodium hydroxide.

58. Question

The number of molecules of water of crystallisation present in washing soda crystals is:

A. five

B. two

C. ten

D. seven

Answer

chemical formula is $Na_2CO_3.10H_2O$

59. Question

The salt whose aqueous solution will tum blue litmus to red is:

A. ammoniumsulphate

B. sodium acetate

C. sodium chloride

D. potassium carbonate

Answer

ammonium sulphate salt is formed of strong acid and weak base. Hence in presence of water, it will give large concentration of H+ ions.

60. Question

The aqueous solution of one of the following salts will tum red litmus to blue. This salt is:

A. potassiumsulphate

B. sodiumsulphate

C. sodium chloride

D. potassium carbonate

Answer

potassium carbonate salt is formed of strong base and weak acid. Hence in presence of water, it will give large concentration of OH- ions.

61. Question

The salt whose aqueous solution will have no effect on either red litmus or blue litmus is

A. potassiumsulphate

B. sodium carbonate

C. ammoniumsulphate

D. sodium acetate

Answer

potassium sulphate salt is formed of strong base and strong acid. Hence in presence of water, it will neutralize each other.

62. Question

The aqueous solution of one of the following salts will tum phenolphthalein indicator pink. This salt is:

A. KCl

B. K_2SO_4

C K_2CO_3

D. KNO_3

Answer

potassium carbonate salt is formed of strong base and weak acid. Hence in presence of water, it will give large concentration of OH- ions.

63. Question

The formula of baking soda is:

A. K_2CO_3

B. $KHCO_3$

C. $NaHCO_3$

D. Na_2CO_3

Answer

the chemical name of baking soda is sodium hydrogencarbonate.

64. Question

Which of the following is treated with chlorine to obtain bleaching powder?

A. $CaSO_4$

B. $Ca(OH)_2$

C. $Mg(OH)_2$

D. KOH

Answer

When calcium hydroxide (slaked lime) reacts with chlorine, it gives calcium oxychloride (bleaching powder) and water is formed.

65. Question

Plaster of Paris is prepared by heating one of the following to a temperature of 100°C. This is:

A. $CaSO_3.2H_2O$

B. $CaCI_2.2H_2O$

C. $CaCO_3.2H_2O$

D. $CaSO_4.2H_2O$

Answer

option d is gypsum.

66. Question

A salt whose aqueous solution will have a pH of more than 7 will be:

A. K_2CO_3

B. K_2SO_4

C. NaCl

D. NH_4CI

Answer

potassium carbonate salt is formed of strong base and weak acid. Hence in presence of water, it will give large concentration of OH- ions. So pH is more than 7.

67. Question

A salt is dissolved in water and the pH of this salt solution is measured with a universal indicator paper. If the pH of solution is less than 7, the salt is most likely to be:

A. CH_3COONa

B. Na_2CO_3

C. KCl

D. NH_4CI

Answer

ammonium chloride salt is formed of strong acid and weak base. Hence in presence of water, it will give large concentration of H+ ions.

68. Question

Which of the following salts will give an aqueous solution having pH of almost 7?

A. NH_4NO_3

B. NH_4CI

C. $CaCI_2$

D. KCl

Answer

potassium chloride salt is formed of strong base and strong acid. Hence in presence of water, it will neutralize each other.

69. Question

P and Q are aqueous solutions of sodium chloride and sodium hydroxide, respectively. Which of these will turn:

(a) blue litmus red?

(b) red litmus blue?

Answer

(a) No solution will tum blue litmus to red as sodium chloride is aneutral salt.

(b) Solution Q (sodium hydroxide) will tum red litmus blue.

70. Question

The metal salt A is blue in colour. When salt A is heated strongly over a burner, then a substance B is eliminated and a white powder C is left behind. When a few drops of a liquid D are added to powder C, it becomes blue again. What could be A, B, C and D?

Answer

A is copper sulphatepentahydrate, $CuSO_4.5H_2O$; B is water, H_2O; C is anhydrous copper sulphate, $CuSO_4$; D is water, H_2O.

Blue colour of copper sulphate is due to presence of 5 molecules of water. When copper sulphate is heated, it loses water molecules and turns into grey-white colour, which is known as anhydrous copper sulphate. After adding water; anhydrous copper sulphate becomes blue again.

71. Question

When the concentrated aqueous solution of substance X is electrolyzed, then NaOH, CI_2 and H_2 are produced.

Name the substance X. What is the special name of this process?

