

Important Questions for Class 10

Science

Chapter 2 - Acids Bases and Salts

Very Short Answer Questions

1 Marks

1. An acid can react with

- (a) AgCl
- (b) Na_2CO_3
- (c) PbSO_4
- (d) Na_2SO_4

Ans: The correct answer is (b) Na_2CO_3

2. Which of the following gives CO_2 on heating?

- (a) Slaked
- (b) Quick lime
- (c) Limestone
- (d) Soda ash.

Ans: The correct answer is (c) Limestone

3. Plaster of Paris is made from

- (a) Limestone

(b) Slaked Lime

(c) Quick lime

(d) Gypsum

Ans: The correct answer is (d) Gypsum

4. Which is a base and not alkali?

(a) NaOH

(b) KOH

(c) $\text{Fe}(\text{OH})_3$

(d) None

Ans: The correct answer is (c) $\text{Fe}(\text{OH})_3$

5. Chemical formula of baking soda is

(a) MgSO_4

(b) Na_2CO_3

(c) NaHCO_3

(d) MgCO_3

Ans: The correct answer is (c) NaHCO_3

6. The H^+ ion concentration of a solution is $1.0 \times 10^{-5} \text{ m}$. The solution is

(a) Acidic

(b) Alkaline

(c) Neutral

(d) Amphoteric

Ans: The correct answer is (a) Acidic

7. An aqueous solution with pH-zero is

(a) Acidic

(b) Alkaline

(c) Neutral

(d) Amphoteric

Ans: The correct answer is (a) Acidic

8. Setting of Plaster of Paris takes place due to

(a) Oxidation

(b) Reduction

(c) Dehydration

(d) Hydration

Ans: The correct answer is (d) Hydration

9. The difference of water molecules is gypsum and Plaster of Paris is

(a) $\frac{5}{2}$

(b) 2

(c) $\frac{1}{2}$

(d) $\frac{3}{2}$

Ans: The correct answer is (d) $\frac{3}{2}$

10. The odour of acetic acid resembles that of

- (a) Rose
- (b) Burning Plastic
- (c) Vinegar
- (d) Kerosene

Ans: The correct answer is (c) Vinegar

11. Washing soda has the formula

- (a) $\text{Na}_2\text{CO}_3 \cdot 7\text{H}_2\text{O}$
- (b) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$
- (c) $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$
- (d) Na_2CO_3

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

12. Plaster of Paris hardens by

- (a) Giving off CO_2
- (b) Changing into CaCO_3
- (c) Combining with water

(d) Giving out water

Ans: The correct answer is (c) Combining with water

13. Which of the following is evolved when Na_2CO_3 is heated?

(a) CO_2

(b) CO

(c) O_2

(d) No

Ans: The correct answer is (d) No

14. A drop of the liquid sample was put on the pH paper, the paper turned blue. The liquid sample must be of

(a) Lemon Juice

(b) HCl

(c) Sodium bicarbonate

(d) Ethanoic acid

Ans: The correct answer is (c) Sodium bicarbonate

15. If the pH of the solution is 13, it means that it is

(a) Weakly acidic

(b) Weakly basic

(c) Strongly acidic

(d) Strongly Basic

Ans: The correct answer is (d) Strongly Basic

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

Ans: If an acid solution is diluted, the hydronium ion concentration decreases.

17. What effect does the concentration of H^+ ions have on the nature of the solution?

Ans: A higher concentration of H^+ ions turns the solution acidic in nature.

18. What effect does the concentration of H^+ ions have on the nature of the solution?

Ans: Higher concentration of H^+ ions turn the solution acidic in nature.

19. What is the common name of the compound CaOCl_2 ?

Ans: The common name of the compound is Bleaching powder.

20. Name the substance which on treatment with chlorine yields bleaching powder.

Ans: Slaked lime (calcium hydroxide) yields bleaching powder in treatment with chlorine.

21. Name the sodium compound which is used for softening hard water.

Ans: The compound which is used for softening hard water is Sodium carbonate.

