

## VERY SHORT ANSWER QUESTIONS

[1 Mark]

**Q. 1. Name the acid present in vinegar.**

**Ans.** Ethanoic acid

**Q.2. Two solutions A and B have pH values of 5 and 8 respectively. Which solution will be basic in nature?**

**Ans.** Solution B

**Q. 3. If a few drops of a concentrated acid accidentally spills over the hand of a student, what should be done?**

**Ans.** The hand is washed immediately with plenty of water and a paste of sodium hydrogencarbonate (a base) is applied to neutralise the acid.

**Q. 4. If someone is suffering from the problem of acidity after overeating; which of the following would you suggest as a remedy?**

**Lemon juice, Baking soda solution or Vinegar.**

**Ans.** Baking soda solution because it is a base and hence neutralises the excess acid present in the stomach

**Q. 5. Arrange the following in the increasing order of acidic strength. Acetic acid, water and hydrochloric acid**

**Ans.** Water < acetic acid < hydrochloric acid.

**Q.6. Why does tooth decay start when the pH of mouth is lower than 5.5?**

**Ans.** Tooth starts decaying when the pH of our mouth is lower than 5.5. This is because below this pH value, the medium of the mouth becomes more acidic due to which tooth enamel corrodes at a faster rate.

**Q. 7. Two solutions X and Y 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?**

**Ans.** X will turn blue litmus to red because it is acidic in nature having pH value less than 7. Y will turn phenolphthalein from colourless to pink because it is basic in nature having pH value greater than 7.

**Q. 8. A knife, which is used to cut a fruit, was immediately dipped into water containing drops of blue litmus solution. The colour of the solution changes to red, what is the nature of the fruit?**

**Ans.** The Fruit is acidic as it turns blue litmus solution to red.

**Q. 9. Explain why an aqueous solution of ammonium chloride is acidic in nature.**

**Ans.** Ammonium chloride ( $\text{NH}_4\text{Cl}$ ) is the salt of a strong acid, hydrochloric acid ( $\text{HCl}$ ), and a weak base ammonium hydroxide ( $\text{NH}_4\text{OH}$ ), so an aqueous solution of ammonium chloride is acidic in nature.

**Q. 10. What are the products formed when an acid reacts with a base?**

**Ans.** Acid reacts with a base to form salt and water.

**Q. 11. Fresh milk has a pH of 6. When it changes into curd (yogurt), will its pH value increase or decrease? Why?**

**Ans.** When milk changes into curd (yogurt), its pH value decreases. This is because during curd formation, lactic acid is produced which makes it acidic.

**Q. 12. A white chemical compound becomes hard on mixing proper quantity of water. It is also used in surgery to maintain joints in a fixed position. Name the chemical compound.**

**Ans.** Plaster of Paris (Calcium sulphate hemihydrate).

**Q.13. Which one of these has a higher concentration of  $\text{H}^+$  ions?**

**1M HCl or 1M  $\text{CH}_3\text{COOH}$**

**Ans.** 1M HCl has a higher concentration of  $\text{H}^+$  ions because it is a strong acid than  $\text{CH}_3\text{COOH}$ .

**Q. 14. In addition to sodium hydrogencarbonate, baking powder contains a substance 'X'. Name the substance 'X'.**

**Ans.** Tartaric acid.

**Q. 15. What is the commercial name of calcium sulphate hemihydrate?**

**Ans.** Plaster of Paris.

**Q. 16.** Name the substance obtained by the action of chlorine on dry slaked lime.

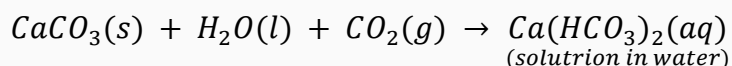
**Ans.** Bleaching powder.

**Q. 17.** How many molecules of water of crystallisation are there in  
(i) Plaster of Paris (ii) washing soda crystals?

**Ans.** (i)  $\frac{1}{2}$  (ii) 10.

**Q. 18.** Why does the milkiness disappear on passing excess of carbon dioxide to lime water?

**Ans.** When carbon dioxide is passed in excess, calcium carbonate (which appears milky) gets converted into calcium hydrogencarbonate which is soluble. Hence, the milkiness disappears.



