Lakhmir Singh Solutions For Class 10 Chemistry Chapter 2 Acids, Bases and Salts

1. 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

Solutions:

(a) When methyl orange is added to a base it turns colour into yellow

(b) Litmus paper changes into blue when dipped in base solution. It changes colour from red to blue as the solution is alkali

(c) Red cabbage extract turns into green colour when added to a base

2. What colours do the following indicators turn when added to an acid (such as hydrochloric acid)

(a) Litmus (b) methyl orange

Solutions:

(a) Litmus paper is an indicator used to identify the whether the solution is acidic or basic. Here when this is dipped in acidic solution like hydrochloric acid it turns blue colour to red.

(b) Methyl orange is also an indicator shows colour change in different solutions. In acid solutions it changes its colour to red.

3. Name an indicator which is red in acid solution but turns blue in basic solution.

Solutions:

Litmus is used as an indicator to identify the solution is acidic or basic by changing its colour from solution to solution. In acidic solution the litmus colour changes from blue to red and in alkali solutions the colour changes from red to blue.

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

Solutions:

Phenolphthalein is used as an indicator in acid-base titrations and it turns colourless in acidic solutions and turns into pink in basic solutions.

5. 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 base.

Solutions:

The given solution contains base because onion extract loses its smell when added to a base, but its smell does not change when added to acid.

6. 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.

Solutions:

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The given solution will be base because when a basic solution is added to vanilla it completely destroys the characteristic smell of vanilla and when in acidic solution it does not change

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

Solution:

When hydrochloric acid reacts with active metal hydrogen gas will be evolved at the surface of the metal in the form of bubbles and thus formed gas is passed through soap and bring candle near the bubble formed. If the gas burns with a pop sound then it can be concluded that it is hydrogen.

8. Name the gas evolved when dilute HCl reacts with sodium hydrogen carbonate. How is it recognized?

Solutions:

Carbon dioxide gas is liberated when hydrochloric acid reacts with sodium hydrogen carbonate. The gas liberated thus will pass through lime water and lime water turns milky due to the presence of carbon dioxide and further more if we do the same the solution becomes clear.

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

Solutions:

Strong acids are those which dissociates into ions in water. Eg: Hydrochloric acid (HCl) and Sulphuric acid (H_2SO_4)

Acetic acid (CH_3COOH) and Citric acid ($C_6H_8O_7$) are weak acids which are partially dissociates into its ions in water

10. Name on natural source of each of the following acids:

(a) Citric acid (b) Oxalic acid

(c) Lactic acid (d) Tartaric acid

Solutions:

(a) The natural source of citric acid is from Lemon

(b) The natural source of oxalic acid is from tomatoes

(c) The natural source of Lactic acid is from sour milk or curd.

(d) The natural source of Tartaric acid is from tamarind

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

Solution:

Animal sting containing Formic acid : Ants

Plant sting containing Formic acid : Nettle leaf sting

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

Solution:

The concentration of hydronium ion decreases on diluting an acid. Thus the strength of the acid decreases.

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Concentration of hydronium ions = Volume of solute (acid)/Volume of solution

13. 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 ammonium powder.

(d) dilute hydrochloric acid reacts with iron filings.

Solutions:

(a) Sulphuric acid + Zinc → Zinc Sulphate solution + Hydrogen gas

$H_2SO_4(aq) + Zn(s) \rightarrow ZnSO_4(aq) + H_2(g)$

(b) Hydrochloric acid + Magneisum → Magnesium chloride solution + Hydrogen gas

$2HCl(aq) + Mg(s) \rightarrow MgCl_2(aq) + H_2(g)$

(c) Sulphuric acid + Aluminium → Aluminium sulphate solution + Hydrogen gas

$3H_2SO4(aq) + 2Al(s) \rightarrow Al_2(SO4)_3(aq) + H_2(g)$

(d) Hydrochloric acid + Iron → Iron(III) Chloride solution + Hydrogen gas

$6HCl(aq) + 2Fe(s) \rightarrow 2FeCl_3(aq) + 3H_2(g)$

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14.Complete and balance the following chemical equations:

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

(b) $Na_2CO_3(s) + HCl\ (aq) \rightarrow$

(c) $NaHCO_3(s) + 6\ HCl \rightarrow$

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

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

Solutions;

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

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

(c) $NaHCO_3(s) + 6\ HCl \rightarrow NaCl(aq) + CO_2(g) + H_2O(l)$

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

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

15. Fill in the blanks in the following sentences :

(a) Acids have a _____ taste and they turn _____ litmus to _____.

(b) Substances do not show their acidic properties without _____.

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

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

(e) Onion and vanilla extract are _____ indicators.

Solutions:

(a) Sour; blue; bed.

(b) Water.

(c) Hydrogen.

(d) Olfactory.

(e) Olfactory.

Short Answer Type Questions

16. (a) What is an indicator? Name three common indicators.

(b) Name the acid-base indicator extracted from lichen.

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

Solutions:

(a) An indicator is a dye that shows a distinct change in colour when put in acid or base or as the ion concentration changes. Litmus, Methyl orange and phenolphthalein are the examples for indicators.

(b) Litmus is the acid-base indicator extracted from lichen. It will show colour change blue to red when in acid and red to blue in base

(c) When turmeric paper is dipped in alkaline solution it will turn to red.

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

Solutions:

Olfactory indicators are those smell or odour changes when it is mixed in an acidic or basic solution. It can be used in laboratory to test whether the solution is base or acid and can perform olfactory titration

Onion and vanilla extracts are the olfactory indicators

When a basic solution like sodium hydroxide solution is added to a cloth strio treated with onions the smell cannot be detected

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

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

Solution:

(a) When an acid reacts with a metal, then a salt and hydrogen gas are formed.

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

(b) Hydrogen gas is liberated when acid reacts with metal. It is observed that a formation of gas bubbles along the surface of the metal. The obtained bubbles is then passed through a soap solution

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and when a burning candle is brought near to the bubble the gas present in the soap bubble will burns with a pop sound and hence it can be concluded that it is hydrogen because only hydrogen gas can make a pop sounds when it burns

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

Solutions:

While diluting an acid, it should be done always in a slow manner with a constant stirring and in small amount. The dilution of an acid is an exothermic reaction. When we add acid to water the heat that evolved gets absorbed by the water but if doing reverse, which is water added to acid a large amount of heat evolved and chances of acid splashing to the person handling will be more.

20. What happens when an acid reacts with a metal hydrogen carbonate? Write equation of the reaction which takes place.

Solution:

When an acid is added to metal hydrogen carbonate, carbon dioxide gas is liberated with a metal salt and water.

Eg: When sodium hydrogen carbonate reacts with hydrochloric acid, sodium chloride and water is formed with an evolution of carbon dioxide gas

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

21. (a)What happens when dilute hydrochloric acid is added to sodium carbonate? Write balanced equation of the reaction involved.

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

Solution:

a) When dilute hydrochloric acid reacts with sodium carbonate, then sodium chloride, carbon dioxide and water are formed.

$NaHCO_3(s) + 2\ HCl \rightarrow 2NaCl(aq) + CO_2(g) + H_2O(l)$

(b) Carbon dioxide gas is liberated during the reaction

The gas evolved when the acid reacts with sodium carbonate is passed through lime water, lime water turns milky or white precipitate of calcium carbonate is formed. This confirms the presence of carbon dioxide.

22. 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 equation which takes place. What is the chemical name of such a reaction?

Solution:

When an acid reacts with base, then a salt and water is formed. When hydrochloric acid reacts with sodium hydroxide solution, then a neutralisation reaction takes place to form sodium chloride and water.

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

Such reaction is called Neutralisation reaction.

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23. 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.

Solution:

When an acid reacts with metal oxide, A salt and water are obtained.

The reaction can be written as follows,

Acid+ Metal oxide → Salt + water

An eg: when a small amount of copper oxide is added to sulphuric acid, colour of the solution becomes blue and the copper oxide dissolves. The blue colour of the solution indicates the formation of copper(II) sulphate

$CuO(s) + H_2SO_4 \rightarrow CuSO_4(aq) + H_2O(l)$

24. (a) What are organic acids and mineral acids?

(b) Give two examples each of organic acids and mineral acids.

(c) State some of the uses of mineral acids in industry.

Solution:

(a) Organic acids are the acids found naturally in plants and animals. They are weak acids and do not dissociate completely in water.