22. A solution turns red litmus blue, its pH is likely to be

- (a) 1
- (b) 2
- (c) 5
- (d) 10

Ans: The correct answer is (d) 10

23. A solution reacts with crushed egg-shells to give a gas that turns lime-water milky.

The solution contains

- (a) NaCl
- (b) HCl
- (c) LiCl
- (d) KCl

Ans: The correct answer is (b) HCl

24. 10mL of a solution of NaOH is found to be completely neutralized by 8mL of a given solution of HCl. If we take 20mL of same solution of NaOH, the amount of HCl solution required to neutralize it will be

- (a) 4mL
- (b) 8mL
- (c) 12mL
- (d) 16mL

Ans: The correct answer is (d) 16mL

25. Which one of the following types of medicines is used for treating indigestion?

- (a) Antibiotics
- (b) Analgesic
- (c) Antacid
- (d) Antiseptic

Ans: The correct answer is (c) Antacid

26. Five solutions A, B, C, D and E when tested with universal indicators showed pH as 4,1,11,7 and 9 respectively. Which solution is:

- (a) neutral?
- (b) strongly alkaline?
- (c) strongly acidic?
- (d) weakly acidic?
- (e) weakly alkaline?

Ans: The correct answer is

- (a) D
- (b) C
- (c) B
- (d) A
- (e) E

27. 'A' is a soluble acidic oxide and 'B' is a soluble base. Compared to pH of pure water. What will be the pH of (a) solution of A (b) solution of B?

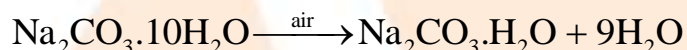
Ans: Since 'A' is acidic, the pH will be less than 7. On the other hand, since 'B' is basic, pH will be more than 7.

Short Answer Questions

2 Marks

1. What happens to the crystals of washing soda when exposed to air?

Ans: Upon exposure of washing soda crystals to air, the following reaction takes place:



In the reaction, the white crystals of washing soda turn into washing powder (white powder). Efflorescence occurs in the washing soda.

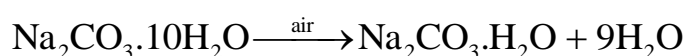
2. What is the chemical name of washing soda? Name three raw materials used in making washing soda by Solvay process?

Ans: The chemical name of washing soda ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$) is sodium carbonate decahydrate.

Ammonia, Brine and Limestone are used to make washing soda by the Solvay process.

3. What is efflorescence? Give an example?

Ans: Upon exposure to air, the loss of the molecules of water of crystallization from a substance is defined as efflorescence. For example, in the reaction given below, the crystals of washing soda turn into washing powder when exposed to air.



4. Why is sodium hydrogen carbonate an essential ingredient in antacids?

Ans: Sodium hydrogen carbonate (NaHCO_3) is an essential ingredient in antacids because of the basic nature of the salt. It neutralizes the HCl acid released in the stomach. The following reaction takes place,



5. Give the name and formula of two

(i) strong monobasic acids

Ans: The required answer is:

Hydrochloric acid (HCl), Nitric acid (HNO_3)

(ii) two weak dibasic acids

Ans: The required answer is:

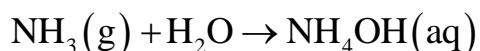
Carbonic acid (H_2CO_3), oxalic acid ($\text{C}_2\text{H}_2\text{O}_4$)

6. Why alkalis like sodium hydroxide and potassium hydroxide should not be left exposed to air?

Ans: Alkalis are hygroscopic in nature. Upon exposure to air, they absorb moisture from the surrounding atmosphere and get dissolved in it.

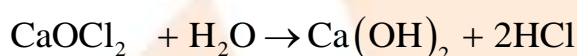
7. Dry ammonia has no action on litmus paper but a solution of ammonia in water turns red litmus paper blue. Why is it so?

Ans: Dry ammonia has no action on the litmus paper because it contains no hydroxyl ions in the absence of water. On dissolving in water, it forms ammonium hydroxide (NH_4OH), which is basic in nature because it dissociates to give NH_4^+ and OH^- ions. Thus, red litmus paper turns blue.



8. Bleaching powder forms a milky solution in water. Explain.

Ans: Bleaching powder reacts with water to form $\text{Ca}(\text{OH})_2$, which has a milky appearance. The reaction is given by,



9. Why does not an acid show any acidic behavior in the absence of water?

Ans: Water is an ionizing compound. In its presence, acids form an aqueous solution and get ionized. This results in the release of H^+ ions and hence, acidic behavior is shown.

10. Fresh milk has a pH of 6. What will be the pH value if milk changes into a curd? Justify.

Ans: Lactose is converted to lactic acid when milk changes into a curd. Because of the greater acidic nature, the pH value decreases.