**Q. 19.** An aqueous solution turns red litmus solution blue. Excess addition of which solution would reverse the change-ammonium hydroxide solution or hydrochloric acid?

**Ans.** hydrochloric acid because adding excess acid to the base would turn blue litmus solution red.

**Q. 20.** Why is the electrolysis of a concentrated solution of sodium chloride known as chlor-alkali process?

**Ans.** It is because of the products formed: chlor for chlorine and alkali for sodium hydroxide.

## Short Answer Type Questions – I

[2 marks]

**Que 1. What is an olfactory indicator? Name two such indicators.**

**Ans.** Those substances whose smell (or odour) changes in acidic or basic solution are called olfactory indicators onion and vanilla extract are olfactory indicators.

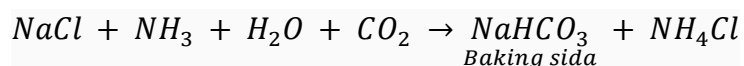
**Que 2. List in tabular form differences between an acid and a base based on their chemical properties.**

**Ans.**

Acids	Bases
1. H <sup>+</sup> ions are released in aqueous solution.	1. OH <sup>-</sup> ions are released in aqueous solution.
2. Reacts with metal carbonates to liberate CO <sub>2</sub> gas	2. No reaction takes place with metal carbonates.

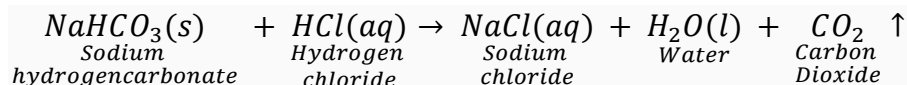
**Que 3. What happens when a cold and concentrated solution of sodium chloride reacts with ammonia and carbon dioxide? Write the equation of the reaction which takes place.**

**Ans.** When a cold and concentrated solution of sodium chloride reacts with ammonia and carbon dioxide, sodium hydrogencarbonate (baking soda) and ammonium chloride is formed.

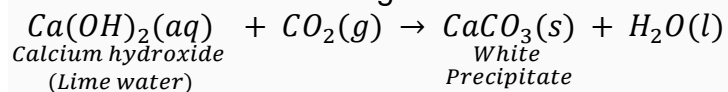


**Que 4. Name the gas evolved when dilute HCl reacts with sodium hydrogen carbonate. How is it recognised?**

**Ans.** CO<sub>2</sub> gas is evolved. The reaction is as follows:



When the produced gas is passed through lime water, lime water turns milky which confirms that the evolved gas is CO<sub>2</sub>.

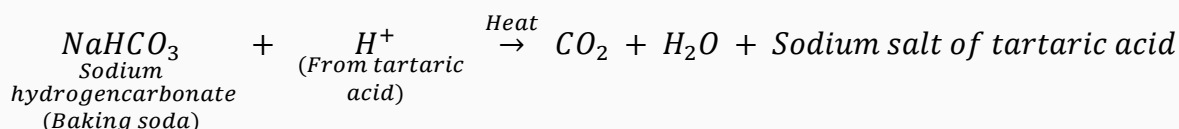


**Que 5. The pH of soil A is 7.5 while that of soil B is 4.5. Which of the two soils should be treated with powdered chalk to adjust its pH and why?**

**Ans.** Soil B having pH 4.5 should be treated with powdered chalk to adjust its pH. Soil B is too acidic. Its acidity can be reduced by adding powdered chalk ( $\text{CaCO}_3$ ), which is a base.

**Que 6. What is 'baking powder'? How does it make the cake soft and spongy?**

**Ans.** Baking powder is a mixture of baking soda ( $\text{NaHCO}_3$ ) and an edible acid like tartaric acid. Baking powder on heating produces carbon dioxide gas which causes bread or cake to rise making it soft and spongy.



