

# OPEN STUDENT FOUNDATION

CHAPTER:2

## STD 10 : SCIENCE IMPORTANT QUESTION DAY 2

Date : 22/02/24

### Section A

- Write the answer of the following questions. [Each carries 1 Mark] [20]
1. Tooth enamel possess chemical substance named .....
  2. Magnesium hydroxide is a weak .....
  3. Toothpastes generally contains .....
  4. Buttermilk is ..... in nature.
  5. The sting of Nettle leaves releases ....., which causes painful stings.
  6. The chemical formula of sodium zincate is  $\text{Na}_2\text{ZnO}_{2(s)}$ .
  7. Bleaching powder is used as reducing agent reactant in chemical industry.
  8. Tartaric acid is present in tomato - natural source.
  9. Baking powder is used to cook food in less time.
  10. Phenolphthalein is a natural indicator.
  11. Following is useful to separate Iron (II) chloride and Iron (III) chloride.  
(A) Distilled water (B) NaOH (C) diluted HCl (D) Hot water
  12. Which of the following doesn't make acidic salt ?  
(A) Nitric acid (B) Carbonic acid (C) Hydrochloric acid (D) Sulphuric acid
  13. Which of the following is the chemical formula of bleaching powder ?  
(A)  $\text{Ca}(\text{OH})_2$  (B)  $\text{CaOCl}_2$  (C)  $\text{Ca}_2\text{OCl}$  (D)  $\text{CaCO}_3 \cdot 2\text{H}_2\text{O}$
  14. Which of the following is known as milk of magnesia ?  
(A)  $\text{Mn}(\text{OH})_2$  (B)  $\text{Mg}(\text{OH})_2$  (C) MgO (D) Mg(OH)
  15. Which of the following is not the form of calcium carbonate ?  
(A) Lime stone (B) Chalk (C) Marble (D) Slaked lime
  16. Ethyl alcohol ( $\text{C}_2\text{H}_5\text{OH}$ ) possesses both groups H and OH. However it is neither acidic nor basic. Why ?
  17. What will be the effect of Litmus on the following ?  
(i) Dry Ammonia gas  
(ii) Solution of Ammonia gas in water.
  18. Write the chemical formula of Caustic Potash.
  19. State the pH of human saliva.
  20. What happens when blue copper sulphate crystal is heated ?

### Section B

- Write the answer of the following questions. [Each carries 2 Marks] [20]
21. Give preparation and uses of plaster of paris.
  22. Give two important uses of washing soda and baking soda.
  23. What is a Neutralisation reaction ? Give two examples.
  24. 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 ?
25. In four different test tubes having (a) Phenolphthalein (b) Universal indicator (c) Distilled water (d) Sodium hydrogen carbonate When you add some drops of acetic acid into it what do you observe ?
26. Give chemical name of washing soda. Name main 3 raw materials useful for making washing soda by solve method.
27. Give common properties and characteristics of Acid and base and indicators for its test.
28. What is Antacid ? Explain.
29. How is the concentration of hydroxide ions ( $\text{OH}^-$ ) affected when excess base is dissolved in a solution of sodium hydroxide ?
30. 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 compound formed is calcium chloride.

**Section C**



- Write the answer of the following questions. [Each carries 3 Marks] [9]
31. Name the chemical compound commonly used by your mother in the kitchen for making tasty crispy pakoras or cake. State its chemical formula and write its chemical equation of its production.
32. Reaction of zinc granules with dilute sulphuric acid and how test of hydrogen gas by burning can be done ? Describe this matter experimentally.
33. The solution of acid made in water conducts electricity. Explain (good conductor) this point with proper activity / experiment.

**Section D**

- Write the answer of the following questions. [Each carries 4 Marks] [12]
34. How does carbon dioxide gas arise from the solution of sodium carbonate and sodium hydrogen carbonate ? Explain with example.
35. Explain : How is water of crystallisation removed from any crystal or copper sulphate ?
36. On the basis of changes in the concentration of  $\text{H}^+$  ion of acid and  $\text{OH}^-$  ions in base, how changes occur in its pH explain.