Mineral acids are those acids which are man-made and derived from one or more inorganic compounds. They are also known as inorganic acids.

(b) Organic acids: Lactic acid, citric acid

Mineral acids : Hydrochloric acid, Nitric acid

(c) Mineral acids are used for the synthesis of various chemicals

Dilute hydrochloric acids are used to remove the deposits inside boilers and to prevent corrosion of the boilers by the acids

Used in the processing of leather, purification of common salt etc.

Nitric acid is used as explosives and fertilizers.

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

HCl, CH_3COOH, H_2SO_4, HNO_3, H_2CO_3, H_2SO_3

Solutions:

A strong acid is one that completely ionises in water to form a large amount of hydrogen ion

A weak acid is that one which partially dissociates in aqueous and produces small amount of hydrogen ions.

HCl, H_2SO_4, HNO_3 are strong acids

CH_3COOH, H_2CO_3, H_2SO_3 are weak acids

26. Why do HCl, 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?

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Solutions:

HCl, H_2SO_4, HNO_3 are those which dissociates in aqueous solutions to give H^+ ions which determines the acidic property of acids.

Glucose and alcohol does not dissociate in aqueous solution even though they contains hydrogen atoms.

This is the reason HCl, H_2SO_4, HNO_3 shows acidic character and glucose and alcohol do not shows acidic character

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

Solutions:

Neutralisation reaction is the reaction between an acid and a base which results in the formation of salt and water.

When sodium hydroxide and hydrochloric reacts each other, sodium chloride and water is formed.

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

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

Solutions:

Curds and other sour foods stuffs are acidic in nature. Acids reacts with metal to produce hydrogen gas thus it spoils the food and also forms some toxic metal compounds which makes the food stuffs to become poisonous

29. (a) What is produced if an acid is added to a base?

(b) Why does dry HCl gas not change the colour of dry litmus paper?

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

Solution:

(a) Salt and water is formed when acid is added to base

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

(b) Because dry HCl does not undergo dissociation to form ions because of the absence of aqueous medium. Colour of the litmus paper changes when ions are present. Hence it does not change the colour of litmus paper

(c) Phenolphthalein indicator turns pink when added to an alkali like sodium hydroxide.

30. (a)Why do acids not show acidic behaviour in the absence of water?

(b)Why does an aqueous solution of an acid conduct electricity?

(c)Why does distilled water not conduct electricity whereas rain water does?

Solution:

(a)Mainly the acid behaviour of an acid is due to the presence of hydrogen ions when acids are dissolved in water. It does not show acidic character in the absence of water because the dissociation of hydrogen ions from an acid occurs in the presence of water only.

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(b) The aqueous solution of an acid conducts electricity due to the presence of charged particles. The charged particles are ions here. Hydrogen and hydronium ions. They carry electric currents thus acids conducts electricity

(c) Distilled water does not conduct electricity because distilled water is the purest water which is free from all the ionic species. But rainwater is not the pure form thus it contains impurities and therefore conducts electricity.

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

(b) 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.

Solutions:

(a) When an acid reacts with metal carbonate, it results to the formation of a salt, carbon dioxide and water.

Example: when dilute hydrochloric acid reacts with sodium carbonate, then sodium chloride, carbon dioxide and water are formed

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

(b)(i) When carbon dioxide is passed through lime water, lime water turns milky.

$\mathbf{Ca(OH)_2 + CO_2} \rightarrow CaCO_3 + H_2O$

(ii) Lime water solution becomes clear

$CaCO_3 + \mathbf{CO_2} + H_2O \rightarrow Ca(HCO_3)_2$

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

Solutions:

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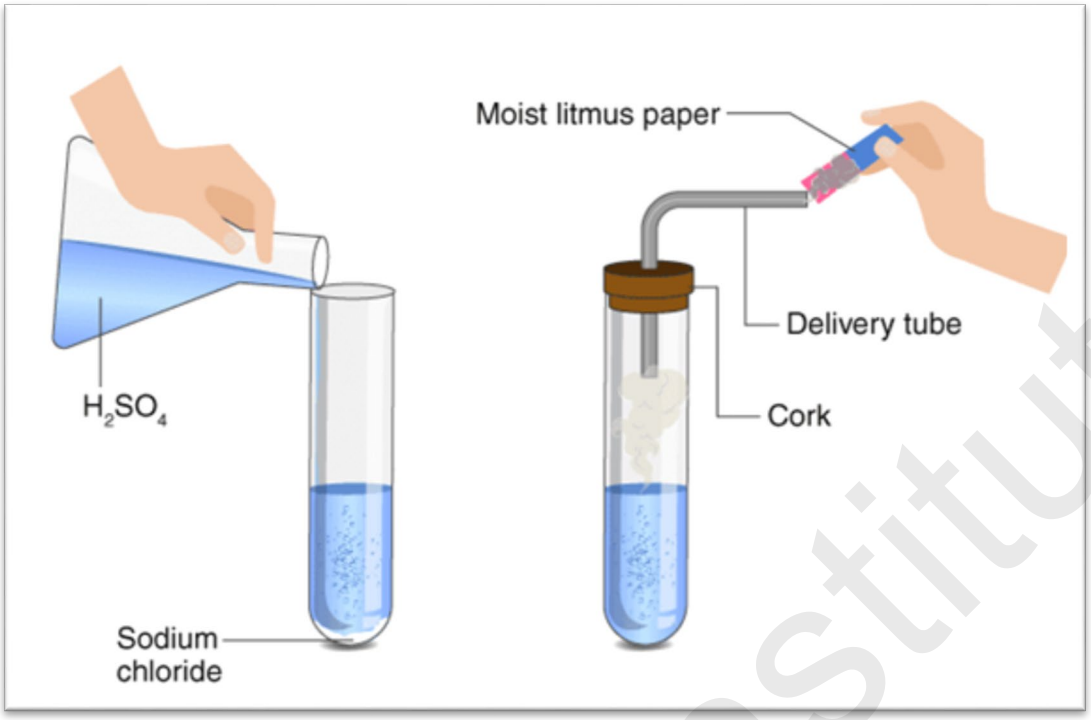

Procedure:

Take about 1g of sodium chloride in an clean dry test tube. Add some concentrated sulphuric acid, a gas will be liberated and comes out through the delivery tube and test the gas evolved with a dry strips of litmus paper.

Observation:

It has been observed no colour change in the litmus paper. When the gas is passed through wet blue litmus paper, it turned to red which shows the gas is an acid, HCl

Conclusion

The activity concludes that the hydrogen ions in HCl are produced in the presence of water because only wet litmus paper turns red and dry one had no change

33. (a) Which element is common to all acids?

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

Solutions:

(a) Hydrogen is common to all acids. Eg: HCl, H_2SO_4, HNO_3

(b) Procedure

Take samples of alcohol, glucose and hydrochloric acid. Take 100 mL Beaker and take a fork and fix the nails. Place the cork inside the beaker and connect the nails to two terminals of a 6 volt battery through a bulb and a switch. Add some hydrochloric acid to the beaker and on the current. Repeat the procedure with alcohol and glucose

Observation:

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In the case of acid the bulb will glow and in case of alcohol and glucose it does not glow because the electric current is carried through the solution by ions.

Conclusion

Acid ionizes to give H^+ ions in aqueous medium but glucose and alcohol don not furnish H^+ ions even though they contains hydrogen atoms.

Multiple Choice Questions MCQ's

34. 10 ml of a solution of NaOH is found to be completely neutralised by 8ml 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) 8ml

(c)12 ml

(d) 16ml

Solution:

Option (d) is the answer. It is given that 10ml of a solution of NaOH is completely neutralised by 8ml of a solution of HCl. Then 20ml of the solution of NaOH which is double the amount taken before will require double the solution of HCl taken earlier. That is 16ml to be completely neutralised.

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

(a) Antibiotic

(b) Analgesic

(c) Antacid

(d) Antiseptic

Solution:

Option (c) is the answer. The reason for the indigestion is due to the formation of excess acid in the stomach and antacid is the medicine that neutralises acidity in stomach.

36. 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_2SO4

Solution:

The option (c) is the answer. Marble chips contain calcium carbonate and this reacts with sulphuric acid to form carbon dioxide and when the gas is passed through lime water it turns milky.

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

(a) Ethanoic acid

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(b) Formic acid

(c) Citric acid

(d) Carbonic acid

Solutions;

Option (d) is the answer. Carbonic acid is formed when carbon dioxide is dissolved in water and hence it is an inorganic or mineral acid. Remaining are found naturally.