Answer

Substance X is Sodium chloride and this process is called as Chlor-alkali process.

72. Question

Consider the following substances:

$NaCI$, $Ca(OH)_2$, $NaHCO_3$, NH_3, Na_2CO_3, H_2O, Cl_2, CO_2, $CaSO_4.2H_2O$, $2CaSO_4.H_2O$, $2CaSO_4.2H_2O$, $CaOCI_2$

(a) Which two substances combine to form bleaching powder?

(b) Which four substances are utilized in the production of washing soda?
(c)Which compound represents plaster of Paris?

(d) Which compound is a part of baking powder?

(e) Which compound is used as an antacid?

Answer

(a) Two substances combine to form bleaching powder are $Ca(OH)_2$ and Cl_2

(b) Four substances which are utilized in the production of washing soda are $NaCl$, NH_3, H_2O and CO_2

(c) Compound which represents plaster of Paris is $2CuSO_4.H_2O$

(d) Compound which is a part of baking powder- $NaHCO_3$

(e) Compound which is used as an antacid- $NaHCO_3$

73. Question

Give one example each of a salt which gives an aqueous solution having

(a) pH less than 7

(b) pH equal to 7

(c) pH more than 7

Answer

(a) pH less than 7-Ammonium chloride

(b) pH equal to 7-sodium chloride

(c) pH more than 7- sodium carbonate.

74. Question

A compound X which is prepared from gypsum has the property of hardening when mixed with a proper quantity of water.

(a) Identify the compound X

(b) Write the chemical equation for its preparation

(c) For what purpose is it used in hospitals?

Answer

(a) Compound X is Plaster of Paris.

(b) Plaster of Paris is obtained by heating of gypsum, a hydrated salt of calcium.

$CaSO_4.2H_2O + Heat \Rightarrow CaSO_4.(0.5)H_2O + (1.5)H_2O$

(c) Doctors use Plaster of Paris to set the fractured bone.

75. Question

Consider the following salts:

Na_2CO_3, NaCI, NH_4CI, CH_3COONa, K_2SO_4, $(NH_4)zSO_4$

Which of these salts will give:

(a) acidic solutions?

(b) neutralsolutions?

(c) basic solutions (or alkaline solutions)?

Answer

(a) acidic solutions NH_4CI, $(NH_4)_2SO$

(b) neutral solutions - NaCl, K_2SO_4

(c) basic solutions(or alkaline solutions)- Na_2CO_3,CH_3COONa

76. Question

A white powdery substance having strong smell of chlorine is used for disinfecting drinking water supply at waterworks. Identify the substance. Give its chemical name and write the chemical reaction for its preparation.

Answer

Bleaching powder, $CaOCI_2$

Bleaching powder is used as disinfectant to clean water.

77. Question

A salt X when dissolved in distilled water gives a clear solution which turns red litmus blue. Explain the phenomenon.

Answer

Salt X is like sodium carbonate, Na_2CO_3, which is made from a strong base and a weak acid. On dissolving in water, salt X gets hydrolyzed to form some strong base and some weak acid which will produce more quantity of OH^- ions.

78. Question

A person found that the cake prepared by him is hard and small in size. Which ingredient has he forgotten to add that would have caused the cake to rise and become light? Explain your answer.

Answer

Baking powder as it causes bread or cake to rise making them soft and spongy.

79. Question

A white chemical compound becomes hard on mixing with proper quantity of water. It is also used in surgery to maintain joints in a fixed position. Name the chemical compound.

Answer

plaster of Paris.

80. Question

When chlorine and sodium hydroxide being produced during the electrolysis of brine are allowed to mix, a new chemical is formed. Name this chemical and write its uses.

Answer

Sodium hypochlorite, NaClO; Used in making household bleaches and for bleaching fabrics.

81. Question

Write the name and formula of one salt each which contains:

(a) twomolecules of water of crystallisation

(b) five molecules of water of crystallisation

(c) ten molecules of water of crystallization

Answer

(a) twomolecules of water of crystallization- Gypsum - $CaSO_4.2H_2O$

(b) five molecules of water of crystallization- Copper sulphate crystals - $CuSO_4.5H_2O$

(c) ten molecules of water of crystallization- Sodium carbonate crystals - $Na_2CO_3.10H_2O$

82. Question

How many molecules of water of crystallization (per formula unit) are present in :

(a) coppersulphate crystals?

(b) washing soda?

(c) gypsum?

Answer

(a) 5

(b) 10

(c) 2