**Que 7. The conditions preferred by some plants are shown in the table below:**

Plant	Apple	Potato	Black currant	Mint	Onion	Strawberry	Lettuce
pH	5.0-6.5	4.5-6.0	6.0-8.0	7.0-8.0	6.0-7.0	5.0-7.0	6.0-7.0

**(a) Which plants grow well over the largest range of pH values?**

**(b) Which plant can grow in the most acidic soil?**

**(c) Which plant can grow in the basic soil only?**

**(d) What is the pH range for onion to grow well?**

**Ans. (a)** Black currant and strawberry

**(b)** Potato (4.5-6.0)

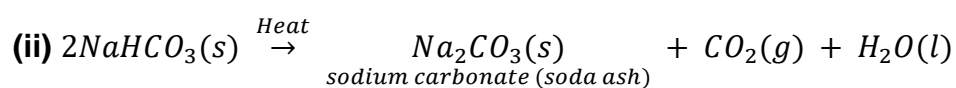
**(c)** Mint (7.0-8.0)

**(d)** 6.0-7.0

**Que 8. (i) Name the products formed when sodium hydrogencarbonate is heated.**

**(ii) Write the chemical equation for the reaction involved in it.**

**Ans. (i)** On heating sodium hydrogencarbonate ( $\text{NaHCO}_3$ ), it decomposes to form sodium carbonate ( $\text{Na}_2\text{CO}_3$ ), water ( $\text{H}_2\text{O}$ ) and carbon dioxide ( $\text{CO}_2$ ).



**Que 9. Name the acid present in an ant sting and give its chemical formula. Also give the common method to get relief from the discomfort caused by the ant sting.**

**Ans.** The acid present in an ant sting is methanoic acid (formic acid). The chemical formula is HCOOH. To get relief, one should apply any available basic salt, e.g., baking soda (NaHCO<sub>3</sub>) on it.

**Que 10. What happens when nitric acid is added to an eggshell?**

**Ans.** Eggshell contain calcium carbonate. When nitric acid is added to it, carbon dioxide gas is evolved. The reaction can be gives as

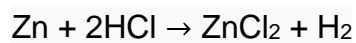


## Short Answer Type Questions – II

[3 marks]

**Q. 1. When zinc metal treated with a dilute solution of a strong acid, a gas is evolved, which is utilised in the hydrogenation of oil. Name the gas evolved. Write the chemical equation of the reaction and also write a test to detect the gas formed.**

**Ans.** When zinc reacts with dilute solution of strong acid, it forms salt and hydrogen gas is evolved.



When a burning splinter is brought near the mouth of the test tube, the gas burns with a pop sound.

**Q. 2. 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?**

**Ans.** hydrochloric acid is produced in our stomach. The excess acid in the stomach causes indigestion which produces pain and irritation. This effect can be cured by using antacids. Antacids (a group of mild bases) react with excess acid in the stomach and neutralise it.

**Q. 3. To the three solutions listed below, a few drops of phenolphthalein and blue litmus were added separately. Specify the colour change in each case, if any:**

Name of the solution	Colour change with phenolphthalein	Colour change with blue litmus
(a) Sodium carbonate (b) Hydrochloric acid (c) Sodium chloride		

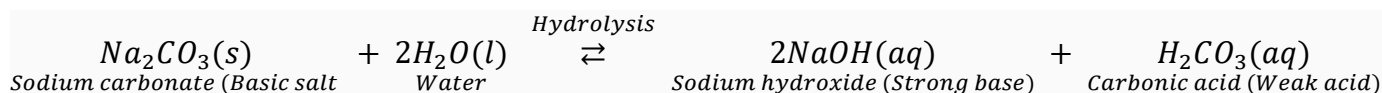
**Ans.**

Name of the solution	Colour change with phenolphthalein	Colour change with blue litmus
(a) Sodium carbonate (b) Hydrochloric acid (c) Sodium chloride	Turns pink No change No change	No change Turns red No change

**Q.4. A salt X when dissolves in distilled water gives a clear solution which turns red litmus blue. Explain this phenomenon.**

**Ans.** Basic solution turn red litmus paper blue. The salt of a weak acid and a strong base gives a basic solution. So, the gives salt X is the salt of a weak acid and a strong base.

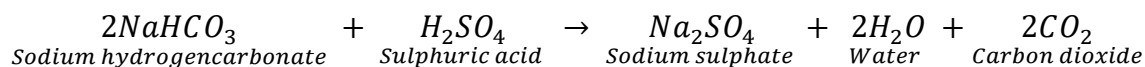
**Example:** When sodium carbonate is dissolved in water, it gets hydrolysed to some extent and forms sodium hydroxide and carbonic acid.