38. The property which is not shown by acids is :

(a) They have sour taste

(b) They feel soapy

(c) They turns litmus paper

(d) Their pH is less than seven

Solutions:

Option (b) is the answer. Acids have a taste of sour and they turn litmus paper red and their pH is less than seven but does not feel soapy.

39.The indicators which turns red in acid solution are:

(a) Turmeric and litmus

(b) Phenolphthalein and methyl orange

(c) Litmus and methyl orange

(d) Phenolphthalein and litmus

Solution:

Option (c) is the answer. In an acid solution litmus and methyl orange turns red in an acid solution.

40. The discomfort caused by indigestion due to overeating can be cured by treating:

(a) Vinegar

(b) Lemon juice

(c) Baking soda

(d) Caustic soda

Solution:

Option (c) is the answer. Baking soda is a base and it neutralises the excess acid formed in the stomach and cures the indigestion due to overeating.

41.The property which is common between vinegar curd is that they:

(a) Have sweet taste

(b) Have bitter taste

(c) Are tasteless

(d) Have sour taste

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Solution:

Option (d) is the answer. Vinegar and curd are acidic and have sour taste

42. The indicator which produces a pink colour in an alkaline solution:

(a) Methyl orange

(b) Turmeric paper

(c) Phenolphthalein

(d) Litmus paper

Solution:

Option (c) is the answer. Phenolphthalein produces pink colour in an alkaline solution and colourless in acidic solution.

43. 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

Solution:

Option (d) is the answer. Zinc granules reacts with HCl to give hydrogen gas that burns with a 'pop' sound.

Questions Based on High Order Thinking Skills (HOTS)

44. When a piece of limestone reacts with dilute HCl, 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 dissolves forming a soluble compound Z.

(a) What are X, Y and Z?

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

(i) when limestone reacts with dilute HCl

(ii) when gas X reacts with limewater to form white precipitate Y.

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

Solution:

(a) X is carbon dioxide Y is calcium carbonate Z is calcium hydrogen carbonate.

(b) (i) $CaCO3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$

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

(iii) $CaCO_3 + CO_2 + H_2O \rightarrow Ca(HCO_3)_2$

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

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Lemon juice, Vinegar, Baking soda solution? Give reason for your choice.

Solution:

Baking soda solution will be suggested for the problem of acidity after overeating because baking soda is base in nature and it neutralizes the excess acid formed in the stomach

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46. 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?

Solutions:

(a) Copper (II) chloride, $CuCl_2$

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

(c) Copper oxide is basic in nature. The reaction between a metal oxide and hydrochloric acid is similar to the neutralization where a salt and water is formed thus we can say copper oxide is basic in nature.

47. 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 change in colour of this indicator which takes place during washing and rinsing the shirt.

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

Solution:

(a) Turmeric is the natural indicator present in curry stain

(b) The yellow stain in the shirt when washed with soap it turns reddish brown because soap is basic and gives a reddish-brown colour when reacts with base and it turns yellow when rinsed with water due to the removal of soap

(c) Basic nature

48. You have been provided with three test-tubes. One of these test -tubes contain 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?

Solution:

The test tube containing distilled water will not bring any change in the colour of blue litmus paper. It turns blue to red when the same litmus paper dipped in the solution containing acidic solution and the third test tube will have no change or effect as it is basic solution

49. 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.

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Solution:

Here substance X is Sodium hydrogen carbonate and Y is carbon dioxide gas

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

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

Solution:

Neutralization of carbonate with an acid and neutralisation of oxides with an acid is different.

Metal carbonate + acid → salt + carbon dioxide + water

Example

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

Metal oxide + acid → Salt + water

Example

$Na_2O + 2HCl \rightarrow 2NaCl + H_2O$

Metal hydroxide + acid → Salt + water

Example

$NaOH + HCl \rightarrow NaCl + H_2O$

51. What happens to (a) the H^+ ions, and (b) temperature of the solution, when an acid is neutralized?

Solution:

(a)During neutralization reaction, H^+ ions combine with OH^- ions and converted to water. The reaction can be represented as

Acid + Base → Salt + Water

For eg: $NaOH + HCl \rightarrow NaCl + H_2O$

(b) As neutralization is an exothermic reaction the temperature of the solution increases when heat is produced

Very Short Answer Type Questions

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

(a) Hydrochloric acid solution

(b) Sodium hydroxide solution

Solution:

When zinc granules are treated with hydrochloric acid, hydrogen gas is liberated with zinc chloride

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

When zinc granules are treated with sodium hydroxide, Hydrogen gas is evolved with sodium zincate

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$Zn(s) + 2NaOH(aq) \rightarrow Na_2ZnO_2(aq) + H_2(g)$

2. What is the common name of water soluble bases?

Solution:

Common name for water soluble bases are called alkalis. It is a unique base that dissolves in water without undergoing any chemical reaction. It has pH more than 7

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

Solution:

When bases dissolved in water it forms hydroxide ions because alkali has a unique property which is soluble in water. All bases are not alkali but all alkalis are bases.

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

Solution:

Tooth decay starts when the pH of the mouth is lower than 5.5 because the mouth turns acidic when pH is below 5.5 the bacteria produces acids by the breaking down of food particles in our mouth. Enamel is made up of calcium phosphate and it is very hardest part in our body. Tooth decay so can be prevented by taking proper treatment by our self.

5. What is the pH of a neutral solution?

Solution:

pH is potential of hydrogen. For a neutral solution pH is always 7. Water has pH 7.

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

Solution:

As per the pH scale it has been divided the pH into 3.

For bases pH >7

For acids pH < 7

For neutral solutions pH = 7

Here pH = 2 will be more acidic

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

Solution:

pH greater than 7 always indicate the solution is basic. Here it is clear that pH of 11 will be more basic than the solution of pH 8. As pH increases the strength of the solution also will increase

8. Name the scientist who developed the pH scale.

Solution:

Soren Sorenson, a Danish chemist developed the pH scale in 1909 and revised to the modern pH in 1924.

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

Solution:

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A universal indicator gives us an idea of how strong or weak an acid or base is. It is a mixture of several indicators. It ranges from pH less than 3 to greater than 11.

10. 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?

Solution:

Soil B is acidic in nature as its pH is less than 7. Therefore soil B should be treated with powdered chalk to reduce the acidity so that plants will grow without any harm.

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

Solution:

Universal indicator is used for testing the pH of a solution. It shows different colours at different concentrations of hydrogen ions. Indicator gives us an idea of how strong or weak an acid or base is.

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

(a) Potassium hydroxide, pH = 12

(b) Soda water, pH = 5

(c) Sulphuric acid, pH = 2

Solution:

(a) Dark Purple

(b) Orange Yellow

(c) Red

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

Solution:

It imparts a red colour when treated with universal indicator. pH is 1 as the pH decreases by 7 the solution become more acid and the hydrogen ion concentration increases. Therefore it will be a strong acid.

14. 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?

Solution:

As per the universal indicator the solution Y will be stronger acid because it turns to red which indicated the pH is 1 and orange colour indicates value is higher than 1.

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

Solutions:

Solution A is having a pH of 3.0 so it will be acidic as it is lesser than 7. Thus it will change the litmus solution from blue to red and the solution B is basic as it is having a value of pH 9.5 it will turn phenolphthalein from colourless to pink.

16. 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?

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Solution:

Drink Q has a pH value of 9 because on pH scale basic solutions have greater than 7.

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

Solution:

The given X and Y indicates that the pH value of 4 which is less than 7 will be acidic reaction so X is acidic. pH value of 8 which is greater than 7 indicates the reaction is basic so Y is basic.

18. 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.

Solutions:

(a) Lower.

(b) Higher.

(c) 7.

(d) Lower.

(e) Higher.

Short Answer Type Questions

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

Solutions:

Fresh milk has a pH of 6 and when it changes into curd the pH value will decrease because the fresh milk when converted to curd it produces lactic acid, as the production is acid the value will be lesser than 7 which causes for acidity. Acidity will increase on this conversion and tastes sour**.**

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

(b) How does a universal indicator work?

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

Solutions:

(a) Universal indicator is a mixture of different indicators which gives colours at different pH and it exactly shows how much the solution is acidic or basic. The scale is from 0 to 14.