**OPEN STUDENT FOUNDATION****CHAPTER:2****STD 10 : SCIENCE****Date : 22/02/24****IMPORTANT QUESTION DAY 2****Section [ A ] : 1 Marks Questions**

No	Ans	Chap	Sec	Que	Universal_Queld
1.	-	Chap 2	S4	2	QP23P11B1012_P1C2S4Q2
2.	-	Chap 2	S4	26	QP23P11B1012_P1C2S4Q26
3.	-	Chap 2	S4	27	QP23P11B1012_P1C2S4Q27
4.	-	Chap 2	S4	23	QP23P11B1012_P1C2S4Q23
5.	-	Chap 2	S4	17	QP23P11B1012_P1C2S4Q17
6.	-	Chap 2	S5	20	QP23P11B1012_P1C2S5Q20
7.	-	Chap 2	S5	18	QP23P11B1012_P1C2S5Q18
8.	-	Chap 2	S5	15	QP23P11B1012_P1C2S5Q15
9.	-	Chap 2	S5	23	QP23P11B1012_P1C2S5Q23
10.	-	Chap 2	S5	24	QP23P11B1012_P1C2S5Q24
11.	B	Chap 2	S6	39	QP23P11B1012_P1C2S6Q39
12.	B	Chap 2	S6	35	QP23P11B1012_P1C2S6Q35
13.	B	Chap 2	S6	26	QP23P11B1012_P1C2S6Q26
14.	B	Chap 2	S6	20	QP23P11B1012_P1C2S6Q20
15.	D	Chap 2	S6	11	QP23P11B1012_P1C2S6Q11
16.	-	Chap 2	S7	54	QP23P11B1012_P1C2S7Q54
17.	-	Chap 2	S7	63	QP23P11B1012_P1C2S7Q63
18.	-	Chap 2	S7	65	QP23P11B1012_P1C2S7Q65
19.	-	Chap 2	S7	70	QP23P11B1012_P1C2S7Q70
20.	-	Chap 2	S7	45	QP23P11B1012_P1C2S7Q45

**Section [ B ] : 2 Marks Questions**

No	Ans	Chap	Sec	Que	Universal_Queld
21.	-	Chap 2	S1	25	QP23P11B1012_P1C2S1Q25
22.	-	Chap 2	S3	15	QP23P11B1012_P1C2S3Q15
23.	-	Chap 2	S3	14	QP23P11B1012_P1C2S3Q14
24.	-	Chap 2	S3	12	QP23P11B1012_P1C2S3Q12
25.	-	Chap 2	S2	6	QP23P11B1012_P1C2S2Q6
26.	-	Chap 2	S2	4	QP23P11B1012_P1C2S2Q4
27.	-	Chap 2	S1	1	QP23P11B1012_P1C2S1Q1
28.	-	Chap 2	S1	15.3R	QP23P11B1012_P1C2S1Q15.3R
29.	-	Chap 2	S8	3.6	QP23P11B1012_P1C2S8Q3.6

30.	-	Chap 2	S8	2.3	QP23P11B1012_P1C2S8Q2.3
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Section [ C ] : 3 Marks Questions

No	Ans	Chap	Sec	Que	Universal_Queld
31.	-	Chap 2	S1	22R	QP23P11B1012_P1C2S1Q22R
32.	-	Chap 2	S1	4R	QP23P11B1012_P1C2S1Q4R
33.	-	Chap 2	S1	9R	QP23P11B1012_P1C2S1Q9R

Section [ D ] : 4 Marks Questions

No	Ans	Chap	Sec	Que	Universal_Queld
34.	-	Chap 2	S1	5R	QP23P11B1012_P1C2S1Q5R
35.	-	Chap 2	S1	24R	QP23P11B1012_P1C2S1Q24R
36.	-	Chap 2	S1	13R	QP23P11B1012_P1C2S1Q13R

# OPEN STUDENT FOUNDATION

CHAPTER:2

## STD 10 : SCIENCE IMPORTANT QUESTION DAY 2

Date : 22/02/24

### Section A

● Write the answer of the following questions. [Each carries 1 Mark] [20]

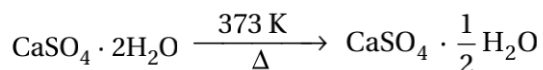
1. Tooth enamel possess chemical substance named .....  
➡  $\text{Ca}_3(\text{PO}_4)_2$  calcium phosphate
2. Magnesium hydroxide is a weak ..... .  
➡ base
3. Toothpastes generally contains ..... .  
➡ calcium phosphate
4. Buttermilk is ..... in nature.  
➡ acidic
5. The sting of Nettle leaves releases ....., which causes painful stings.  
➡ Methanoic acid ( $\text{HCOOH}$ )
6. The chemical formula of sodium zincate is  $\text{Na}_2\text{ZnO}_{2(s)}$ .  
➡ True
7. Bleaching powder is used as reducing agent reactant in chemical industry.  
➡ True
8. Tartaric acid is present in tomato - natural source.  
➡ False
9. Baking powder is used to cook food in less time.  
➡ False
10. Phenolphthalein is a natural indicator.  
➡ False
11. Following is useful to separate Iron (II) chloride and Iron (III) chloride.  
(A) Distilled water      (B) NaOH      (C) diluted HCl      (D) Hot water  
Ans. (B) NaOH
12. Which of the following doesn't make acidic salt ?  
(A) Nitric acid      (B) Carbonic acid      (C) Hydrochloric acid      (D) Sulphuric acid  
Ans. (B) Carbonic acid
13. Which of the following is the chemical formula of bleaching powder ?  
(A)  $\text{Ca}(\text{OH})_2$       (B)  $\text{CaOCl}_2$       (C)  $\text{Ca}_2\text{OCl}$       (D)  $\text{CaCO}_3 \cdot 2\text{H}_2\text{O}$   
Ans. (B)  $\text{CaOCl}_2$
14. Which of the following is known as milk of magnesia ?  
(A)  $\text{Mn}(\text{OH})_2$       (B)  $\text{Mg}(\text{OH})_2$       (C) MgO      (D) Mg(OH)  
Ans. (B)  $\text{Mg}(\text{OH})_2$
15. Which of the following is not the form of calcium carbonate ?  
(A) Lime stone      (B) Chalk      (C) Marble      (D) Slaked lime  
Ans. (D) Slaked lime