Being a strong base, sodium hydroxide is fully ionised and gives a large amount of hydroxide ions (OH<sup>-</sup>). Carbonic acid is a weak acid which is only slightly ionised and hence, gives a small amount of hydrogen ions (H<sup>+</sup>). The H<sup>+</sup> ions produced by carbonic acid neutralises only a small amount of OH<sup>-</sup> ions produced by sodium hydroxide and the rest amount of OH<sup>-</sup> ions are present in the solution. Hence, the Na<sub>2</sub>CO<sub>3</sub> solution is basic in nature. It turns red litmus blue.

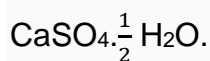
**Q.5. With the help of a chemical equation, explain how a soda-acid fire extinguisher helps in putting out a fire.**

**Ans.** Soda-acid fire extinguisher contains sodium bicarbonate and sulphuric acid, which are in separate containers in them. When knob of the fire extinguisher is pressed, then sulphuric acid mixes with sodium bicarbonate solution and produces a lot of CO<sub>2</sub> gas, which forms a blanket over the fire and cuts it off from the supply of the air to the burning substance and the fire stops.



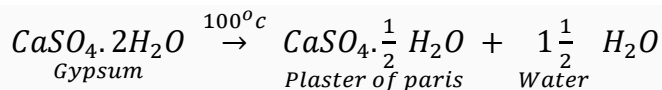
**Q. 6. A compound which is prepared from gypsum has the property of hardening when mixed with a proper quantity of water. Identify the compound. Write the chemical equation for its preparation. For what purpose is it used in hospitals?**

**Ans.** The compound prepared from gypsum on heating it at 100°C, is known as Plaster of Paris. Its chemical formula is



Hence, its chemical name is calcium sulphate hemihydrate. The chemical equation for its preparation is as follows:



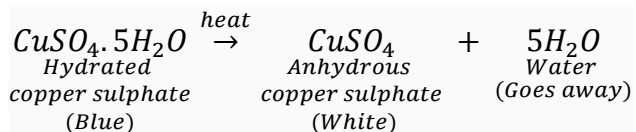


Plaster of Paris is used in hospitals mainly as plaster for supporting fractured bones in the right position. In dentistry, it is used for making casts.

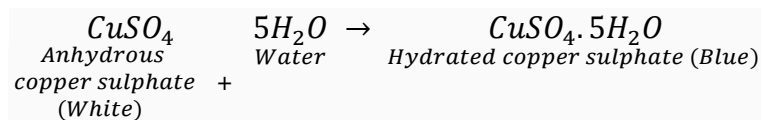
**Q. 7. What is meant by water of crystallisation? Explain that the crystallisation salts contain water of crystallisation.**

**Ans.** Water of crystallisation is a fixed number of water molecular present in one formulas unit of a salt. One formula unit of copper sulphate contains five water molecules (5H<sub>2</sub>O). The water molecules which form part of the structure of a crystal are called water of crystallisation. When hydrated salts are heated strongly, they lose their water of crystallisation.

On strong heating, blue copper sulphate turn white (due to the loss of water of crystallisation).



Anhydrous copper sulphate turns blue on adding water.

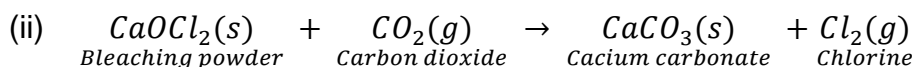


**Q. 8. (i) Write the formula and chemical name of bleaching powder.**

**(ii) Write chemical equation to represent the action of atmospheric CO<sub>2</sub> gas on bleaching powder when left exposed in open.**

**(iii) State for what purpose is bleaching powder used in water treatment plants.**

**Ans.** (i) Chemical formula: CaOCl<sub>2</sub>  
Chemical name: Calcium oxychloride

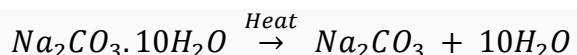
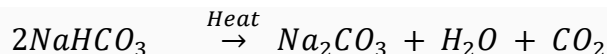


(iii) Bleaching powder is used in water treatment plants for disinfecting drinking water to make it free of germs.