(b) Universal indicator is a pH indicator and it shows colour change if we add a drop of acid or base. It exhibits several colour changes according to the nature of solution.

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(c) For neutral substance like water The pH value will be always 7. A green colour will be observed when a drop of universal indicator added to the testube contacting water and shows the neutrality of water.

21. Which chemical is injected into the skin of a person?

(a) During an ant's sting?

(b) During the nettle leaf hair sting?

How can the effect of these stings be neutralised?

Solution:

(a) Methanoic acid is injected into the skin of a person during ant's sting. The ant sting is acidic and thus injected to the body will create itching and pain. If we add baking soda like bases it will neutralise the acid and the effect of the sting is neutralised

(b) Methanoic acid is injected into the skin of a person during nettle leaf hair sting. The nettle leaf hair sting is acidic and it will cause itching and pain when injected into the body. When applies base like baking soda it neutralises the effect of the sting by neutralising the acid.

22. (a) Explain the pH change as the cause of tooth decay. How can tooth decay caused by pH change be prevented?

(b) 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?

Solutions:

Solution:

(a)Tooth is made up of calcium phosphate and enamel is the hardest part in our body it covers the surface of teeth. If the pH in the mouth is below 5.5 it causes acidity and tooth decay starts. Acid have the power of decaying any material if it is hard even. It can be prevented by our self by brushing every two times a day after having food. Before going to bed is necessary because bacterial action can takes place easily while sleeping. Toothpaste containing more basicity can be used for brushing the teeth.

(b) pH of water contains 7. The Rain water is 5.6 because of acid rain, the acidity of river and lake water increases. The animals living in water feels more difficulty in living in water having low pH. In order to prevent the acidity bases like calcium carbonate can be added to the water hence it neutralises the excess acidity caused by the acid rain.

23. (a) What happens during a bee sting? What is its remedy?

(b) What happens during a wasp sting? What is its remedy?

Solution:

(a) During a bee sting it injects acidic liquid in to the body and causes severe pain and itching sensation. By rubbing with a base like baking soda will neutralises the acidity and prevent paining and irritation.

(b) During a wasp sting it injects alkali to the body and by treating with acid like vinegar it will give relief

24. (a) Why is it wrong to treat a bee sting with vinegar?

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

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Solution:

(a) Bee sting is acidic and should be treated with base. As vinegar is an acid it doesn't cure the effect of bee sting.

(b Baking soda is a base solution which is used to treat bee sting or ant sting. Wasp sting injects alkaline liquid so baking soda does not make any changes while used.

25. (a) 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?

(b) 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.

Solution:

(a) pH is potential of hydrogen and signifies whether the solution is acid or base and also its strength. pH greater than 7 is considered as basic and lesser than 7 can be considered as acid. For neutral solutions pH will be 7.

Solution B with lower pH value of 4 is highly acidic

(b) Soil with pH 4.2 is acidic. It can be treated with the chemicals such as calcium oxide or calcium hydroxide which are bases and commonly called quick lime and slaked lime.

26. (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 (it) alkalis?

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

Solution:

(a) (i) Acids; A, C and D.

(ii) Alkalis; B, E and F.

(b) (i) Sulphuric acid is used to make car batteries

(ii) Nitric acid is used to make explosives

(iii) Sodium hydroxide is used for making soaps.

(iv) Nitric acid is used to make fertilizer's.

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

(b) The pH values of three acids A, B and C having equal molar concentrations are 5.0, 2.8 and 3.5 respectively. Arrange these acids in order of the increasing acid strengths.

Solution:

(a)A cold drink with a pH value 5 is acidic and therefore blue litmus turns red and red litmus remains as such.

(b) Acid values are considered if less than pH 7. Here the acids in the increasing order of their strengths are A<C<B

28. 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)?

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Solution:

The given are bases which is used for acidified soil. The soil to become acidic it should be less than pH 7 and thus soil will be treated with bases like quick lime, slaked lime.

29. 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?

Solution:

Dilute hydrochloric acid is produced in our stomach due to the digestion. Sometimes the acid will produce more in the case of over eating and it causes discomfort and some kind of irritation. The only remedy we can take is by having antacids which are weak bases and neutralizes the excess acid formed in our stomach.

30. 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.

Solution:

The acidity of soil is when the pH changes lower than 7. Bases like slaked lime and quick lime can be added to the soil in order to make the soil free from acidity and hence soil become fertile and will be suitable for cultivation.

31. 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, $Mg(OH)_2$

Solutions:

Strong bases are those which ionize in water completely and produces large amount of hydroxide ions

Weak bases are those bases which partially ionize in water and produces little amount of hydroxide ions.

NaOH and KOH are strong bases

NH_4OH, $Ca(OH)_2$, $Mg(OH)_2$ are weak bases.

32. 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

Solutions:

(i) H^+, Cl^-

(ii) H^+, NO_3^{2-}

(iii) H^+, SO_4^{2-}

(iv) Na^+, OH^-

(v) K^+, OH^-

(vi) Mg^{2+}, OH^-

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33. (a) What would you expect the pH of pure water to be?

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

c) 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?

Solution:

(a) The pH of pure water is 7 as it is neutral substance

(b) A universal indicator shows a green colour in an aqueous solution of sugar. Aqueous solution of sugar is neutral and will have pH of 7

(c) Universal indicator shows a greenish yellow colour at pH 6 and Orange yellow at pH 5. Here if the sample of rain water turned into yellow indicates the pH should lies in between these two values and considered to be a weak acid

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

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

(c) How does an antacid work?

(d) Name two common antacids.

Solutions:

(a) Indigestion is due to the production of excess hydrochloric acid in the stomach caused due to over eating. Since it is the formation of acid the pH should be less than 7.

(b) Antacid solution is a base so definitely the pH will be greater than 7 and used to treat people facing acidity

(c) Antacids are used to treat the excess acid formed in our stomach due to indigestion. Antacids are bases that neutralises the acid inside the stomach and prevent from pain and discomfort.

(d) Magnesium hydroxide and sodium hydrogen carbonate are two antacids used.

35. 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

Solutions:

Washing soda and tooth paste : pH Value above 7

Lemon juice, vinegar and stomach juices : pH value below 7

The substances having pH value above 7 will turn red litmus paper to blue due to the basicity

The substance having pH value less than 7 will turn blue litmus paper into red due to their acidity

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

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

Solution:

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(a) All the basic solutions have H^+ ions but the concentration of them will be less as that of hydroxide ions and thus becomes basic

(b) When the solution becomes more acidic the pH will get lower because in the pH scale the values lesser than 7 is acidic

Long Answer Type Questions

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

(b) Give the names and formulae of two strong bases and two weak bases.

(c) What type of ions are formed:

(i) when an acid is dissolved in water?

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

(d) Write the neutralisation reaction between acids and bases in terms of the ions involved.

(e) Write any two important uses of bases

Solutions:

(a) Acids are those substance when dissolved in water dissociates completely to produce hydrogen ions and tastes sour. It turns litmus paper from blue to red eg: HCl and H_2SO_4

Bases are those substance when dissolved in water partially dissociates to produce hydroxide ions and tastes bitter. It changes litmus paper from red to blue eg: NaOH and $Mg(OH)_2$

(b) Strong bases are Sodium hydroxide NaOH and potassium hydroxide KOH

Weak bases are calcium hydroxide $Ca(OH)_2$ and Ammonium hydroxide NH_4OH

(c) (i) Hydrogen ions are formed when an acid dissolves in water

(ii) Hydroxide ions are formed when base dissolved in water

(d) $H^+(aq) + OH^-(aq) \rightarrow H_2O(l)$

(e) Bases like sodium hydroxide is used to manufacture soap, paper etc and calcium hydroxides are used to manufacture bleaching powder

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

(b) 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?

Solution:

(a) When zinc granules are heated with sodium hydroxide solution, hydrogen gas is formed with sodium zincate salt

$Zn(s) + 2NaOH(aq) \rightarrow Na_2ZnO_2(aq) + H_2(g)$

(b) When base reacts with oxides, salt and water is formed

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

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This reaction shows that non-metal oxides are acidic in nature

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

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

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

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

(e) 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

Solution:

(a) The solution becomes more acidic when the concentration of hydrogen ion increases

(b) The solution become more basic as the concentration of hydroxide ion increases

(c) If the pH is less than 7 it becomes acidic. Here the pH is 3 hence vinegar is acidic in nature

(d) When universal indicator paper shows pH to be 8 then can be concluded that the substance or solution is basic in nature. Here soap is basic.