16. Ethyl alcohol (C<sub>2</sub>H<sub>5</sub>OH) possesses both groups H and OH. However it is neither acidic nor basic. Why ?
- ➡ Because Ethyl alcohol doesn't give either H<sup>+</sup> ion or OH<sup>-</sup> ions in a solution. Therefore it is neither acidic nor basic.
17. What will be the effect of Litmus on the following ?
- (i) Dry Ammonia gas
- (ii) Solution of Ammonia gas in water.
- ➡ (i) Dry Ammonia gas does not show any effect on litmus paper.
- (ii) Ammonia solution makes red litmus into blue.
18. Write the chemical formula of Caustic Potash.
- ➡ Caustic Potash – KOH – Potassium Hydroxide
19. State the pH of human saliva.
- ➡ pH of human saliva → 7.4
20. What happens when blue copper sulphate crystal is heated ?
- ➡ When blue crystals of CuSO<sub>4</sub>·5H<sub>2</sub>O are heated then it turns into dehydrated CuSO<sub>4</sub> white crystals.

**Section B**

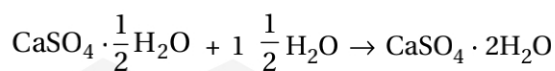
- Write the answer of the following questions. [Each carries 2 Marks] [20]

21. Give preparation and uses of plaster of paris.
- ➡ Gypsum possesses two molecules of water in the form of water of crystallisation.
- ➡ The chemical formula of Gypsum is CaSO<sub>4</sub> · 2H<sub>2</sub>O.
- ➡ **Preparation of plaster of Paris :** On heating gypsum at 373 K, it loses water molecules and becomes calcium sulphate hemihydrate  $\left( \text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O} \right)$ .
- ➡ This is called Plaster of Paris



Gypsum Plaster of Paris

- ➡ **The uses of Plaster of Paris are as follows :**
- (i) The substance which doctors use as plaster for supporting fractured bones in the right position.
- (ii) Plaster of Paris is a white powder and on mixing with water, it changes to gypsum once again giving a hard solid mass.



Plaster of Paris Gypsum

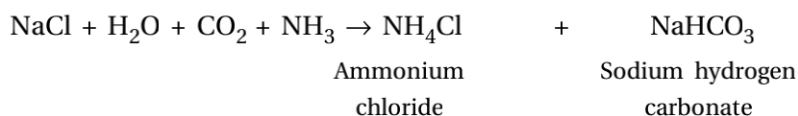
- (iii) Plaster of Paris is used for making toys, materials for decoration and for making surfaces smooth.
22. Give two important uses of washing soda and baking soda.

- ➡ **Uses of washing Soda :**
- (i) The use of sodium carbonate is done in glass, soap and paper industry.
- (ii) It is used in preparation of sodium components like Borax.
- (iii) Sodium carbonate is used in houses for cleaning purpose.

(iv) It is used to remove permanent hardness of water.

➡ **Uses of Baking Soda :**

- (i) The baking soda is used commonly in the kitchen for making tasty Crispy Pakodas etc. sometimes it is added for faster cooking.
- (ii) The chemical name of compound is sodium hydrogencarbonate ( $\text{NaHCO}_3$ ). It is produced one among raw materials of sodium chloride.

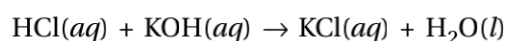
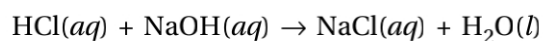
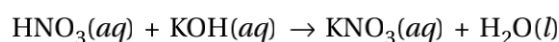


23. What is a Neutralisation reaction ? Give two examples.

➡ **Neutralisation Reaction :** Generally the reaction between acid and base gives salt and water. This is called Neutralisation reaction.



