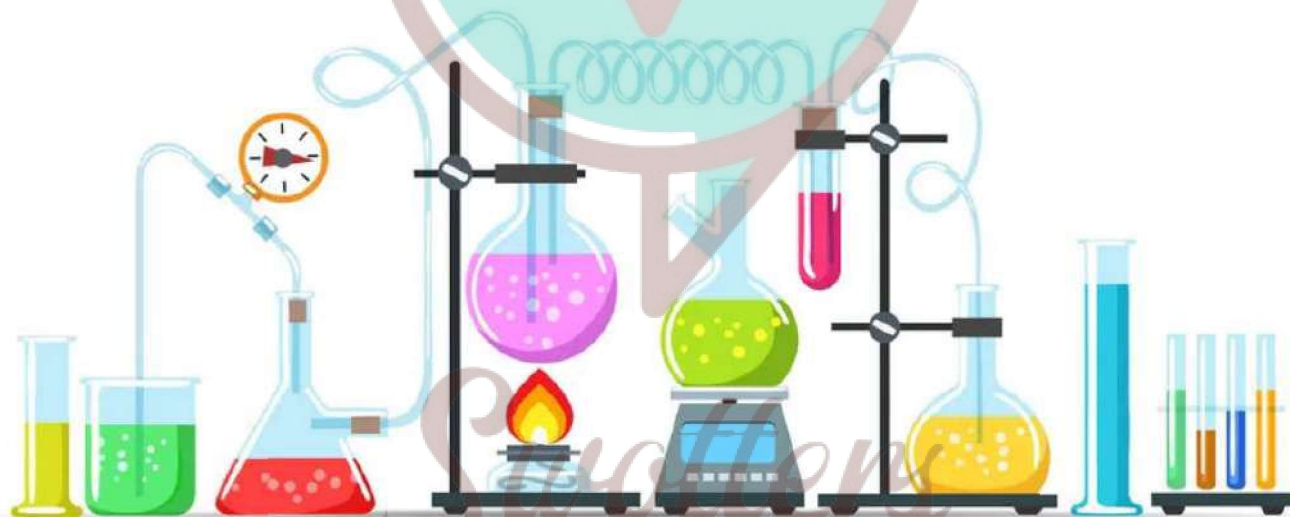


# SCIENCE

(Chemistry)



## Important Questions

### ➤ Multiple Choice Questions:

1. What happens when a solution of an acid is mixed with a solution of a base in a test tube?

- (i) Temperature of the solution decreases
- (ii) Temperature of the solution increases
- (iii) Temperature of the solution remains the same
- (iv) Salt formation takes place

- (a) (i) and (iv)
- (b) (i) and (iii)
- (c) (ii) only
- (d) (ii) and (iv)

2. When hydrogen chloride gas is prepared on a humid day, the gas is usually passed through the guard tube containing calcium chloride. The role of calcium chloride taken in the guard tube is to

- (a) absorb the evolved gas
- (b) moisten the gas
- (c) absorb moisture from the gas
- (d) absorb  $\text{Cl}^-$  ions from the evolved gas

3. Which one of the following salts does not contain water of crystallisation?

- (a) Blue vitriol
- (b) Baking soda
- (c) Washing soda
- (d) Gypsum

4. In terms of acidic strength, which one of the following is in the correct increasing order?

- (a) Water < Acetic acid < Hydrochloric acid
- (b) Water < Hydrochloric acid < Acetic acid
- (c) Acetic acid < Water < Hydrochloric acid
- (d) Hydrochloric acid < Water < Acetic acid

5. What is formed when zinc reacts with sodium hydroxide?

- (a) Zinc hydroxide and sodium
- (b) Sodium zincate and hydrogen gas

(c) Sodium zinc-oxide and hydrogen gas

(d) Sodium zincate and water

6. Tomato is a natural source of which acid?

(a) Acetic acid

(b) Citric acid

(c) Tartaric acid

(d) Oxalic acid

7. Brine is an

(a) aqueous solution of sodium hydroxide

(b) aqueous solution of sodium carbonate

(c) aqueous solution of sodium chloride

(d) aqueous solution of sodium bicarbonate

8.  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  is

(a) washing soda

(b) baking soda

(c) bleaching powder

(d) tartaric acid

9. At what temperature is gypsum heated to form Plaster of Paris?

(a)  $90^\circ\text{C}$

(b)  $100^\circ\text{C}$

(c)  $110^\circ\text{C}$

(d)  $120^\circ\text{C}$

10. How many water molecules does hydrated calcium sulphate contain?

(a) 5

(b) 10

(c) 7

(d) 2

➤ **Very Short Question:**

1. Write a balanced chemical equation for the reaction between sodium carbonate and hydrochloric acid indicating the physical state of the reactants and products.