(e) (i) pH = 9 : Alkaline.

(ii) pH = 4 : Acidic.

(iii) pH = 7 : Neutral.

(iv) pH = 1 : Acidic.

(v) pH = 10 : Alkaline.

(vi) pH = 3 : Acidic.

Multiple Choice Questions (MCQ's)

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

(a) Sodium hydroxide

(b) Manganese dioxide

(c) Magnesium hydroxide

(d) Potassium hydroxide

Solution:

Option (c) is the answer. Magnesium hydroxide is a base and acts as antacid which prevents indigestion which neutralizes the excess acid formed in the stomach

41 Bee sting contains:

(a) An acidic liquid

(b) A salt solution

(c) An alkaline liquid

(d) An alcohol

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Solution:

Option (a) is the answer. Bee sting contains an acidic liquid. It is methanoic acid

42. Wasp sting contains:

(a) A sugar solution

(b) An acidic liquid

(c) A salt solution

(d) An alkaline liquid

Solution:

Option (d) is the answer. Wasp sting is alkali or base that causes pain and irritation.

43.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

Solution:

Option (c) is the answer. Wasp does not inject acidic liquid but it injects alkaline liquid to the skin through their skin which causes pain and irritation.

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

(a) 1

(b) 4

(c) 5

(d) 10

Solution:

Option (d) is the answer. If the solution is having pH greater than 7 it is basic and here the solution has pH 10 thus they turn litmus red to blue

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

(a) 7

(b) 5

(c) 8

(d) 14

Solution:

Option (b) is the answer. If the solution is having pH lesser than 7 it is acidic and here the solution has pH 5 thus they turn litmus blue to red

46.A solution turns Phenolphthalein indicator pink. The most likely pH of the solution will be:

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(a) 6

(b) 4

(c) 9

(d) 7

Solution:

Option (c) is the answer. Phenolphthalein is the indicator used in acid-base titration in order to identify whether solution is acid or base. Here the indicator shows colourless to pink indicates that the medium is basic and pH is 10 which is greater than 7

47. The colour of methyl orange indicator in a solution is yellow. The pH of the solution is likely to be:

(a) 7

(b) Less than 7

(c) 0

(d) More than 7

Solution:

Option (d) is the answer. The pH of the solution will be more than 7. This indicates the solution is basic and indicator turns to yellow.

48. Bee stings can be treated with:

(a) Vinegar

(b) Sodium hydrogencarbonate

(c) Potassium hydroxide

(d) Lemon juice

Solution:

Option (b) is the answer. Bee stings inject an acidic liquid to the skin and causes severe pain and itching. If we treat with base like sodium hydrogencarbonate(baking soda) it neutralizes the acid and relieve pain.

49. Wasp stings can be treated with:

(a) Baking soda

(b) Vinegar

(c) Washing soda

(d) Milk of magnesia

Solution:

Option (b) is the answer. Wasp stings inject alkaline solution to the skin which causes pain and irritation. By applying vinegar like weak acid it neutralizes and prevents the pain.

50.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:

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(a) Wasp

(b) Ant

(c) Honey bee

(d) Nettle leaf hair

Solution:

Option (a) is the answer. Wasp sting injects alkaline solution and thus rubbing with an acid like vinegar will give relief from pain and irritation caused by the wasp.

51. 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

Solution:

Option (b) is the answer. Fresh milks when converted into curd will produce lactic acid. The value of pH for an acid will always lesser than 7.

52. The acid produce naturally in our stomach is :

(a) Acetic acid

(b) Citric acid

(c) Hydrochloric acid

(d) Sulphuric acid

Solution:

Option (c) is the answer. Hydrochloric acids produces naturally in our stomach in the process of digestion in a certain amount, if it exceeds then it causes acidity or ulcer.

53. The daffodil plant grow best in soil having a pH range of 6.0 to6.5. 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?

Solutions:

(a) Salt

(b) Lime

(c) Sand

(d) Compost

Solution:

Option (b) is the answer. If the pH of the soil is 4.5 it indicates the soil is acidic and the soil should be treated with a base like quick lime or slaked lime it further neutralizes the acid.

Questions Based on Higher Order Thinking Skills

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54. 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?

Solution:

(a) The milkman shifts the pH of the fresh milk from 6 to slightly alkalinity because in alkaline condition milk it is not easy to become sour or to curd due to the formation of lactic acid.

(b) The milk takes time to set as curd because the milk is basic and acids produced are neutralized by the base

55. 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

Solution:

Both sulphur and carbon burn in the air to form sulphur dioxide and carbon dioxide. Both are having pH less than 7 which indicates acidic oxides.

Hydrogen will form water by reacting with oxygen and the pH will be 7 as it is neutral. Magnesium and copper does not form oxides which having less than pH 7

56. 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?

Solutions:

(i) D : Weakly alkaline having pH = 11

(ii) C : Neutral having pH = 7

(iii) A: Strongly acidic having pH = 1

(iv) E : Strongly alkaline having pH = 13

(v) B: Weakly acidic having pH = 5

57. 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?

Solution:

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(a)Potatoes grow in the soil having acidic nature of pH 5.5

(b) Broccoli grows better in alkaline soil because he added a lot of lime to the soil which is acidic and seems more basic.

58. 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**
Over cleaner	**Purple**
Car battery acid	**Pink**

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

Solutions:

The solutions have been arranged below in the increasing order of their pH values

Sulphuric acid (pH 1) < Car battery acid (pH 2) < Washing-up liquid (pH 5) < Milk of magnesia (pH 9) < Metal polish (pH 12) < Oven cleaner (pH 14)

59. 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?

Solutions:

(a) Solution A turns universal indicator blue to purple so it is basic in nature and will turn litmus blue.

(b) Solution B turns universal indicator orange to red so it is acidic in nature and will turn litmus red.

(c) Milk of magnesia and sodium hydroxide solution are like solution A

(d) Lemon juice and hydrochloric acid are like solution B

(e) Neutralisation reaction takes place between A and B which produces salt and water

60. 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?

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Solutions:

(a)Wasp sting is basic. It injects alkaline liquid to the skin of the person and causes pain and itching sensation. By rubbing vinegar the person will get rid of pain and itching.

(b) Bee sting is acidic. It injects acidic liquid to the skin of a person and severe pain and irritation persists. Baking soda is a base used to treat the bee sting which neutralizes the acid

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

(b) What damage could be caused while the pH is low?

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

Solutions:

(a) The main reason for the low pH in a person's mouth after each meal is due to the acid formation due to the activity of bacteria. After meals the sugar in the food item will break down to acids by the bacteria as the acid has low pH acidity increases.

(b) While pH in the mouth is low tooth decay can occur which is formed due to the acidity in mouth.

(c) Tooth decay can be prevented by our self without consulting a doctor. Always brush teeth two times a day after having food. Before sleeping brushing is must as the chances of bacterial action is more at the time of sleep. Avoid sweet items like chocolates and ice creams.

62. 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
Baking soda	8.5
Black coffee	5.0
Household ammonia	12.0
Lemon juice	2.5
Milk	6.5
Salt	7.0
Sugar	7.0
Toothpaste	9.0
Vinegar	3.0
Washing soda	11.5

(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?

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

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

Solutions:

(a) To measure the pH universal indicator is used which is having different colours identifying pH from 0 to 14.

(b) pH 2.5 Lemon juice is the most acidic which is less than 7

(c) Household ammonia with pH 12 is the most alkaline

(d) Salt solution and sugar solution are neutral having pH 7.

(e) To treat wasp stings vinegar the weak acid can be used as the wasp sting injects alkaline liquid to the skin.

(f) Baking soda being a base can be used to neutralize the acid which is caused due to the bee sting. It injects methanoic acid to the skin.

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63. 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.

Solutions:

(a) X is zinc metal and Y is hydrogen gas which makes a pop sound

(b) (i) $Zn(s) + 2HCl \rightarrow ZnCl_2 + H_2$

Zinc reacts with hydrochloric acid to give zinc chloride and hydrogen gas is liberated

(ii) $2NaOH(aq) + Zn \rightarrow Na_2ZnO_2(aq) + H_2$

Zinc reacts with sodium hydroxide gives sodium zincate and hydrogen gas is evolved.