**Q. 9. How would you distinguish between baking powder and washing soda by heating?**

**Ans.** The chemical formula of baking powder is sodium hydrogencarbonate ( $\text{NaHCO}_3$ ); whereas, that of washing soda is sodium carbonate ( $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ ).

Sodium hydrogencarbonate on heating gives  $\text{CO}_2$  gas which will turn lime water milky whereas no such gas is obtained from sodium carbonate.



**Q. 10. Salt A commonly used in bakery products on heating gets converted into another salt B which itself is used for removal of hardness of water and a gas C is evolved. The gas C when passed through lime water, turns it milky. Identify A, B and C.**

**Ans.** Baking powder ( $\text{NaHCO}_3$ ), salt A is commonly used in bakery products. On heating, it forms sodium carbonate ( $\text{Na}_2\text{CO}_3$ ), B and  $\text{CO}_2$  gas, C is evolved. When  $\text{CO}_2$  gas is passed through lime water it forms calcium carbonate ( $\text{CaCO}_3$ ), which is slightly soluble in water making it milky.

A –  $\text{NaHCO}_3$ ;                      B –  $\text{Na}_2\text{CO}_3$ ;                      C –  $\text{CO}_2$  gas

**Q. 11. What are strong and weak acids? In the following list of acids, separate strong acids weak acids: Hydrochloric acid, citric acid, acetic acid, nitric acid, formic acid, sulphuric acid.**

**Ans.** In aqueous solutions, strong acids ionise completely and provide hydronium ions. On the other hand, weak acids are partially ionised and an aqueous solution of same molar concentration provides a much smaller concentration of  $\text{H}_3\text{O}^+$  ions.

Strong acids—Hydrochloric acid, sulphuric acid, nitric acid.

Weak acids—Citric acid, acetic acid, formic acid.

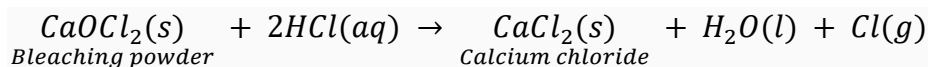
**Q. 12. What happens when dilute hydrochloric acid is added to the following and write balanced chemical equations**

**(i) Bleaching powder**

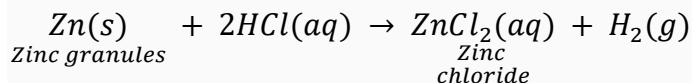
**(ii) Zinc granules**

**(iii) Baking soda**

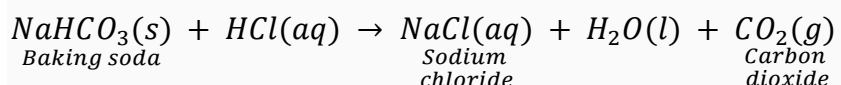
**Ans.** (i) Calcium chloride and chlorine gas are formed.



(ii) Hydrogen gas is evolved.



(iii) Sodium chloride and carbon dioxide gas are formed.



**Q. 13. Give suitable reason for the following statements:**

**(i) We feel burning sensation in the stomach when we overeat.**

**(ii) The crystals of washing soda change to white powder on exposure to air.**

**(ii) An aqueous solution of sodium chloride is neutral but an aqueous solution of sodium carbonate is basic.**

**Ans.** (i) when we overeat excess of acid is produced in the stomach which causes burning sensation.

(ii) Washing soda is sodium carbonate decahydrate which when exposed to air loses 10 molecules of water and changes to white powder.

(iii) Sodium chloride is a salt of strong acid HCl and strong base NaOH, so it is neutral. Sodium carbonate is a salt of weak acid H<sub>2</sub>CO<sub>3</sub>, and strong base NaOH, so it is basic.