11. What is the reaction between hydrogen in concentration ion concentration of an aqueous solution and pH?

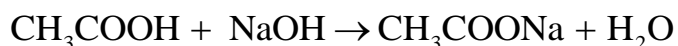
Ans: The reaction is given as

$$\text{pH} = -\log[\text{H}^+], \text{ where } \text{H}^+ \text{ is hydrogen ion concentration}$$

12. How will you show that acetic acid is monobasic acid?

Ans: When acetic acid reacts with a basic solution, only one H^+ ion is replaced

by the base, which shows acetic acid is a monobasic acid. For example,

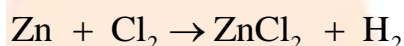


13. Why should curd and sour substance not be kept in brass and copper vessels?

Ans: Brass is an alloy of copper and zinc metals. These metals react with acids present in curd and sour substances to form poisonous soluble salts. Hence, storing curd and sour substances in brass or copper vessels makes them unfit for consumption.

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

Ans: When an acid reacts with a metal, hydrogen gas is liberated. For example,



We bring a burning splinter near the liberated gas. If the gas is hydrogen, it burns with a pop sound.

15. Why does an aqueous solution of an acid conduct electricity?

Ans: Water is a polarizing compound. Acid gets ionized in aqueous solution and H^+ ions are released. These ions conduct electricity.

16. Why does dry HCl gas not change the colour of the dry litmus paper?

Ans: When litmus paper comes in contact of H^+ ions, the colour of the paper changes. These ions are produced only upon dissolution of HCl gas in water. Therefore, dry HCl do not change the colour of dry litmus paper.

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

Ans: Addition of water to acid leads to a highly exothermic reaction. The intensity of the heat produced can break the glass container or cause severe burns to the person adding it. On the other hand, adding acid to water with constant stirring, aids the absorption of the heat produced by water and any harm/damage is avoided.

18. How is concentration of hydroxide ions (OH^-) affected when excess base is dissolved in a solution of sodium hydroxide?

Ans: The dissolution of excess base in a solution of sodium hydroxide will release more hydroxide (OH^-) ions. Therefore, it will lead to an increase in the concentration of hydroxide ions.

19. Do basic solutions also have H^+ ions? If yes, then why are these basic?

Ans: The H^+ ions are present in both acidic and basic solutions. A solution is acidic if the concentration of H^+ ions is more than OH^- ions. On the other hand, a solution is basic if the concentration of OH^- ions concentration is more than the H^+ ions.

20. You have two solutions 'A' and 'B'. The pH of solution 'A' is 6 and pH of solution 'B' is 8. Which solution has more hydrogen ions concentration? Which is acidic and which one is basic?

Ans: On a pH scale, any solution having pH value less than 7 is considered acidic and that with a pH value of more than 7 is basic. Hence, according to the given pH values, solution 'A' is acidic in nature, while solution 'B' is basic. Also, since 'A' is acidic, it has a greater concentration of hydrogen ions.

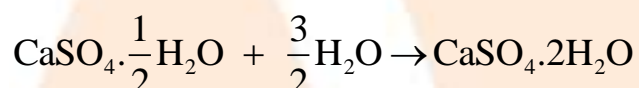
22. What will happen if a solution of sodium hydrogen carbonate is heated? Give the equation of reaction involved.

Ans: On heating a solution of sodium hydrogen carbonate, sodium carbonate, carbon dioxide and water are produced.



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

Ans: The reaction is as follows:



24. Why does distilled water not conduct electricity, whereas rain water does?

Ans: The presence of small amounts of acid in rainwater aids the conduction of electricity. Distilled water is pure water and lacks ions. Therefore, it cannot conduct electricity.

25. Why do acids not show acidic behavior in the absence of water?

Ans: Acids produce hydrogen ions or hydronium ions only in presence of water. Therefore, it shows acidic behavior only in the presence of water.

26. Equal lengths of magnesium ribbons are taken in test tubes A and B. Hydrochloric acid is added to test tube A, while acetic acid is added to test B. In which test tube will the fizzing occur more vigorously and why?

Ans: The concentration of H^+ ions in test tube A will be more than that in test tube B, because hydrochloric acid is stronger than acetic acid. Therefore, faster reaction in test tube A will lead to vigorous fizzing.

27. Fresh milk has a pH of 6. How do you think the pH will change as it turns into curd? Explain your answer.

Ans: Bacterial action on fresh milk turns it into curd. Hence, the lactose in the fresh milk is turned into lactic acid. Because of the formation of more acid, the pH will be lower than 6.

28. Plaster of Paris should be stored in a moisture-proof container. Explain why?

Ans: A hard mass of gypsum is formed when Plaster of Paris comes in contact with moisture. Therefore, it should be stored in a moisture-proof container.

29. Kazi and Priyam want to prepare dil H_2SO_4 . Kazi added conc H_2SO_4 to water slowly with constant stirring & cooling whereas Priyam added water to conc H_2SO_4 .