Very Short Answer Type Questions

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1. What is the chemical formula of (a) baking soda, and (b) washing soda

Solution

(a) Chemical formula of baking soda is $NaHCO_3$ which is a base

(b) Chemical formula of washing soda is Na_2CO3

2. Write the chemical formula of (i) soda ash and (ii) sodium carbonate decahydrate.

Solutions:

(i) Soda ash is having a formula Na_2CO_3. Chemical name is sodium carbonate

(ii) Sodium decahydrate is having a formula $Na_2CO_3.10H_2O$. This is washing soda

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3. State whether the following statement is true or false:

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

Solution:

The statement is false because water of crystallisation is very important part in the crystal structure of salts. It is not free or additional water outside the crystal and it can't be wet, it is dry always

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

$CuSO_4.5H_2O$ or $CuSO_4$.

Solution:

$CuSO_4.5H_2O$ has blue colour due to the presence of water of crystallization. There is a presence of water in the molecule. If it would be anhydrous the colour will be white because it won't have water molecule. Copper sulphate itself will have no colour due to the absence of water molecule

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

Solutions:

Sodium carbonate is a salt formed from a strong base and we know that bases turns litmus red to blue.

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

Solution:

When plaster of Paris is mixed with water, it forms gypsum which is calcium sulphate dehydrate. Plaster of Paris is made by heating gypsum at a temperature of 373K

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

Solution:

Chlorine should be treated with dry slaked lime i.e calcium hydroxide to get bleaching powder

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

8. What is the commercial name of calcium sulphate hemihydrate?

Solution:

The commercial name of calcium sulphate hemihydrate is plaster of Paris. It is prepared by heating gypsum at a temperature of 373K. $CaSO_4.1/2\ H_2O$ is the chemical formula.

9. Name the product formed when Cl_2 and H_2 produced during electrolysis of brine are made to combine.

Solution:

When hydrogen and chlorine react with each other, hydrochloric acid is formed

$H_2 + Cl_2 \rightarrow 2HCl$

10. Name a calcium compound which hardens on wetting with water.

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Solution:

Plaster of Paris is the compound which hardens on wetting with water. It is chemically calcium sulphate hemihydrate.

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

Solution:

Sodium carbonate decahydrate is the constituent of many dry soap powders. It is commonly known as washing soda. $Na_2CO_3.10H_2O$ is the chemical formula

12. Name a metal carbonate which is soluble in water.

Solution:

Washing soda is soluble in water and is used in dry soap powders. It has a formula $Na_2CO_3.10H_2O$

13. Name an acid which is present in baking powder.

Solution:

Tartaric acid is present in baking powder, which is a mixture of tartaric acid and sodium hydrogen carbonate.

14. Name the metal whose carbonate is known as washing soda.

Solution;

Sodium is the metal whose carbonate is called washing soda. Washing soda is soluble in water and is used in dry soap powders. $Na_2CO_3.10H_2O$ is the chemical formula

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

Solution:

Antacids help to neutralize the acid present in our stomach. $NaHCO_3$ is used as an antacid. It helps to reduce the secretion of stomach acids

16. What is the common name of (a) $NaHCO_3$ and (b) $Na_2CO_3.10H_2O$

Solution:

(a) Baking soda, which is used as a base to neutralize acid. It also used as mouth wash and many other household uses are there

(b) Washing soda is also known as sodium carbonate which is soluble in water and uses in dry soap powders. It helps to remove stains in clothes.

17. Write the chemical name and formula of (a) common salt and (b) caustic soda.

Solution:

(a) Sodium chloride is common salt or table salt which we use for food items.

(b) Caustic soda is sodium hydroxide is a versatile alkali used in the manufacture of paper

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

Solution:

Common salt which is called sodium chloride usually occurs naturally in sea water in dissolved form and also found in underground deposit as rock salt.

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19. Name the major salt present in sea water.

Solution:

Sodium chloride is the major salt present in the sea water and also found as rock salt. It is called common salt which used in food stuffs.

20. How is common salt obtained from sea water?

Solution:

Common salt which is present in sea water can be obtained by the process of evaporation through sunlight which leaves crude common salt. Then it further get purified and will obtain pure salt.

21. Why is sodium chloride required in our body?

Solution:

Sodium chloride is much required our body because for the working of nervous system, muscle movements and also for the production of hydrochloric acid

22. Name three chemicals made from common salt or sodium chloride.

Solution:

Sodium hydroxide, sodium carbonate and sodium hydrogen carbonate are the chemicals made from sodium chloride. The common names are caustic soda, washing soda, and baking soda.

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

Solution:

Sodium chloride is used in the manufacture of soap

It is used in cooking food

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

Solution:

Common salt is mined from the underground deposits called rock salt.

The salt mined which is then undergone evaporation and make common salt.

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

Solution:

Sodium chloride is used as preservatives in pickles and in curing meat and fish.

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

Solution:

Common salt or sodium chloride is the raw material for making caustic soda. Caustic soda is sodium hydroxide is a versatile alkali used in the manufacture of paper.

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

Solution:

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Three products obtained by the electrolysis of an aqueous solution of sodium chloride are chlorine gas(formed at anode), hydrogen gas (formed at the cathode) and sodium hydroxide solution (formed near the cathode)

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

(a) Chlorine formed?

(b) Hydrogen formed?

(c) Sodium hydroxide formed?

Solution:

(a)During the electrolysis of a saturated solution of sodium chloride, chlorine gas is produced at the anode which is positive chloride

(b) Hydrogen gas is produced at the cathode that is negative electrode.

(c) Sodium hydroxide is formed near the cathode.

29. Fill in the following blanks:

(a) Common salt is obtained from sear water by the process of …….

(b) Rock salt is mined just like …….

(c) Chemical formula of washing soda is ……

(d) Sodium hydrogencarbonate is …… soda whereas sodium carbonate is …. Soda

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

Solution:

(a) Evaporation

(b) Coal

(c) $Na_2CO_3.10H_2O$

(d) Baking soda; washing soda

(e) $CaSO_4.1/2H_2O$

30. Complete and balance the following equations:

(a) $NaCl(aq) + H_2O(l) \rightarrow$

(b) $2NaHCO_3 \rightarrow$

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

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

Solution:

(a) $NaCl(aq) + H_2O(l) \rightarrow 2NaOH(aq) + Cl_2(g) + H_2(g)$

(b) $2NaHCO_3 \rightarrow Na_2CO_3 + CO_2 + H_2O$

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

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

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

Solution:

Washing soda is sodium carbonate decahydrate

It is a white crystalline solid and soluble in water

It is highly alkaline substance having property of removing dirt

Washing soda is used in soap, glass, and paper industries

It is used in the manufacture of sodium compounds such as borax.

32. 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.

Solution:

Sodium chloride – NaCl.

Sodium carbonate – Na_2CO_3.

Aqueous solution of sodium chloride is neutral because it is formed from strong acid and strong base. The aqueous solution of sodium carbonate is alkaline because it is prepared fromm the reaction of weak acid and a strong base.

$Na_2CO_3(s) + 2H_2O(l) \rightarrow 2NaOH(aq) + H_2CO_3(aq)$

33. 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.

Solution:

The chemical formula of ammonium chloride is NH_4Cl.

It is formed from a weak base, ammonium hydroxide and a strong acid. Ammonium chloride when dissolved in water it hydrolyses to form ammonium hydroxide and hydrochloric acid

$NH_4Cl + H_2O \rightarrow NH_4OH + HCl$

The formed hydrochloric acid is strong acid and it ionizes to give H+ ions whereas ammonium hydroxide is weak base and give small amount of OH- ions on dissociation.

34. 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?

Solution:

Baking soda is a substance which is added to the food stuff to cook fast. It is a sodium salt.

The chemical name of baking soda is sodium hydrogencarbonate which is also called sodium bicarbonate.

Baking soda is used in fire extinguishers and also used in preparing baking powder and also in baking cakes etc.

Washing soda and baking soda is different. Washing soda consist of two sodium atoms attached to carbonate group and baking soda have one atom of sodium and one hydrogen. Both differs in one hydrogen atom

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

Solution:

Baking soda is produced in large scale by reacting a cold and concentrated solution of sodium chloride called brine with ammonia and carbon dioxide

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

36. 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.

Solution:

When a cold and concentrated solution of sodium chloride reacts with ammonia and carbon dioxide 2 products are formed sodium hydrogen carbonate and ammonium chloride

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

37. (a) What is meant by "water of crystallisation" in a substance? Explain with an example.