## Long Answer Type Questions

[5 Marks]

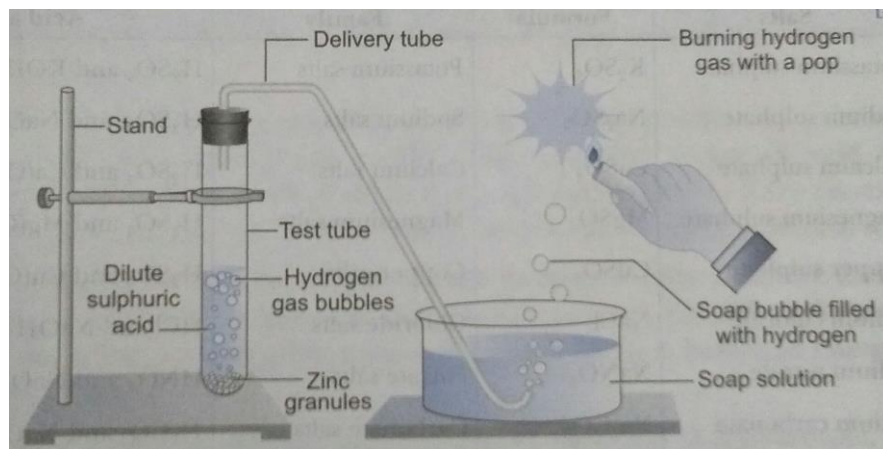
Que 1. (i) In the following schematic diagram for the preparation of hydrogen gas as shown as figure, what would happen if following changes are made?

(a) In place of zinc granules, same amount of zinc dust is taken in the test tube.

(b) Instead of dilute sulphuric acid, dilute hydrochloric acid is taken.

(c) Sodium hydroxide is taken in place of dilute sulphuric acid and the tube is heated.

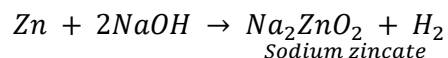
(ii) How do metal carbonates and metal hydrogencarbonates react with acids?



Ans. (i) (a) Hydrogen gas will evolve with greater speed.

(b) Almost same amount of gas is evolved.

(c) If sodium hydroxide is taken, hydrogen gas will be evolved.

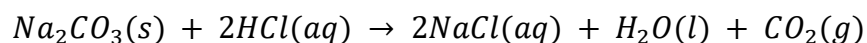


(ii) All metal carbonates and hydrogencarbonates react with acids to form a corresponding salt, carbon dioxide and water.

Metal carbonate + Acid  $\rightarrow$  Salt + Carbon dioxide + Water

Metal hydrogencarbonate + Acid  $\rightarrow$  Salt + Carbon dioxide + Water

For example, sodium carbonate reacts with dilute hydrochloric acid as follows:



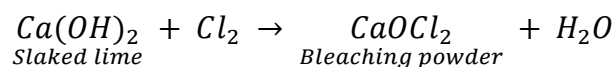
Sodium hydrogencarbonate reacts with dilute hydrochloric acid as follows:



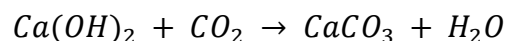
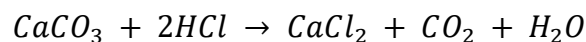
**Que 2. A metal carbonates X on reacting with an acid gives a gas which when passed through a solution Y gives the carbonate back. On the other hand, a gas G that is obtained at anode during electrolysis of brine is passed on dry Y, it gives a compound Z, used for disinfecting drinking water. Identify X, Y G and Z.**

**Ans.** The gas evolved at anode during electrolysis of brine is chlorine (G).

When chlorine gas is passed through dry  $\text{Ca}(\text{OH})_2$  (Y) produced bleaching powder (Z) used for disinfecting drinking water.



Since Y and Z are calcium salts, therefore X is also a calcium salt and is calcium carbonate.



**Que 3. Write the formulae of the salts given below.**

**Potassium sulphate, sodium sulphate calcium sulphate, magnesium sulphate, copper sulphate, sodium chloride sodium nitrate, sodium carbonate and ammonium chloride.**

**Identify the acids and bases from which the above salts may be obtained. How many families can you identify among these salts?**

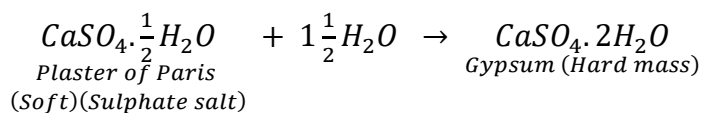
**Ans.** The formulae of the given salts and the acids and bases from which these salts may be obtained are given in the following table.