Name the student who was correct and why?

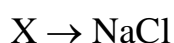
Ans: Addition of water to concentrated acid leads to a highly exothermic reaction. The intensity of the heat produced can break the glass container or cause severe burns to the person adding it. On the other hand, adding acid to water with constant stirring, aids the absorption of the heat produced by water and any harm/damage is avoided. Hence, Kazi was correct.

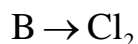
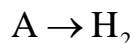
30. A compound 'X' on electrolysis in aqueous solution produces a strong base. 'Y' along with two gases 'A' and 'B'. 'B' is used in the manufacture of bleaching powder. Identify X, Y, A and B. Write chemical equations.

Ans: The chemical equations may be written as:



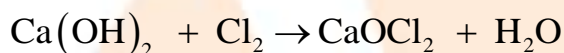
Here,



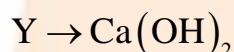
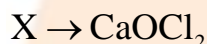


31. A yellow powder X gives a pungent smell if left open in air. It is prepared by the Reaction of dry compound Y with chlorine gas. It is used for disinfecting drinking Water. Identify X and Y. Write the reaction involved.

Ans: The reaction is written as:



Here,



32. A few drops of phenolphthalein indicator were added to an unknown solution A. It acquired pink colour. Now another unknown solution B was added to it drop by drop and the solution becomes colorless. Predict the nature of A & B.

Ans: Phenolphthalein turns pink in colour when it is dissolved in a basic solution and the pink colour becomes colourless on dissolution with an acid. Hence, according to the given question, we can say that solution 'A' is basic in nature, while solution 'B' is acidic.

Short Answer Questions

3 Marks

1.

(a) Name the raw materials used in the manufacture of sodium carbonate by Solvay process?

Ans: The raw materials used are- sodium hydroxide, limestone and ammonia.

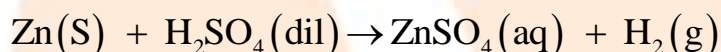
(b) How is sodium hydrogen carbonate separated from a mixture of NH_4Cl and NaHCO_3 ?

Ans: Sodium hydrogen carbonate (NaHCO_3) settles down as a precipitate because it is sparingly soluble in water. However, NH_4Cl remains dissolved in the solution. The precipitate is removed by filtration.

2. Write equations for the following reactions

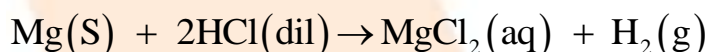
(i) Dilute sulphuric acid reacts with zinc granules

Ans: The reaction can be written as:



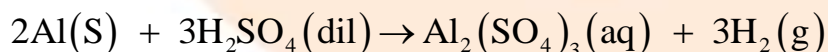
(ii) Dilute hydrochloric acid reacts with magnesium ribbon.

Ans: The reaction can be written as:



(iii) Dilute sulphuric acid reacts with aluminum powder.

Ans: The reaction can be written as:



3.

(a) An aqueous solution has a pH value of 7.0. Is this solution acidic, basic or neutral?

Ans: The nature of the solution is neutral.

(b) If H^+ concentration of a solution is $1 \times 10^{-2} \text{ mol L}^{-1}$ what will be its pH value?

Ans: It is given that,

$$\begin{aligned} [H^+] &= 1 \times 10^{-2} \text{ mol L}^{-1} \\ &= 10^{-2} \text{ M} \end{aligned}$$

Hence,

$$\begin{aligned} \text{pH} &= \log \left[\frac{1}{[H^+]} \right] \\ &= -\log [H^+] \\ &= -\log [10^{-2}] \\ &= -(-2) \log 10 \end{aligned}$$

Finally,

$$\text{pH} = 2$$

(c) Which has higher pH value: 1-M HCl or 1-M NaOH?

Ans: A solution with 1M NaOH is basic in nature and will have a higher pH value.

A solution with 1M HCl is acidic in nature and will have a lower pH value.

4. What will you observe when:

(i) Red litmus is introduced into a solution of sodium sulphate.

Ans: No colour change will occur because the solution of Na_2SO_4 and water is almost neutral.

(ii) Methyl orange is added to dil HCl.

Ans: The colour of methyl Orange will change to reddish.

(iii) Blue litmus is introduced into a solution of ferric chloride

Ans: FeCl_3 solution will form ferric hydroxide and hydrochloric acid, when it reacts with water. The presence of a strong acid will make the solution acidic in nature. Therefore, the blue litmus will change to red.