➡ **Examples of Neutralisation Reaction :**



24. 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 ?

➡ (a) Milkman turns pH of fresh milk from 6 to little basic side. Because by doing this the medium of milk becomes sour for longer period. Means such milk doesn't become stale very fast.

(b) Such milk takes longer time to get in curd, because as a result of ionisation there is a base in the form of baking soda, which does not becomes acidic in a easy form. So, milk take more time to become curd.

25. In four different test tubes having (a) Phenolphthalein (b) Universal indicator (c) Distilled water (d) Sodium hydrogen carbonate When you add some drops of acetic acid into it what do you observe ?

➡ (a) No change occurs (colourless)

(b) It gets converted into either orange or red colour.

(c) It gets mixed completely and solution will be colourless and clean.

(d) Effervescence with excretion of  $\text{CO}_2$  gas in large amount.

26. Give chemical name of washing soda. Name main 3 raw materials useful for making washing soda by solve method.

➡ The chemical name of washing soda : Sodium carbonate decahydrate  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

➡ Three raw materials useful for making washing soda by solve method : (i) Sodium chloride (ii) Ammonia (iii) Lime stone

27. Give common properties and characteristics of Acid and base and indicators for its test.

➡ Acids are sour in taste and change the colour of blue litmus to red, whereas bases are bitter in taste and turns red litmus into blue.

➡ Litmus is a natural indicator. Likewise turmeric is also considered as a natural indicator.



➡ For e.g., stain of a curry on a white cloth becomes reddish-brown when soap, which is basic in nature is scrubbed on it. It turns yellow again when the cloth is washed with plenty of water because base as a soap is removed from it.

➡ **Test :** Generally synthetic indicators like Methyl orange and phenolphthalein are used for test of acids and bases.

28. What is Antacid ? Explain.

➡ **pH in our Digestive System :**

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

➡ During indigestion the stomach produces too much acid and this causes pain and irritation.

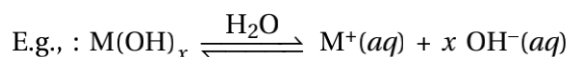
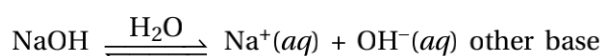
➡ To get rid of this pain, people use bases called antacids.

➡ These antacids neutralize the excess acid. e.g., Magnesium hydroxide (Milk of magnesia) and a mild base is often used for this purpose.

29. How is the concentration of hydroxide ions ( $\text{OH}^-$ ) affected when excess base is dissolved in a solution of sodium hydroxide ?

➡ When more amount of base is added in the solution of sodium hydroxide, then hydroxide ions ( $\text{OH}^-$ ) affect the concentrations in the following way :

➡ Sodium hydroxide ( $\text{NaOH}$ ) is a strong base when more amount of base is added in this solution then concentration of ( $\text{OH}^-$ ) ion decreases in per unit volume. Because during this  $\text{NaOH}$  and aqueous solution of other base is also displaced.



30. 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 compound formed is calcium chloride.

➡ Producing gas –  $\text{CO}_2$

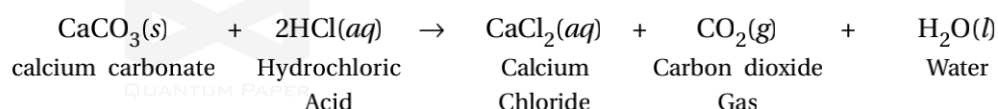
Metal compound –  $\text{CaCO}_3$  (calcium carbonate)

➡ Here the gas produced is  $\text{CO}_2$  which extinguishes burning candle.

➡ When metallic carbonate reacts with acid, one of the product obtained from it is calcium chloride.

➡ Therefore, compound A would be calcium carbonate ( $\text{CaCO}_3$ ).

➡ As a result balanced equation for reaction can be written as follows :



### Section C

● Write the answer of the following questions. [Each carries 3 Marks]

[9]

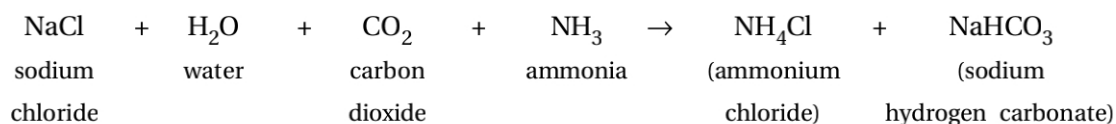
31. Name the chemical compound commonly used by your mother in the kitchen for making tasty crispy pakoras or cake. State its chemical formula and write its chemical equation of its production.

➡ The baking soda is commonly used in the kitchen for making tasty crispy pakoras etc.