S.No.	Salts	Formula	Family	Acids and Base
1.	Potassium sulphate	K <sub>2</sub> SO <sub>4</sub>	Potassium salts	H <sub>2</sub> SO <sub>4</sub> and K OH
2.	Sodium sulphate	NaSO <sub>4</sub>	Sodium salts	H <sub>2</sub> SO <sub>4</sub> and Na OH
3.	Calcium sulphate	CaSO <sub>4</sub>	Calcium salts	H <sub>2</sub> SO <sub>4</sub> and Ca
4.	Magnesium sulphate	MgSO <sub>4</sub>	Magnesium salts	(OH) <sub>2</sub>
5.	Copper sulphate	CuSO <sub>4</sub>	Copper salts	H <sub>2</sub> SO <sub>4</sub> and Mg
6.	Sodium chloride	NaCl	Chloride salts	(OH) <sub>2</sub>
7.	Sodium nitrate	NaNO <sub>3</sub>	Nitrate salts	H <sub>2</sub> SO <sub>4</sub> and Cu
8.	Ammonium chloride	NH <sub>4</sub> Cl	Carbonate salts	(OH) <sub>2</sub>
9.	Sodium carbonate		Chloride salts	HCl and NaOH
				HNO <sub>3</sub> and NaOH
				H <sub>2</sub> CO <sub>3</sub> and NaOH
				HCl and NH <sub>4</sub> OH

**Que 4. A sulphate salt of group 2 element of the periodic Table is a white, soft substance, which can be moulded into different shapes by making its dough. When this compound is left in open for some time, it becomes a solid mass and cannot be used for moulding purposes. Identify the sulphate salt and state why does it shows such a behaviour. Give the reaction involved.**

**Ans** The substance which is used for making different shapes is plaster of Paris. Its chemical name is calcium sulphate hemihydrate (CaSO<sub>4</sub>. 1/2H<sub>2</sub>O). The two formula unit of Ca SO<sub>4</sub> share one molecule of water. As a result, it is soft.

When it is left open for some time, it absorbs moisture from the atmosphere and forms gypsum, which is a hard solid mass.



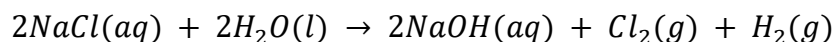
## HOTS (Higher Order Thinking Skills)

**Q. 1. Why is acetic acid called a weak acid though there are four hydrogen atoms in the molecule?**

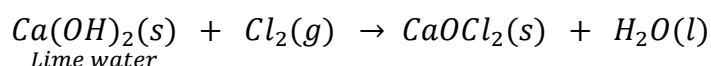
**Ans.** Though acetic acid has four hydrogen atoms, only one of the four hydrogen atoms is released as  $H^+$  ion in solution. So, it is a weak acid.

**Q.2. In one of the industrial processes used for manufacture of sodium hydroxide, a gas X is formed as by-product. The gas X reacts with lime water to give a compound Y which is used as a bleaching agent in chemical industry. Identify X and Y giving the chemical equation of the reactions involved.**

**Ans.** In the manufacture of sodium hydroxide, hydrogen gas and chlorine gas (X) are formed as by-products. When chlorine gas (X) reacts with lime water, it forms calcium oxychloride (bleaching powder) Y. The reactions are



X –  $Cl_2$  (Chlorine gas)



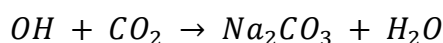
Y – Calcium oxychloride (bleaching powder)

**3. A baker found that the cake prepared by him is hard and small in size. Which ingredient had he forgotten to add that would have caused the cake to rise and become light? Give reason.**

**Ans.** The baker had forgotten to add baking powder. Baking powder is a mixture of baking soda (sodium hydrogencarbonate) and a mild edible acid such as tartaric acid. When this baking powder is added with water, then sodium hydrogencarbonate ( $NaHCO_3$ ) reacts with tartaric acid to evolve carbon dioxide gas. This  $CO_2$  gas causes the cake to rise and become soft and spongy.