2. During summer season, a milkman usually adds a small amount of baking soda to fresh milk.

Give reason.

3. What is the difference between slaked lime and lime water?
4. Which acid is present in sour milk or curd?
5. Why is potassium iodide added into common salt to use it as table salt?
6. What are the pH values of distilled water and common salt solution?
7. 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 chloralkali 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.
8. Which bases are called alkalis? Give an example of an alkali.
9. A knife, which is used to cut a fruit, was immediately dipped into water containing drops of blue litmus solution. If the colour of the solution is changed to red, what inference can be drawn about the nature of the fruit and why?
10. How do  $H^+$  ions exist in water?

### ➤ Short Questions:

1. How will you find pH of lemon juice?
2. A sample of bleaching powder was kept in an air tight container. After a month, it lost some of its chlorine content. How will you account for it?
3. An aqueous solution of sodium carbonate is basic and not acidic. Assign reason.
4. An old person complained of acute pain in the stomach. Doctor gave him a small antacid tablet and he got immediate relief. What actually happened?
5. A milkman adds very small amount of baking soda to fresh milk. What happens to its pH?
6. 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 dropwise and the solution ultimately became colourless. Predict the nature of the solutions A and B.
7. A compound which is prepared from gypsum has the property of hardening when mixed with proper quantity of water. Identify the compound. Write chemical equation to prepare the compound. Mention one important use of the compound.
8. The oxide of a metal M was water soluble. When a blue litmus strip was dipped in this solution, it did not undergo any change in colour. Predict the nature of the oxide.

### ➤ Long Questions:

1. (a) A solution has a pH of 7. Explain how you would you:  
(i) increase its pH



(ii) decrease its pH

(b) If a solution changes the colour of the litmus from red to blue, what can you say about its pH?

(c) What can you say about the pH of a solution that liberates carbon dioxide from sodium carbonate?

2. Explain why:

(i) Common salt becomes sticky during the rainy season

(ii) Blue vitriol changes to white upon heating

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

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

(b) How is sodium hydrogen carbonate formed during Solvay process separated from a mixture of  $\text{NH}_4\text{Cl}$  and  $\text{NaHCO}_3$ ?

(c) How is sodium carbonate obtained from sodium hydrogen carbonate?

### ➤ Assertion Reason Question:

1. For question two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

- Both A and R are true, and R is correct explanation of the assertion.
- Both A and R are true, but R is not the correct explanation of the assertion.
- A is true, but R is false.
- A is false, but R is true.

**Assertion:** The process of dissolving an acid or a base in water is highly exothermic reaction.

**Reason:** Water must always be added slowly to acid with constant stirring.

2. For question two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

- Both A and R are true, and R is correct explanation of the assertion.
- Both A and R are true, but R is not the correct explanation of the assertion.
- A is true, but R is false.
- A is false, but R is true.

**Assertion:** Higher the  $\text{H}^+$  ion concentration, lower is the pH value.

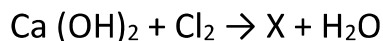
**Reason:** The pH of a neutral solution = 7, that of a basic solution < 7 and that of an acidic solution >

### ➤ Case Study Questions:

1. Read the following and answer any four questions from (i) to (v).

Bleaching powder is also known as chloride of lime. It is a solid and yellowish white in colour. Bleaching powder can be easily identified by the strong smell of chlorine. When calcium hydroxide (slaked lime) reacts with chlorine, it gives calcium oxychloride (bleaching powder) and water is formed. Aqueous solution of bleaching powder is basic in nature. The material to be bleached is first passed through solution of Na OH to remove greasy matter. Then it is passed through aqueous solution of bleaching powder and very dil. HCl solution. HCl reacts with bleaching powder to liberate nascent oxygen which bleaches material.