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

(a) What does this information tell you about the chemical name of the wasp sting?

Ans: Vinegar (acetic acid) is acidic in nature and if it is to be used to heal or neutralize the effect of wasp stings, it implies that the chemical present in the stings is basic.

(b) If there were no baking soda in the house, what other household substances would you use to treat as stings?

Ans: Baking soda is basic in nature. If it is used to treat bee stings, it implies that the stings must be acidic. In case of unavailability of baking soda in the house, a solution of ammonium hydroxide NH_4OH can be used for the same.

6. Does Tartaric acid help in making cake or bread fluffy. Justify.

Ans: No, tartaric acid does not make cake/bread fluffy because no carbon dioxide is released during baking. Its role is to react with the Na_2CO_3 formed by the decomposition of NaHCO_3 .



If this reaction does not occur, the Na_2CO_3 will impart a bitter taste to the cake.

7. Explain why?

(a) Common salt becomes sticky during the rainy season.

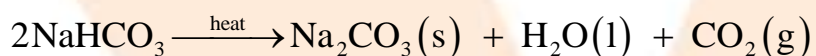
Ans: On exposure to moist air, common salt becomes sticky because it contains impurities of magnesium chloride, which has a tendency to become liquid.

(b) Blue vitriol changes to white upon heating.

Ans: Blue vitriol ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$) changes to anhydrous copper sulphate (CuSO_4) on heating, which is white in colour.

8. A compound X of sodium is commonly used in the kitchen for making crispy pakoras. It is also used for curing acidity in the stomach. Identify 'X'. What is its chemical formula? State the reaction that takes place when it is heated during cooking?

Ans: Compound X can be identified as baking powder (or baking soda). Chemically, the compound is sodium hydrogen carbonate (NaHCO_3). On heating the compound, the following reaction occurs:



9. Explain why-

(i) Anhydrous calcium chloride is used in desiccators

Ans: The hygroscopic nature of anhydrous calcium chloride makes it readily absorb moisture and therefore, it is used as a desiccator.

(ii) If bottle full of concentrated H_2SO_4 is left open in the atmosphere by accident, the acid starts flowing out the bottle of its own.

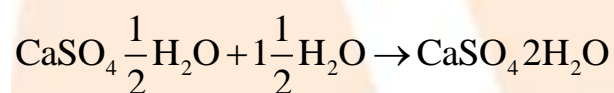
Ans: Concentrated sulphuric acid is highly hygroscopic. It begins to absorb moisture from air and gets diluted. Because of the increase in volume, the acid starts flowing out of the bottle.

10. How is plaster of Paris chemically different from gypsum? How may these be interconverted? Write one use of plaster of Paris?

Ans: Plaster of Paris is the anhydrous form of gypsum. It is prepared by heating gypsum.

Plaster of Paris is used in surgical bandages for setting fractured bones. Before applying on the fractured bone, it is mixed with water, which results in hydration and it changes into gypsum. The hard mass of gypsum keeps the bones in position.

Plaster of Paris and Gypsum may be interconverted by the reaction:



Plaster of Paris

Gypsum

‘B’

‘A’

11.

(a) What is the action of red litmus on

(i) Dry ammonia gas

Ans: As no hydroxyl ions are released, red litmus has no action on dry ammonia gas.

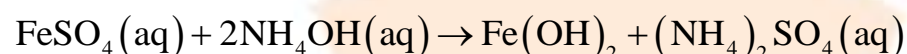
(ii) Solution of ammonia gas in water?

Ans: Ammonium hydroxide is formed when ammonia is passed through water. It turns red litmus blue because it dissociates to give hydroxyl ions.

(b) State the observations you would make on adding ammonium hydroxide to aqueous solution of

(i) ferrous sulphate

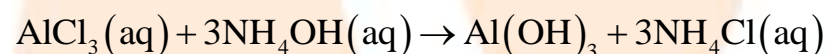
Ans: Double decomposition reaction gives green precipitate of ferrous hydroxide.



(Green ppt.)

(ii) Aluminium chloride?

Ans: Double decomposition reaction gives white precipitate of aluminum hydroxide.

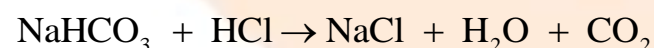


(White ppt.)

12. State the chemical property in each case on which the following uses of baking soda are based

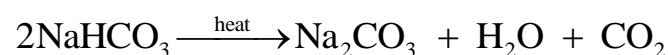
(i) As an antacid

Ans: The weakly alkaline nature of baking soda neutralizes the hydrochloric acid formed in the stomach.