(b) How would you show that blue copper sulphate crystals contain water of crystallisation?

(c) Explain how anhydrous copper sulphate can be used to detect the presence of moisture (water) in a liquid.

Solution:

(a)Water of crystallisation is that the water molecules that form part of the structure of a crystal of a salt. For example the washing soda crystals contains 10 molecules of water of crystallisation and represented as $Na_2CO_3.10H_2O$

(b) Copper sulphate crystals are blue in colour $CuSO_4.5H_2O$ and when is heated it loses water and will become white in colour. Thus we can conclude that the blue colour is due to water of crystallization

(c) Take a drop of the liquid which to be tested and add to white anhydrous copper sulphate powder. The blue colour indicates the presence of moisture or water

38. (a) What is the common name of sodium hydrogencarbonate?

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

(c) Explain why, sodium hydrogencarbonate is used as an antacid.

Solution:

(a) Baking soda is the common name of sodium hydrogencarbonate

(b) When a solution of sodium hydrogencarbonate is heated, then it decomposes to give sodium carbonate with an evolution of carbon dioxide gas

$2NaHCO_3 \rightarrow Na_2CO_3 + CO_2 + H_2O$

(c) Sodium hydrogencarbonate is used as an antacid because the function of antacid is neutralizing the excess acid present in the stomach and helps to get relief from indigestion

39. (a) What will happen if heating is not controlled while preparing Plaster of Paris?

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

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Solution:

(a) 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.

(b) $CaSO_4.1/2H_2O + 1\ 1/2H_2O \rightarrow CaSO4.2H_2O$

40. (a) What happens when copper sulphate crystals are heated strongly? Explain with the help of an example.

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

Solution:

(a) Copper sulphate crystals when heated strong it loses the water and the blue colour will turn to white

$CuSO_4.5H_2O \rightarrow CuSO_4 + 5H_2O$

(b) When water is added to anhydrous copper sulphate, it gets hydrated and turns blue.

$CuSO_4 + 5H_2O \rightarrow CuSO_4.5H_2O$

41. (a) Name two constituents of baking powder.

(b) How does baking powder differ from baking soda?

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

Solution:

(a) Sodium hydrogencarbonate and tartaric acid are the constituents of baking powder.

(b) Baking powder is a mixture of baking soda and tartaric acid and baking soda is only sodium bicarbonate. They looks similar in appearance

(c) On mixing baking powder with water in the making of cake the sodium bicarbonate reacts with tartaric acid to evolve carbon dioxide gas and it gets into the wet dough and bubbles out. Thus the cake become soft and spongy

$NaHCO_3(aq) + H^+ \rightarrow Na^+(aq) + CO_2(g) + H_2O(l)$

42. (a) What is the chemical name of bleaching powder?

(b) What is the chemical formula of bleaching powder?

(c) What are the materials used for the preparation of bleaching powder?

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

Solutions:

(a) Chemical name of bleaching powder is calcium oxychloride

(b) $CaOCl_2$

(c) Calcium hydroxide and chlorine.

(d) Bleaching powder is used as a disinfectant in the drinking water which kills germs and bacteria.

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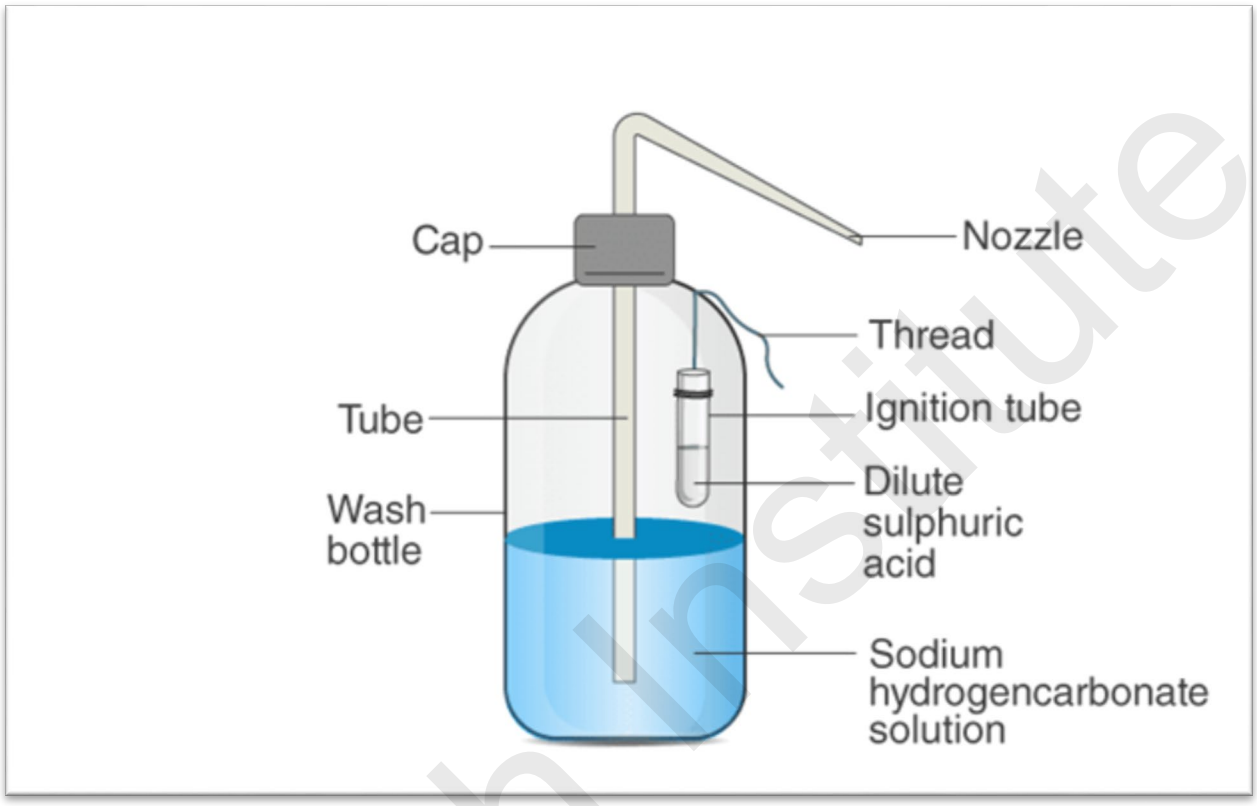
43. What does a soda-acid type fire extinguisher contain? How does it work? Explain the working of acid fire extinguisher with the help of labeled diagram.

Solution:



A soda type of fire extinguisher contains solutions of sulphuric acid and sodium hydrogencarbonate in separate containers.

The working is described below

A knob present in the fire extinguisher is pressed once and the sulphuric acid mixes with the sodium hydrogencarbonate solution to produce carbon dioxide gas. The carbon dioxide gas will go out as a liquid that falls on the burning substance because of the high pressure in the extinguisher. A blanket of carbon dioxide comes out with the liquid and cut the supply of air to the burning substance. When the supply of air gone the fire gets extinguished.

$2NaHCO_3 + H_2SO_4 \rightarrow Na_2SO_4 + 2CO_2 + 2H_2O$

44. (a) Name a sodium compound used for softening hard water.

(b) Which compound of calcium is used for disinfecting drinking water supply?

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

(d) Name one compound of calcium which is used for removing colour of a coloured cloth.

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

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

Solution:

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(a) Sodium carbonate is used for softening hard water. Commonly called washing soda

(b) Bleaching powder is a calcium compound which is used for disinfecting drinking water supply.

(c) Sodium carbonate is the metal compound which has detergent and cleansing property

(d) Bleaching powder or calcium oxychloride ($CaOCl_2$) is used for removing the colour

(e) Plaster of Paris has a property of setting into hard mass on addition of water.

(f) Bleaching powder or calcium oxychloride ($CaOCl_2$) is obtained by the action of chlorine on solid slaked lime

45. (a) What is gypsum ? What happens when gypsum is heated to 100℃ (373K)?

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

(c) Name the compound which is used in hospitals for setting fractured bones.

(d) Which is the real bleaching powder agent in the bleaching powder?

Solution:

(a) Gypsum is calcium sulphate dehydrate ($CaSO_4.2H_2O$) and when heated to a temperature of 373K it loses three-fourth of its water of crystallization and forms plaster of Paris ($CaSO_4.1/2H_2O$)

(b) Sodium carbonate or washing soda is used to make borax and glass

(c) Plaster of Paris is used for setting fractured bones because on addition of water to this turns hard mass and if we mould a layer around the fractured part it solidifies and supports the damaged bone hence heal the fracture.