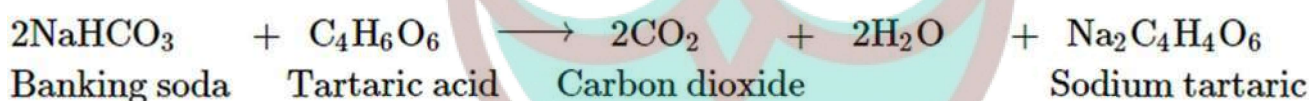
- i. Bleaching powder is used as:
  - a. Bleaching agent in textile, paper and jute industry.
  - b. Disinfectant for water to make water free of germs.
  - c. Oxidising agent in many industries.
  - d. All of these.
- ii. Bleaching powder is also known as:
  - a. Calcium oxychloride.
  - b. Calcium hypochlorite.
  - c. Chloride of lime.
  - d. All of these.
- iii. Bleaching powder gives smell of chlorine because it.
  - a. Is unstable.
  - b. Gives chlorine on exposure to atmosphere.
  - c. Is a mixture of chlorine and slaked lime.
  - d. Contains excess of chlorine.
- iv. Select the correct statement (s) regarding bleaching powder.
  - a. It is pale yellow powder having smell of chlorine.
  - b. It is sparingly soluble in water and gives milky suspension when dissolved in water.
  - c. As bleaching powder gives nascent oxygen, it shows bleaching property.
  - d. All of these.
- v. Identify the product 'X' in the given reaction.



- $\text{CaOCl}_2$
- $\text{CaCl}_2$
- $\text{Ca(ClO}_3)_2$
- $\text{CaCO}_3$

2. Read the following and answer any four questions from (i) to (v).

Baking powder produces carbon dioxide on heating, so it is used in cooking to make the batter spongy. Although, baking soda also produces  $\text{CO}_2$  on heating, but it is not used in cooking because on heating, baking soda produces sodium carbonate along with carbon dioxide. Sodium carbonate, thus, produced, makes the taste bitter. Baking powder is the mixture of baking soda and a mild edible acid. Generally, tartaric acid is mixed with baking soda to make baking powder. When baking powder is heated,  $\text{NaHCO}_3$  decomposes to give  $\text{CO}_2$  which makes bread and cake fluffy. Tartaric acid helps to remove bitter taste due to formation of sodium tartrate.



- On passing excess  $\text{CO}_2$  gas in aqueous solution of sodium carbonate, the substance obtained is:
  - $\text{NaOH}$
  - $\text{NaHCO}_3$
  - $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$
  - $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$
- When sodium hydrogen carbonate is added to acetic acid, it evolves a gas. Which of the following statements are true about the gas evolved?
  - It turns lime water milky.
  - It extinguishes a burning splinter.
  - It turns lime water milky.
  - It has a pungent odour.
  - (I) and (II).
  - (I), (II) and (III).
  - (II), (III) and (IV).
  - (I) and (IV).
- Select the correct statement regarding sodium hydrogen carbonate.
  - $\text{CO}$  and  $\text{CO}_2$  are produced during the heating of  $\text{NaHCO}_3$ .
  - It is insoluble in water.
  - It is used in soda-acid fire extinguishers.

- d. All of these.
- iv. Acetic acid was added to a solid X kept in a test tube. A colourless and odourless gas was evolved. The gas was passed through lime water which turned milky. It was concluded that,
- Solid X is sodium hydroxide and the gas evolved is  $\text{CO}_2$ .
  - Solid X is sodium bicarbonate and the gas evolved is  $\text{CO}_2$ .
  - Solid X is sodium acetate and the gas evolved is  $\text{CO}_2$ .
  - Solid X is sodium chloride and the gas evolved is  $\text{CO}_2$ .
- v. Which of the following statements are correct regarding baking soda?
- Baking soda is sodium hydrogen carbonate.
  - On heating, baking soda gives sodium carbonate.
  - It is used for manufacture of soap.
  - It is an ingredient of baking powder.
- I and IV only.
  - I, II and III only.
  - I, II and IV only.
  - I, II, III and IV.