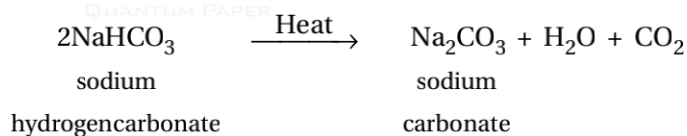


- ➡ The chemical name of the compound is sodium hydrogencarbonate ( $\text{NaHCO}_3$ ).

**Preparation :** It is produced using sodium chloride as one of the raw materials.



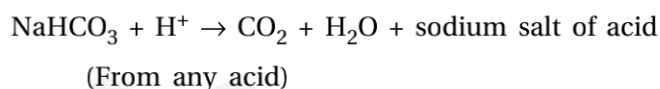
- ➡ Normally it is used for neutralizing acid. It is a mild non-corrosive basic salt.
- ➡ The following reaction takes place when it is heated during cooking.



- ➡ Sodium hydrogencarbonate has got various uses in the household.

➡ **Uses of sodium hydrogencarbonate ( $\text{NaHCO}_3$ ) :**

- For making baking powder, which is a mixture of baking soda (sodium hydrogen carbonate) and a mild edible acid such as tartaric acid. When baking powder is heated or mixed in water the following reaction takes place.



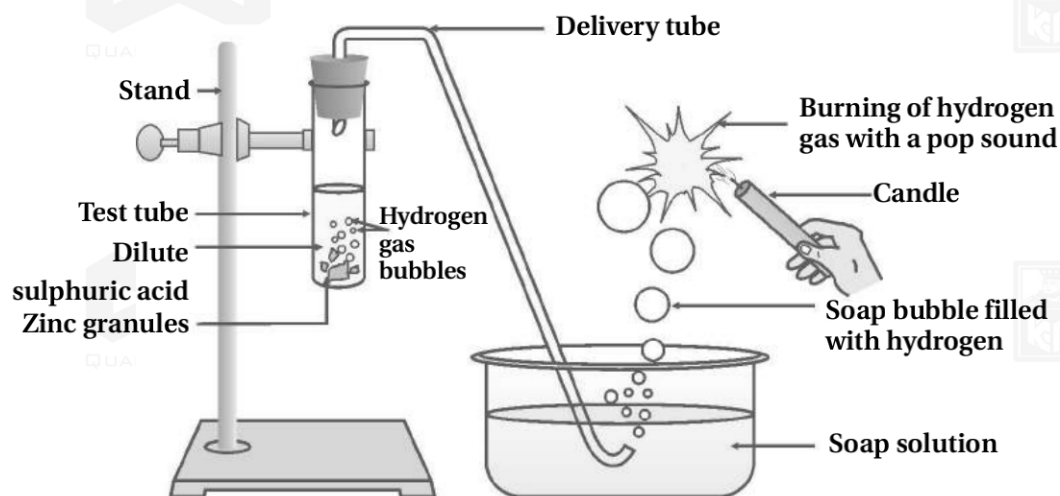
- ➡ Carbon dioxide produced during the reaction can cause bread or cake to rise making them soft and spongy.

- Sodium hydrogencarbonate is also an ingredient in antacids. Being alkaline, it neutralizes excess acids in the stomach and provides relief.

- It is also used in soda-acid fire extinguishers.

32. Reaction of zinc granules with dilute sulphuric acid and how test of hydrogen gas by burning can be done ? Describe this matter experimentally.

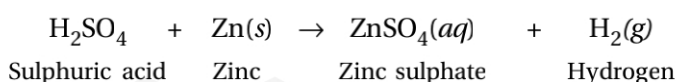
- ➡ Reaction of zinc granules with dilute sulphuric acid, test of Hydrogen gas produced by burning reaction can be explained by following activity / experiment :



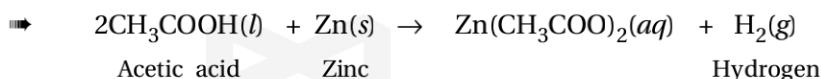
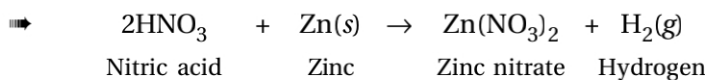
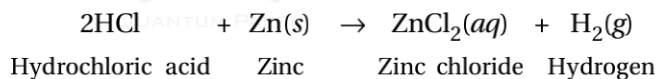
**Reaction of zinc granules with dilute sulphuric acid and testing hydrogen gas by burning**

- ➡ First of all set the apparatus as shown in figure.
- ➡ Take about 5 ml of dilute sulphuric acid in a test tube and add few pieces of zinc granules to it.