**Q4. A dry pellet of a common base B, when kept in open absorbs moisture and turns sticky. The compound is also a by-product of chlor-alkali process. Identify B. What type of reaction occurs when B is treated with an acidic oxide? Write a balanced chemical equation for one such solution.**

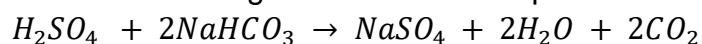
**Ans.** Sodium hydroxide ( $NaOH$ ) is a commonly used base and is hygroscopic, that is, it absorbs moisture from the atmosphere and becomes sticky. The acidic oxides react with base to give salt and water. The reaction between  $NaOH$  and  $CO_2$  can be given as



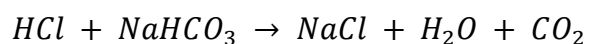
**Q5. A compound 'A' is used in fire extinguishers, as an antacid and its small amount is also used in making bakery items. Identify the compound and also explain the reason for above mentioned uses of the compound 'A'.**

**Ans.** Compound 'A' is sodium hydrogencarbonate- $\text{NaHCO}_3$ .

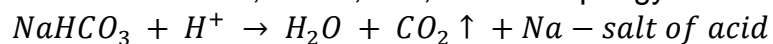
**(i)** It is used in fire extinguishers because it produces  $\text{CO}_2$  gas on reaction with acid.



**(ii)** It is used as an antacid because it neutralises excess acid (HCl) present in stomach.



**(iii)** It is used in making bakery items because on reaction with acid it produces  $\text{CO}_2$  gas which makes bread, cakes, etc., soft and spongy.





## Value Based Questions

**Q. 1. Nishant is a lazy boy. He doesn't like to brush his teeth instead he rinses his mouth with water. His mother makes sure that he brushes his teeth twice a day.**

**Answer the following questions based on the above situation:**

**(i) Why does Nishant's mother insist on brushing teeth twice a day?**

**(i) How is a toothpaste better than just water, for cleaning teeth?**

**(ii) What values are promoted by Nishant's mother?**

**Ans.** (i) We should brush our teeth twice a day as bacteria present in the mouth, produce acids by degradation of sugar and food particles remaining in the mouth after eating.

(ii) The best way to prevent this is to clean the mouth using toothpastes which are generally basic.

These can neutralise the excess acid and prevent tooth decay.

(iii) Awareness, caring, health consciousness.

**Q. 2. Farmers are using a large number of pesticides and fertilisers in their fields to increase crop production and to enhance their profits. But by doing so, they are causing damage to the soil as well as to the environment.**

**Answer the following questions based on the above situation:**

**(i) Do you agree with this statement?**

**(ii) Why should we avoid eating fruits and vegetables without washing them properly?**

**(iii) What values are neglected by the farmers?**

**Ans.** (i) Plants require a specific pH range for their healthy growth. By using a large number of pesticides and fertilisers, pH of the soil changes, which makes it more acidic or basic. So in the long run, the soil becomes infertile. This leads to soil erosion, damaging the environment also. So, use of these pesticides and fertilisers should be restricted.

(ii) The chemical pesticides sprayed by the farmers in their fields, stick to the fruits and vegetables. So, they should be removed by washing properly, before eating.

(iii) Care towards society, unselfishness.

**Q. 3. A student accidentally spilled concentrated  $\text{H}_2\text{SO}_4$  on his hand. Before the teacher got to know, his friend washed his hands with water and also with soap but the burning sensation on hand still continued. His friend then rubbed solid sodium bicarbonate on his hand and then washed with water, finally the burning sensation is relieved.**

**Answer the following questions based on the above situation**

**(i) Mention the values shown by student's friend.**

**(ii) Can you recommend any other substance available in the laboratory which can be used instead of sodium bicarbonate?**

**(iii) Write the chemical reaction involved in the treatment of acid burn with sodium bicarbonate.**

**Ans. (i)** Presence of mind, critical thinking and dignity of individual.

**(ii)** Pouring dilute sodium hydroxide on the burning hand and keeping in water for 10 minutes can also be done.

**(iii)**  $2\text{NaHCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O} + 2\text{CO}_2$