### Answer Key-

#### ➤ Multiple Choice Answers:

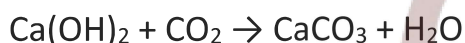
- (d) (ii) and (iv)
- (c) absorb moisture from the gas
- (b) Baking soda
- (a) Water < Acetic acid < Hydrochloric acid
- (b) Sodium zincate and hydrogen gas
- (d) Oxalic acid
- (c) aqueous solution of sodium chloride
- (a) washing soda
- (b)  $100^\circ\text{C}$
- (d) 2

#### ➤ Very Short Answers:

- Answer: Food becomes rancid when fat and oils present in the food are oxidized.
- Answer:  $\text{X} = \text{Mg}$ ,  $\text{Y} = \text{MgO}$ ,  $\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$
- Answer: An equation that has equal number of atoms of each element on both the sides

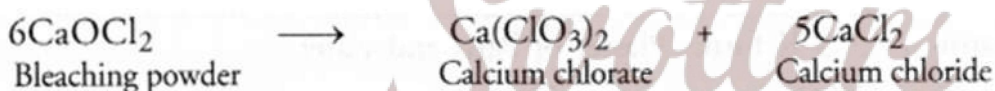
of the equation is called a balanced chemical equation, i.e., mass of the reactants is equal to mass of the products.

4. Answer:  $\text{BaCl}_2(\text{aq}) + \text{Na}_2\text{SO}_4(\text{aq}) \rightarrow \text{BaSO}_4(\text{s}) + 2\text{NaCl}(\text{aq})$
5. Answer: It is a brown mass known as hydrated ferric oxide. Its formula is  $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$ .
6. Answer: The zinc rod will change into zinc sulphate.
7. Answer: Both silver chloride and silver bromide are used in black and white photography.
8. Answer: The process is known as the reduction of metal oxide.
9. Answer: Corrosion is responsible for the formation of this coating. Black coating is due to formation of  $\text{Ag}_2\text{S}$  and green coating is due to formation of  $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$ .
10. Answer: Lime water (calcium hydroxide) combines with carbon dioxide to form a suspension of calcium carbonate which makes lime water milky.

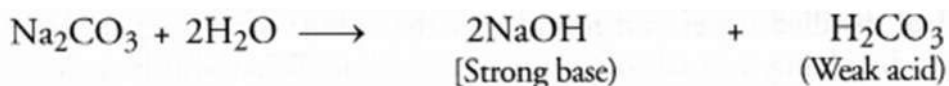


### ➤ Short Answer:

1. Answer:
  - (a) Take about 5mL of the given sample of lemon juice in a test tube.
  - (b) Dip a strip of the universal pH paper in the tube.
  - (c) Take out the strip and note its colour. It will acquire a orange red colour.
  - (d) On comparison with pH paper chart, the pH of the solution falls in the range between 2 and 3.
2. Answer: Bleaching powder if kept even in an airtight container, will slowly decompose of its own and form calcium chlorate and calcium chloride. The reaction is called auto-oxidation. This will result in decrease in its chlorine contents.



3. Answer: Sodium carbonate reacts with water to form sodium hydroxide and carbonic acid.

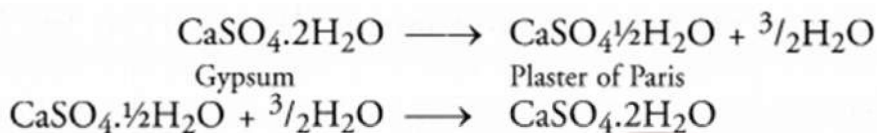


Since the base is strong while acid is weak, the solution is basic and not acidic.

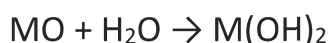
4. Answer: The old person was suffering from acute acidity. Antacid tablet contains sodium hydrogen carbonate ( $\text{NaHCO}_3$ ). It reacts with the acid ( $\text{HCl}$ ) formed because of acidity and neutralizes its effect. That is how the old person got relief.
5. Answer: The pH of fresh milk is nearly 6. Baking soda is sodium hydrogen carbonate ( $\text{NaHCO}_3$ ). On adding it to fresh milk, the medium becomes alkaline and its pH therefore, increases.