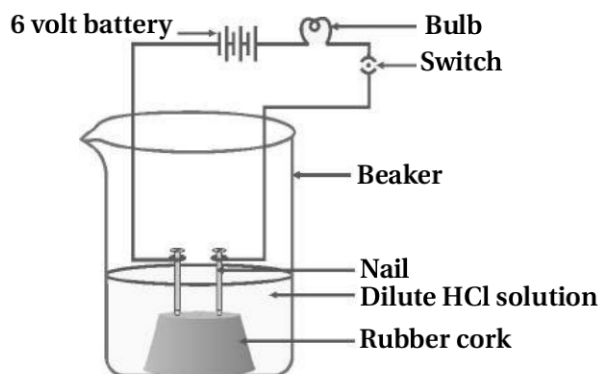
- ➡ During this a certain observation is seen on the surface of zinc granules.
- ➡ During this hydrogen gas is produced it passed from the soap solution. During this bubbles rise in soap solution.
- ➡ For doing test of arising gas, a burning candle is taken near to bubble filled with gas, certain observation is seen.
- ➡ **Observation :** Here we can observe during experiment that hydrogen gas is produced by reaction of sulphuric acid on the surface of zinc granules. For testing it is passed from soap solution and hydrogen gas produced in it produces bubbles which shows origin of Hydrogen gas.
- ➡ Now when burning candle is taken near to the bubbles filled with gas, hydrogen gas produced by popping sound burns.
- ➡ Now similar experiment / activity is repeated with HCl (hydrochloric acid), HNO<sub>3</sub> (Nitric acid) and Acetic acid (CH<sub>3</sub>COOH) or some more acids. Observations are found to be tested and note that whether observations in all cases are equal or different ?
- ➡ **Conclusion :** Therefore from given experiment / activity, it can be decided that metal displaces hydrogen gas from acid in a reaction, which can be seen as a dihydrogen gas.
- ➡ Therefore, any metals which combines with acids and forms a compound is called a salt. So the reaction of a metal with an acid can be summarized as – Acid + metal → salt + Hydrogen gas
- ➡ This matter can be written below in a equation form for zinc sulphate.



- ➡ Similarly equations with other acids can be written as follows :



- ➡ It can be said that zinc produces hydrogen gas with all types of acids.
33. The solution of acid made in water conducts electricity. Explain (good conductor) this point with proper activity / experiment.
- ➡ Generally all acids generate hydrogen gas on reacting with metals. So hydrogen seems to be common to all acids.
  - ➡ All compounds having hydrogen are acidic or the solution of acid in water is good conductor of heat. The explanation of this matter can be given by the below activity / experiment.
  - ➡ First of all in different 100 mL beakers, Glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>), Alcohol (CH<sub>3</sub>OH + Methanol), Hydrochloric acid (HCl) and sulphuric acid (H<sub>2</sub>SO<sub>4</sub>) are taken.
  - ➡ Now taking rubber cork which can be adjusted in 100 mL beaker, two nails are applied on this cork, then this beaker is put in beaker of 100 mL that possesses any one solution of the above.
  - ➡ Then take little dilute HCl in first beaker, keeping cork in first beaker, keeping cork in it as per figure. Connect the nails to the two terminals of a 6 volt battery through a bulb and a switch.



### Acid solution in water conducts electricity

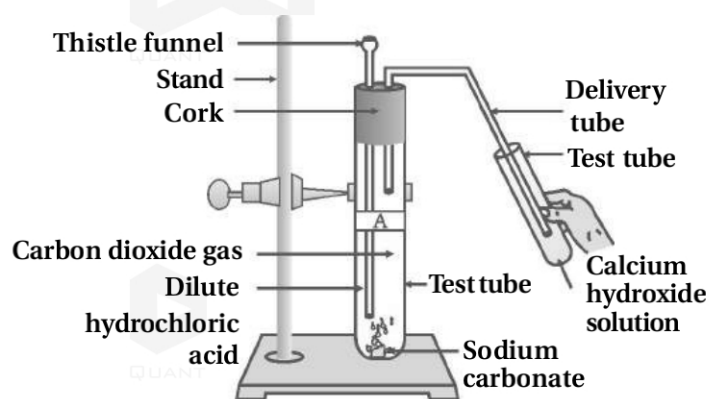
- ➡ Similarly pour some dilute sulphuric acid in beaker and repeat the experiment and note down its observation.
- ➡ Similarly repeat the experiment with glucose and alcohol solution and note down its observation and it is observed that whether bulb glows or not in each case of solution ?
- ➡ **Observations :** It can be observed during experiment / activity that in given experiment, in case of HCl and  $H_2SO_4$  bulb starts glowing but it can be seen during observation that in case of other two solutions Glucose and Alcohol, the bulb does not glow.
- ➡ **Conclusion :** It can be concluded from observation of above experiment that glowing of the bulb indicates there is a flow of electric current through the solution.
- ➡ The electric current is carried through the solution by ions.
- ➡ Acids contain  $H^+$  ion, that suggests that acid produces hydrogen. ions(aq) in solution which are responsible for their acidic properties.