(ii) As a constituent of baking powder. Give the chemical for baking soda

Ans: Using baking soda while baking makes the cake porous and fluffy. It is because carbon dioxide gas is evolved in the form of bubbles when baking.



The chemical formula of baking soda is NaHCO_3 .

13. Metal compound 'A' reacts with dilute hydrochloric acid to produce effervescence. The gas evolved extinguishes a burning candle. Write a balanced chemical equation for the reaction, if one of the compounds formed is calcium chloride.

Ans: We can say that 'A' is a salt of calcium because one of the products is calcium chloride.

Burning candle is extinguished, indicating the formation of carbon dioxide by the reaction of 'A' with hydrochloric acid.

Upon reaction with hydrochloric acid, calcium carbonate produces calcium chloride and carbon dioxide. Hence, 'A' is calcium carbonate.

The chemical equation can be given as:



14. Why do HCl, HNO₃ etc. show acidic characters in aqueous solution while solutions of compounds like alcohol and glucose do not show acidic character?

Ans: In their aqueous form, compounds like hydrochloric acid and nitric acid, release hydrogen ions, which signals acidic character.

On the other hand, compounds like alcohol and glucose cannot release hydrogen ions. Therefore, they show no acidic properties.

15. Under what soil condition do you think a farmer would treat the soil of his field with quicklime (calcium oxide) or slaked lime (calcium hydroxide) or chalk (calcium carbonate).

Ans: Quicklime (calcium oxide), slaked lime (calcium hydroxide) and chalk (calcium carbonate) are basic in nature. Hence, a farmer would use them to neutralize the effect of acidic soil conditions.

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

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

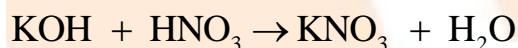
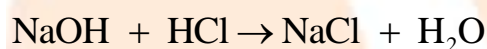
Ans: Sodium hydrogen carbonate (baking soda) is a base. Hence, on addition to milk, the solution would become slightly alkaline. This implies that the pH value would become greater than 6 (slightly alkaline) on addition of a very small amount of baking soda

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

Ans: A neutralization reaction between the lactic acid of the curd and sodium hydrogen carbonate will prolong the time taken by milk to set as curd.

17. What is a neutralization reaction? Give two examples.

Ans: Neutralization reaction is the reaction between an acid and a base to produce salt and water. For example:



18. Give two important uses of washing soda and baking soda.

Ans: The uses of washing soda are as follows:

- (i) Cleansing agent.
- (ii) Permanently removing hardness of water.
- (iii) Used in paper, glass and soap industries.

The uses of baking soda are as follows:

- (i) Production of baking powder.
- (ii) As an antacid.

19. Compound P forms enamel of teeth. It is the hardest substance of the

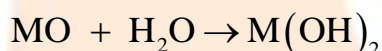
body. It does not dissolve in water but it is corroded when pH in the mouth is below 5.5. How does toothpaste prevent dental decay?

Ans: The compound P is $\text{Ca}(\text{PO}_4)_2$.

Bacterial action on the remaining food particles in the mouth produces acids from the degradation of sugar. Toothpastes are usually basic in nature. It helps in neutralizing the excess acid and prevents tooth decay.

20. The oxide of a metal M was water soluble when a blue litmus strip was dipped in this solution, it did not go any change in colour. Predict the nature of oxide.

Ans: The nature of the metal oxide is basic in nature. On dissolution in water, it forms a metal hydroxide. This hydroxide is basic in nature, as the blue litmus did not undergo any change in colour.



21. A road tanker carrying an acid was involved in an accident and its contents spilled on the road, iron drain covers began melting and fizzing as the acid ran over them. A Specialist was called to see if the acid actually leaked into the nearby river.

(a) Explain how the specialist could carry out a simple test to see if the river water contains some acid or not.

Ans: The expert can use a simple litmus paper test to determine if the river water contains acid or not. If the expert dips a strip of blue litmus paper into the sample of river water and the colour changes to red, it implies that the river water has been affected by the acid spill.

(b) The word melting is incorrectly used in the report. Suggest a better name that should have been used.

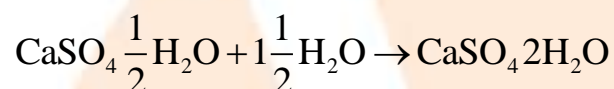
Ans: The word melting can be replaced with corrosion.

(c) Explain why drain covers began fizzing as the acid rain over them.

Ans: Hydrogen gas is evolved when iron reacts with an acid.