(d) Bleaching powder is also called calcium chlorohypochlorite because a little of mixture of hydrochloric acid and hypochlorous acid

46. (a) What is "baking powder"? How does it make the cake soft and spongy?

(b) In addition to sodium hydrogencarbonate, baking powder contain a substance X. Name the substance. What is the role of substance X in the baking powder?

Solution:

(a) Baking powder is a mixture of baking soda and tartaric acid when mixed with water the sodium hydrogen carbonate reacts with tartaric acid carbon dioxide gas is liberates and trapped in wet dough and bubbles out slowly making the cake soft and spongy.

(b) Substance X is tartaric acid and it reacts with sodium carbonate formed and neutralise it otherwise cakes and breads will taste bitter.

47. State two uses each of the following compounds:

(a) Sodium hydroxide (b) Chlorine

(c) Hydrogen (d) Hydrochloric acid.

Solution:

(a) Sodium hydroxide:

1. Used for making soaps

2. Manufacturing of paper

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(b) Chlorine

1. Used in the production of bleaching powder

2. Used for sterilising drinking water

(c) Hydrogen

1. Used as fuels in rockets

2. Used in hydrogenation of oils

(d) Hydrochloric acid

1. Used in medicines and cosmetics

2. Textile dyeing and tanning industries

48. (a) What is the common name of the compound $CaOCl_2$?

(b) Name the raw material used for the preparation of plaster of Paris.

(c) Which property of plaster of Paris is utilised in making casts for broken limbs in hospitals?

(d) Explain why chlorine is used for sterilising drinking water supply.

Solution:

(a) Bleaching powder

(b) Gypsum

(c) Plaster of Paris has the property of setting into hard mass after wetting.

(d) Chlorine is the best for sterilising drinking water supply because it kills all the bacteria and germs present in the water. It acts as a disinfectant

Long Answer Type Questions

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

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

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

Solutions:

(a) when a concentrated solution of sodium chloride is electrolysed, it decomposes to form sodium hydroxide, chlorine and hydrogen

$2NaCl(aq) + 2H_2O(l) \rightarrow 2NaOH(aq) + Cl_2(g) + H_2(g)$

(b) The electrolysis of a concentrated solution of sodium chloride is known as chlor-alkali because of the products formed, Chlorine and hydrogen.

(c) Sodium hydroxide, chlorine and hydrogen

(a) Sodium hydroxide:

1. Used for making soaps

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2. Manufacturing of paper

(b) Chlorine

1. Used in the production of bleaching powder

2. Used for sterilising drinking water

(c) Hydrogen

1. Used as fuels in rockets

2. Used in hydrogenation of oils

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

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

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

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

Solutions:

Washing soda is produced from sodium chloride

Step 1: A cold and concentrated solution of sodium chloride called brine is reacted with ammonia and carbon dioxide to obtain sodium hydrogencarbonate

$NaCl + NH_3 + H_2O + CO_2 \rightarrow NaHHCO_3 + NH_4Cl$

Step 2: Sodium hydrogencarbonate formed is separated by filtration dried and heated. It further decomposes to sodium carbonate

$2NaHCO_3 \rightarrow Na_2CO_3 + CO_2 + H_2O$

Anhydrous sodium carbonate is called soda ash

Step 3: Soda ash is then dissolved in water and recrystallized to get washing soda crystals containing 10 molecules of water of crystallization

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

(b) An aqueous solution of washing soda is alkaline because it turns red litmus to blue

(c) Washing soda has a cleansing and detergent property thus it removes dirt and grease from dirty clothes

(d) Used as cleansing agent

Used to remove permanent hardness of water

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51. (a) What is bleaching powder? How is bleaching powder prepared? Write chemical equation of the reactions involved.

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

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(c) Write two important uses of bleaching powder.

Solution:

(a) Bleaching powder is calcium oxychloride($CaOCl_2$). It is prepared by passing chlorine gas over a dry slaked lime

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

(b) When bleaching powder reacts with sulphuric acid, it liberates chlorine gas.

$CaOCl_2 + H_2SO_4 \rightarrow CaSO_4 + Cl_2 + H_2O$

(c) (i) Used as disinfectant

Used in the manufacturing of chloroform

52. (a) What is plaster of Paris? Write the chemical formula for plaster of Paris.

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

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

(d) Write two important uses of plaster of Paris.

Solution:

(a) Plaster of Paris is called calcium sulphate hemihydrate which is a hard substance made by the addition of water and gypsum. $CaSO_4.1/2H_2O$ is the formula

(b) It is prepared by heating gypsum to a temperature at 373K and it loses $3/4^{th}$ of its water of crystallisation and forms Plaster of Paris

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

(c) The presence of moisture can cause the slow setting of plaster of Paris by bringing about its hydration

(d) Used for healing the fracture of bones

Used as fire proofing material.

53. (a) 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.

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

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

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

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

Solution:

(a) A salt is a compound when a metal replaces the hydrogen atom in an acid.

Example: Sodium chloride NaCl; It is obtained from hydrochloric acid and sodium metal.

Ammonium chloride NH_4Cl; It is obtained from ammonia and hydrochloric acid.

(b) The salt having same positive ions are said to belong to a family of salts.

Sodium chloride and sodium sulphate are the examples of family of salts

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(c) The salts which contains water of crystallization are called hydrated salt

Example: Copper sulphate crystals contain 5 molecules of water of crystallization

(d) Copper sulphate pentahydrate salt – Its chemical formula is $CuSO_4.5H_2O$. It is blue in colour.

Iron sulphate heptahydrate salt – Its chemical formula is $FeSO_4.7H_2O$. It is green in colour.

(e) Colour of litmus turns red in an aqueous solution of ammonium chloride salt.

Multiple Choice Questions (MCQ's)

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

(a) KCl

(b) NH_4Cl

(c) Na_2CO_3

(d) CH_3COONa

Solution:

Option (b) is the answer.

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

(a) Na_2CO_3

(b) Na_2SO_4

(c) NaCl

(d)$(NH_4)_2SO_4$

Solution:

Option (a) is the answer.

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

(a) CH_3COONa

(b) NH_4Cl

(c) KCl

(d) Na_2CO_3

Solution:

Option (c) is the answer.

57. The products of chlor-alkali process are:

(a) NaCl, Cl_2 , and H_2

(b) Cl_2 , H_2 and NaOH

(c) Cl_2, Na_2CO_3 and H_2O

(d) NaOH, Cl_2 and HCl

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Solution:

Option (b) is the answer.

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

(a) Five

(b) Two

(c) Ten

(d) Seven

Solution:

Option (c) is the answer.

59. The salt whose aqueous solution will turn blue litmus to red is:

(a) Ammonium sulphate

(b) Sodium acetate

(c) Sodium chloride

(d) Potassium carbonate

Solution:

Option (a) is the answer.

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

(a) Potassium sulphate

(b) Sodium sulphate

(c) Sodium chloride

(d) Potassium carbonate

Solution:

Option (d) is the answer.

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

(a) Potassium sulphate

(b) Sodium carbonate

(c) Ammonium sulphate

(d) Sodium acetate

Solution:

Option (a) is the answer.

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

(a) KCl

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(b) K_2SO_4

(c) K_2CO_3

(d) KNO_3

Solution:

Option (c) is the answer.

63. The formula of baking soda is:

(a) K_2CO_3

(b) $KHCO_3$

(c) $NaHCO_3$

(d) KNO_3

Solution:

Option (c) is the answer.

64. 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

Solution:

Option (b) is the answer.

65. Plaster of paris is prepared by heating one of the following to a temperature of 100℃. This is:

(a) $CaSO_3.2H_2O$

(b) $CaCl_2.2H_2O$

(c) $CaCO_3.2H_2O$

(d) $CaSO_4.2H_2O$

Solution:

Option (d) is the answer.

66. 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_4Cl

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Solution:

Option (a) is the answer.

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

(a) CH_3COONa

(b) Na_2CO_3

(c) KCl

(d) NH_4Cl

Solution:

Option (d) is the answer.

68. Which of the following salt will give an aqueous solution having pH of almost 7?

(a) NH_4NO_3

(b) NH_4Cl

(c) $CaCl_2$

(d) KCl

Solution:

Option (d) is the answer.

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