### Section D

- Write the answer of the following questions. [Each carries 4 Marks] [12]

34. How does carbon dioxide gas arise from the solution of sodium carbonate and sodium hydrogen carbonate ? Explain with example.

- ➡ The reaction of metal carbonate and metal bicarbonate with acid can be explained by following experiment / activity :

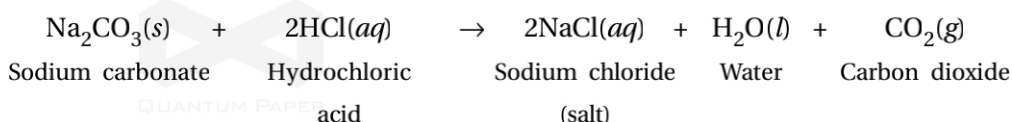


**Passing carbon dioxide gas through calcium hydroxide solution**

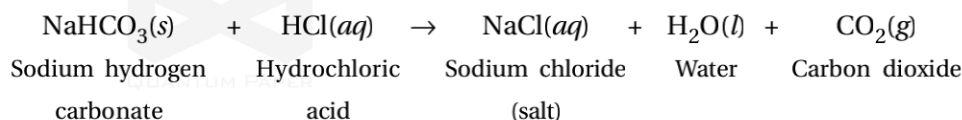
- ➡ First of all two test tubes are taken and they are named as A and B.
- ➡ Take about 0.5 g of sodium carbonate ( $Na_2CO_3$ ) in test tube A and about 0.5g of sodium hydrogen carbonate ( $NaHCO_3$ ) in test tube B.
- ➡ Add about 2 ml of dilute HCl to both the test tube A and B.

- ➡ During this, any gas produced is observed.
- ➡ Pass the gas produced in each case through lime water (Calcium hydroxide solution) as shown in figure and record your observations.
- ➡ **Observations :** It can be observed during given activity / experiment that here sodium carbonate ( $\text{Na}_2\text{CO}_3$ ) being base by reacting with Hydrochloric acid (HCl) produces salt and water and carbon dioxide ( $\text{CO}_2$ ) gas.
- ➡ Similarly sodium hydrogen carbonate ( $\text{NaHCO}_3$ ) is also a base it also produces salt, water and carbon dioxide by reacting with hydrochloric acid (HCl).
- ➡ The chemical reactions occurring in above activity / experiment can be written as follow :

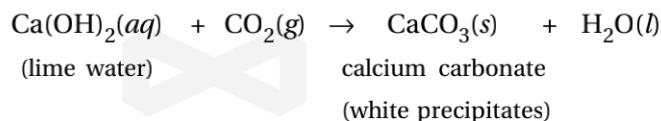
**Test tube : A**



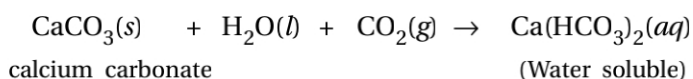
**Test tube : B**



- ➡ On passing the carbon dioxide gas evolved through lime water it gives precipitates of calcium carbonate ( $\text{CaCO}_3$ ).



- ➡ On passing excess carbon dioxide the following reaction takes place and water soluble substances are produced.

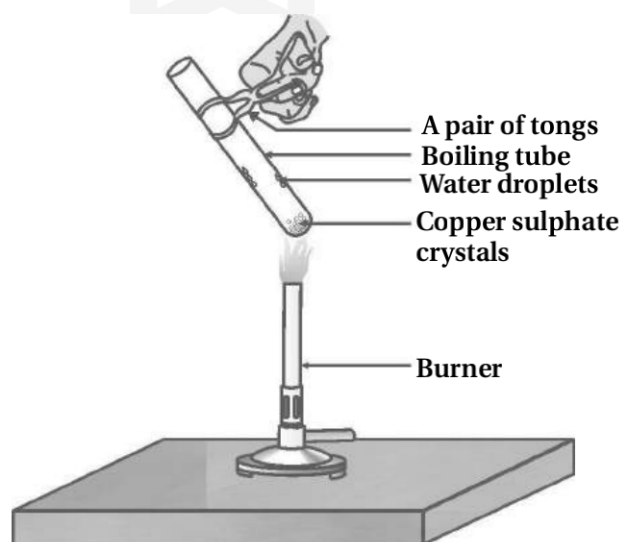


- ➡ Here lime stone, chalk and marble are different forms of calcium carbonate.
- ➡ All metal carbonates and hydrogencarbonates react with acids to give a corresponding salt, carbon dioxide and water.
- ➡ Thus the reaction can be summarized as –
- ➡ Metal carbonate / metal hydrogencarbonate + Acid  $\longrightarrow$  salt + carbon dioxide + water

35. Explain : How is water of crystallisation removed from any crystal or copper sulphate ?

- ➡ Given activity / experiment is done to remove water of crystallisation from crystals of copper sulphate and whether its crystals are dry or not that can be explained.