22. A compound 'A' on heating at 370K gives 'B' used as plaster for supporting fractured bones in the right position. 'B' on mixing with water changes to 'A'. Identify 'A' and 'B' and write the chemical reaction.

Ans: The reaction can be given by:



Plaster of Paris

Gypsum

'B'

'A'

23. A student heated a few crystals of copper sulphate in a dry boiling tube.

(a) What will be the color of the copper sulphate after heating?

Ans: Copper Sulphate becomes white in colour after heating.

(b) Will you notice water droplets in the boiling tube?

Ans: Yes, water droplets will be present in the boiling tube.

(c) Where have these come from?

Ans: Even though copper sulphate crystals seem to be dry, they contain water of crystallization. The water droplets are formed because of this water crystallization.

Long Answer Questions

5 Marks

1.

(a) The pH of rainwater collected from two cities A and B was found to be 6 and 5 respectively. Water of which city is more acidic? Find out the ratio of hydrogen ion concentration in the two samples of rain water?

Ans: Lower pH value is an indication of greater acidic nature. Hence, the rain water of city B is more acidic.

We know that,

$$\begin{aligned}\text{pH} &= -\log[\text{H}^+] \\ &= \log\left[\frac{1}{\text{H}^+}\right]\end{aligned}$$

For city A,

$$\log\left[\frac{1}{\text{H}^+}\right] = 6$$

$$\begin{aligned}\left[\frac{1}{\text{H}^+}\right] &= \text{anti log } 6 \\ &= 10^6\end{aligned}$$

$$[\text{H}^+] = 10^{-6}$$

For city B,

$$\log\left[\frac{1}{\text{H}^+}\right] = 5$$

$$\left[\frac{1}{\text{H}^+}\right] = \text{anti log } 5 = 10^5$$

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

Hence, the ratio is,

$$\frac{\text{city A}}{\text{city B}} = \frac{10^{-6}}{10^{-5}}$$

$$= \frac{1}{10}$$

(b) Arrange the following in order (ascending) of their pH values.

NaOH solution, Blood, lemon Juice.

Ans: The increasing order of pH values for the given solution are:

Lemon juice < Blood < NaOH solution.

2.

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

Ans: Water is a polarizing compound. In aqueous solution form, acid dissociates to give ions. Electricity is conducted by the free movement of these ions.

(b) How does the concentration of hydrogen ions $[\text{H}_3\text{O}]^+$ changes when the solution of an acid is diluted with water?

Ans: Dilution aids the process of dissociation of acid into ions. Thus, the concentration of $[\text{H}_3\text{O}]^+$ ions increase on dilution.

(c) Which has higher pH. A concentrated or dilute solution of HCl?

Ans: The number of ions per unit volume decreases with an increase in $[\text{H}_3\text{O}]^+$ ions. Therefore, pH will increase on dilution.

(d) What would you observe on adding dil HCl acid to

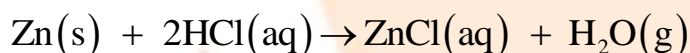
(i) Sodium bicarbonate placed in a test tube.

Ans: A brisk effervescence from the evolution of CO_2 is observed.



(ii) Zinc metal in a test tube.

Ans: A brisk effervescence from the evolution of H_2 is observed.



3. A road tanker carrying acid was involved in an accident and its contents spilled on the road. At the side of the road iron drain cover began melting and fizzing as the acid ran over them. A specialist was called to see if the acid actually leaked into the nearby river.

(a) Explain why specialist could carry out sample tests to see if the river water contains some acid or not.

Ans: The expert can use a simple litmus paper test to determine if the river water contains acid or not. If the expert dips a strip of blue litmus paper into the sample of river water and the colour changes to red, it implies that the river water has been affected by the acid spill.

(b) Suggest a better report name for the word ‘melting’

Ans: The chemical reaction of drain cover (made of iron) with the acid can be called corrosion.

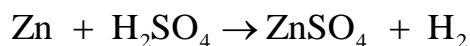
(c) Explain why the drain covers began fizzing as the acid ran over them.

Ans: Hydrogen gas is evolved when iron reacts with an acid (like, sulphuric acid or hydrochloric acid). The release of hydrogen is accompanied with an effervescence and hence, the fizzing on the covers was observed.

4. Write word equations and then balanced equations for the reaction taking place when:

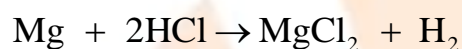
(a) Dilute Sulphuric acid reacts with zinc granules.