6. Answer: The solution A is basic in nature and phenolphthalein has imparted pink colour to it. The solution B is of an acid which has ultimately made solution A colourless by neutralising its basic effect.
7. Answer: The compound is Plaster of Paris ( $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$ ). It is formed from Gypsum ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ) upon heating to a temperature of 373 K and also changes back to Gypsum on adding water. Plaster of Paris is used for setting fractured bones.



8. Answer: The metal oxide (MO) is of basic in nature. It dissolves in water to form metal hydroxide as follows:



A blue litmus does not undergo any change in colour in the basic medium.

### ➤ Long Answer:

1. Answer:

(a) The solution with pH 7 is neutral. Its pH can be increased by adding a small amount of base like sodium hydroxide. Basic solutions have pH more than 7. Similarly, pH can be decreased by adding small amount of acid like hydrochloric acid. Acidic solutions have pH less than 7.

(b) The change in colour of litmus from red to blue indicates that the solution is of basic nature with pH more than 7.

(c) Carbon dioxide can be liberated by reacting sodium carbonate solution with acid like dilute hydrochloric acid. This shows that the solution is of acidic nature with pH less than 7.

2. Answer:

(i) Common salt contains the impurity of magnesium chloride ( $\text{MgCl}_2$ ) which is of deliquescent nature. When exposed to atmosphere, it becomes moist. Therefore, common salt becomes sticky during the rainy season.

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

(iii) Concentrated sulphuric acid is highly hygroscopic. It absorbs moisture from air and gets diluted. Since the volume increases, the acid starts flowing out of the bottle.

3. Answer:

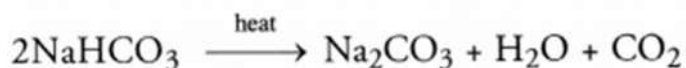
(a) The raw materials used are: NaCl, lime stone or  $\text{CaCO}_3$  and  $\text{NH}_3$ .

(b) Sodium hydrogen carbonate ( $\text{NaHCO}_3$ ) is sparingly soluble or less soluble in water and gets separated as a precipitate while  $\text{NH}_4\text{Cl}$  remains in solution. The precipitate is removed



by filtration.

(c) Sodium hydrogen carbonate is converted to sodium carbonate upon heating.



### ➤ Assertion Reason

1. (c) A is true, but R is false.

#### Explanation:

The process of dissolving an acid or a base in water is highly exothermic reaction. Acid must always be added slowly to water with constant stirring.

2. (c) A is true, but R is false.

#### Explanation:

Higher the  $\text{H}^+$  ion concentration, lower is the pH value. The pH value less than 7 represents an acidic solution and value more than 7 represents a basic solution.

### ➤ Case Study Answer:

1.

- i. (d) All of these.
- ii. (d) All of these.
- iii. (b) Gives chlorine on exposure to atmosphere.

#### Explanation:

Bleaching powder gives chlorine on exposure to air by reacting with  $\text{CO}_2$ .



- iv. (d) All of these.
- v. (a)  $\text{CaOCl}_2$

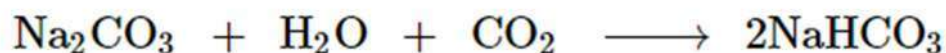
#### Explanation:



2.

i. (b)  $\text{NaHCO}_3$

**Explanation:**



ii. (b) (I), (II) and (III).

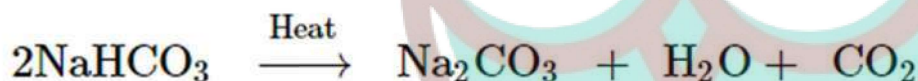
**Explanation:**



Carbon dioxide gas is evolved which turns lime water milky. It extinguishes a burning splinter since it is not a supporter of combustion. It dissolves in sodium hydroxide solution and it is an odourless gas.

iii. (c) It is used in soda-acid fire extinguishers.

**Explanation:**



$\text{NaHCO}_3$  is soluble in water.

iv. (b) Solid X is sodium bicarbonate and the gas evolved is  $\text{CO}_2$ .

**Explanation:**



v. (c) I, II and IV only.

**Explanation:**

It is not used in manufacture of soap.