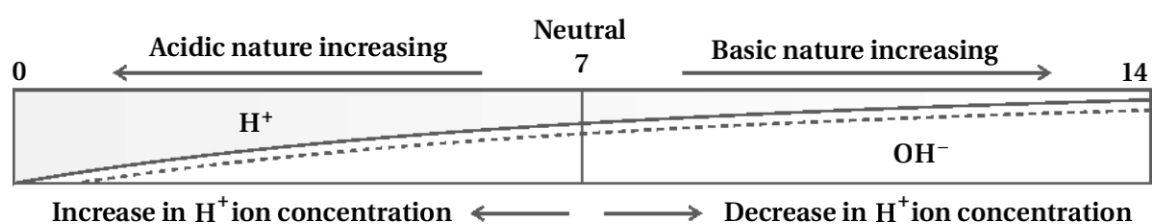




### Removing water of crystallisation

- ➡ First of all some crystals of copper sulphate are heated in a dry test tube.
  - ➡ After boiling the crystals of copper sulphate, the change in its colour is checked.
  - ➡ When the crystals of copper sulphate are boiled, water droplets appear on the upper part of the test tube. From where they came ? It is recorded.
  - ➡ Now after heating it, two-three drops of water are added on the sample of copper sulphate.
  - ➡ During this it is observed that whether blue colour of copper sulphate reappears after adding water droplets ?
  - ➡ **Observation :** It is observed during activity / experiment that when crystals of copper sulphate are heated, it loses its blue colour and converts into dehydrated white copper sulphate.
  - ➡ While water releases from copper sulphate crystals, it accumulates in the form of drops at the upper part of the test tube.
  - ➡ But when drops of water are added into dehydrated white remains of copper sulphate, the blue colour of copper sulphate reappears.
  - ➡ **Conclusion :** We can conclude from the above activity / experiment that the crystals of copper sulphate which appear dry possess crystal water. When this crystals are heated, water is removed and salt turns white.
  - ➡ If we moisten the crystals again with water, the blue colour of the crystals reappears.
  - ➡ Thus water of crystallisation is the fixed number of water molecules present in one formula units of a salt.
  - ➡ Five water molecules are present in one formula unit of a salt.
  - ➡ Chemical formula for hydrated copper sulphate is  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ .
36. On the basis of changes in the concentration of  $\text{H}^+$  ion of acid and  $\text{OH}^-$  ions in base, how changes occur in its pH explain.
- ➡ Acid-base indicators can be used to distinguish between acid and a base.
  - ➡ Similarly universal indicator is used to decide/determine the strength of acid or base and quantitative mass of ions in solution.
  - ➡ Universal indicator is a mixture of several indicators. It is used to determine the strength of acid or base.

- ➡ Moreover universal indicator shows different colours at different concentrations of hydrogen ions in a solution.
- ➡ A scale for measuring hydrogen ion concentration in a solution is called pH scale.
- ➡ The p in pH stands for potenz in German meaning power.
- ➡ On the pH scale we can measure pH generally from 0 (very acidic) to 14 (very alkaline). pH should be thought of simply as a number which indicates the acidic or basic nature of solution.
- ➡ Higher the hydronium ion concentration, lower is the pH value.
- ➡ The pH of a neutral solution is 7.
- ➡ Values less than 7 on the pH scale represent an acidic solution.
- ➡ Values more than 7 on the pH scale represent a basic solution.
- ➡ As the pH value increases from 7 to 14 it represents an increase in  $\text{OH}^-$  ion concentration in the solution, that is increase in the strength of alkali.
- ➡ Generally paper impregnated with the universal indicator is used for measuring pH.



#### Variation of pH with the change in concentration of $\text{H}^+(\text{aq})$ and $\text{OH}^-(\text{aq})$ ions

- ➡ The change occurring in concentration of  $\text{H}^+(\text{aq})$  and  $\text{OH}^-(\text{aq})$  show variation in pH.
- ➡ Thus strength of acid and base depend on number of  $\text{H}^+$  and  $\text{OH}^-$  ions produced respectively.
- ➡ If we take hydrochloric acid and acetic acid of the same concentration, say one molar then this produce different amounts of hydrogen.
- ➡ Acids that give rise to more  $\text{H}^+$  ions are said to be strong acids and acids that give less  $\text{H}^+$  ions are said to be weak acids.