Ans: Zinc + Sulphuric acid \rightarrow Zinc sulphate + Hydrogen



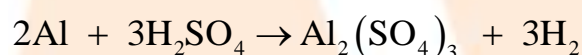
(b) Dilute hydrochloric acid reacts with magnesium ribbon.

Ans: Magnesium + Sulphuric acid \rightarrow Magnesium chloride + Hydrogen gas



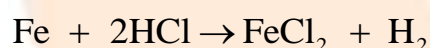
(c) Dilute Sulphuric acid reacts with aluminum powder

Ans: Aluminum + Sulphuric acid \rightarrow Aluminum sulphate + Hydrogen gas



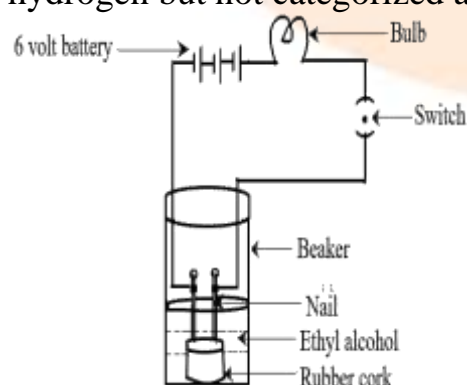
(d) Dilute hydrochloric acid reacts with iron filings.

Ans: Iron + Hydrochloric acid \rightarrow Iron chloride + Hydrogen



5. Compounds such as alcohols and glucose also contain hydrogen but are not categorized as acids. Describe an activity

Ans: The following activity can prove that alcohol and glucose both contain hydrogen but not categorized as acids.



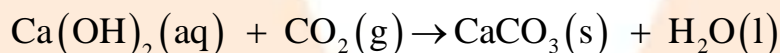
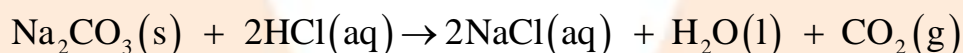
Apparatus required: - Beaker, nails, battery, connecting wires, bulb, switch and alcohols.

Procedure:

1. The experiment is set up as shown
2. Ethyl alcohol is taken in the beaker.
3. The bulb does not glow when the switch is in on position.
4. The alcohol is replaced with a glucose solution. The bulb still does not glow.

6. A compound X is bitter in taste. It is a component of washing powder & reacts with dil. HCl to produce brisk effervescence due to colourless, odourless gas Y which turns lime water milky due to formation of Z. When excess of is passed, milkiness disappears due to formation of P. Identify X, Y, And Z & P.

Ans: The chemical reactions are as follows:

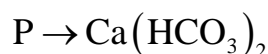
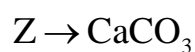
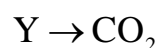


Here,

$\text{Ca}(\text{OH})_2$ is lime water

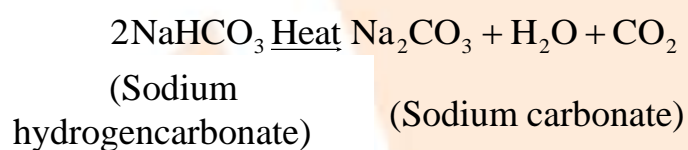
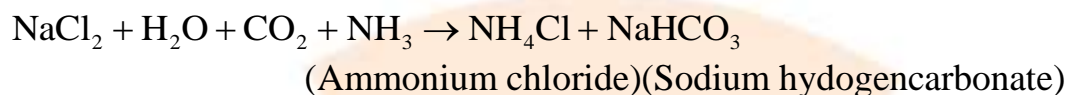
CaCO_3 is the white precipitate

And,



7. When gas passes through a saturated solution of ammoniacal brine, two compounds 'X' and 'Y' are formed. 'Y' is used as an antacid and decomposes to form another solid 'Z'. Identify 'X', 'Y', 'Z' and write chemical equations.

Ans: The chemical reactions are as follows:



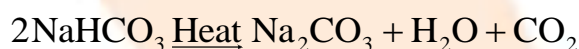
Here,



8. A substance 'X' used in the kitchen for making tasty crispy pakoras and is also an Ingredient of antacid. Name the substance 'X'.

(i) How does 'X' help to make cakes and bread soft and spongy?

Ans: The chemical reaction is as follows:



(Sodium hydrogencarbonate) (Sodium carbonate)

The CO_2 gas escapes as bubbles, leaving behind pores. These pores make the cake/bread soft and spongy

(ii) Is the pH value of solution of 'X' is lesser than or greater than 7.0?

Ans: Being a salt of a strong base, the pH of the solution will be more than 7.0