

## Syllabus

- *Acids, bases and salts : Their definitions in terms of furnishing of  $H^+$  and  $OH^-$  ions, General properties, examples and uses, concept of pH scale (Definition related to logarithm not required), importance of pH in everyday life; preparation and uses of Sodium Hydroxide, Bleaching powder, Baking soda, Washing soda and Plaster of Paris.*

## Quick Review

- Acids are sour in taste. They turn blue litmus red. Acids are the substances that furnish  $H^+$  ions in aqueous solution.
- If in an aqueous solution, concentration of acid is low, it is called **dilute solution** and if concentration of acid is high, it is called **concentrated solution**.
- Hydrochloric acid is released in stomach to make medium acidic in nature. It leads to coagulation of protein and helps in their digestion. HCl kills bacteria coming to the stomach along with the food.
- When a burning matchstick is brought near the hydrogen gas, it burns with a pop sound.
- When  $CO_2$  gas is passed through lime water, it turns milky. If  $CO_2$  is passed in excess, milkiness disappears.
- There are many natural substances like red onion peels, red cabbage leaves, beetroot extract, coloured petals of some flowers. They are called indicators because they indicate the presence of acid or base by showing the change in colour.
- Acids react with certain metal oxides to form salt and water. Acids react with metal carbonates and hydrogen carbonates to produce carbon dioxide gas.
- Strong bases react with active metals to produce hydrogen gas. Bases react with non-metallic oxides to produce salt and water.
- Both acids and bases conduct free electric current in their aqueous solution due to the presence of free ions.
- Strength of an acid or base depends on the number of  $H^+$  ions or  $OH^-$  ions produced by them respectively. More the  $H^+$  ions produced by an acid, stronger is the acid. More the  $OH^-$  ions produced by a base, stronger is the base.

### Indicators :

These are the substances which change their colour / smell in different types of substances.

### Types of Indicators

#### Natural indicators

Found in nature in plants.

Litmus, red cabbage leaves extract, flowers of hydrangea plant, turmeric

#### Synthetic indicators

These are chemical substances.

Methyl orange, phenolphthalein

#### Olfactory indicators

These substances have different odour in acid and bases.

	S.No.	Indicator	Smell/Colour in acidic solution	Smell/Colour in basic solution
Natural Indicator	1.	Litmus	Red	Blue
	2.	Red cabbage leaf extract	Red	Green
	3.	Flower of hydrangea plant	Blue	Pink
	4.	Turmeric	No change	Red

### TOPIC - 1

Acid, Bases and Salts

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Synthetic Indicator	1.	Phenolphthalein	Colourless	Pink
	2.	Methyl orange	Red	Yellow
Olfactory Indicator	1.	Onion	Characteristic smell	No smell
	2.	Vanilla essence	Retains smell	No smell
	3.	Clove oil	Retains smell	Loses smell

**Chemical Properties of Acids and Bases****Reaction of Metals with****Acids**

Acid + Metal  $\rightarrow$  Salt + Hydrogen gas

*e.g.*,  $2\text{HCl} + \text{Zn} \rightarrow \text{ZnCl}_2 + \text{H}_2$

**Bases**

Base + Metal  $\rightarrow$  Salt + Hydrogen gas

*e.g.*,  $2\text{NaOH} + \text{Zn} \rightarrow \text{Na}_2\text{ZnO}_2 + \text{H}_2 \uparrow$   
(Sodium zincate)

- Hydrogen gas released can be tested by ringing burning candle near gas bubbles, it burst with pop sound.

**Reaction of Metal Carbonates / Metal Hydrogen Carbonates with****Acids**

Acid + Metal Carbonate / Metal hydrogen Carbonate  $\rightarrow$  Base + Metal Carbonate / Metal Hydrogen Carbonate  
Salt +  $\text{CO}_2$  +  $\text{H}_2\text{O}$

*e.g.*,  $2\text{HCl} + \text{Na}_2\text{CO}_3 \rightarrow 2\text{NaCl} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow$  No Reaction

$\text{HCl} + \text{NaHCO}_3 \rightarrow \text{NaCl} + \text{CO}_2 + \text{H}_2\text{O}$

- $\text{CO}_2$  can be tested by passing it through lime water.

$\text{Ca}(\text{OH})_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$

(Lime water turns milky.)

- When excess  $\text{CO}_2$  is passed,

$\text{CaCO}_3 + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{HCO}_3)_2$

(Milkyness disappears.)

**Bases****Reaction of Acids and Bases With Each Other**

Acid + Base  $\rightarrow$  Salt +  $\text{H}_2\text{O}$

**Neutralisation Reaction :** Reaction of acid with base is called as neutralization reaction.

*e.g.*,  $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

**IF :**

Strong Acid + Weak Base  $\rightarrow$  Acidic salt +  $\text{H}_2\text{O}$

Weak Acid + Strong Base  $\rightarrow$  Basic salt +  $\text{H}_2\text{O}$

Strong Acid + Strong Base  $\rightarrow$  Neutral salt +  $\text{H}_2\text{O}$

Weak Acid + Weak Base  $\rightarrow$  Neutral salt +  $\text{H}_2\text{O}$

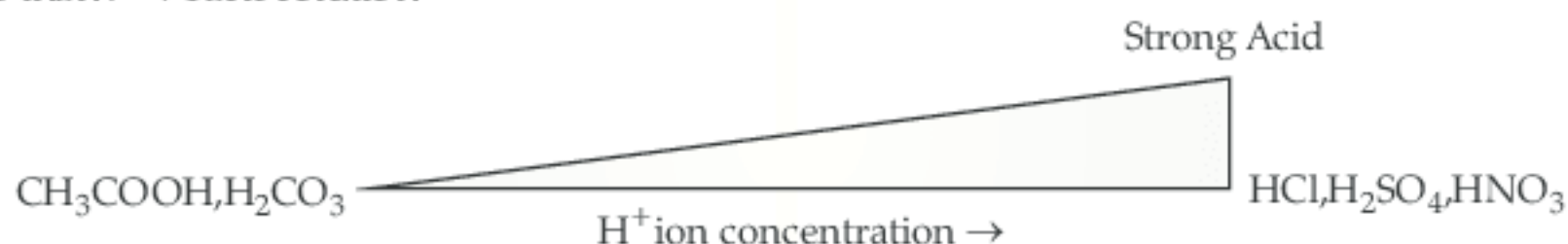
- pH of stomach is 1.5-3.0 due to secretion of HCl. In case of indigestion, acidity increases which can be neutralized by antacids like milk of magnesia.
- Cold drinks, chocolates and sweets are most harmful for health as well as tooth. They produce acids in mouth which are responsible for tooth decay.
- Salts of a strong acid and a strong base are neutral with pH value of 7.
- Salts have various uses in everyday life and in industries.
- A salt is soluble if it dissolves in water to give a solution with a concentration of at least 0.1 moles per litre at room temperature.

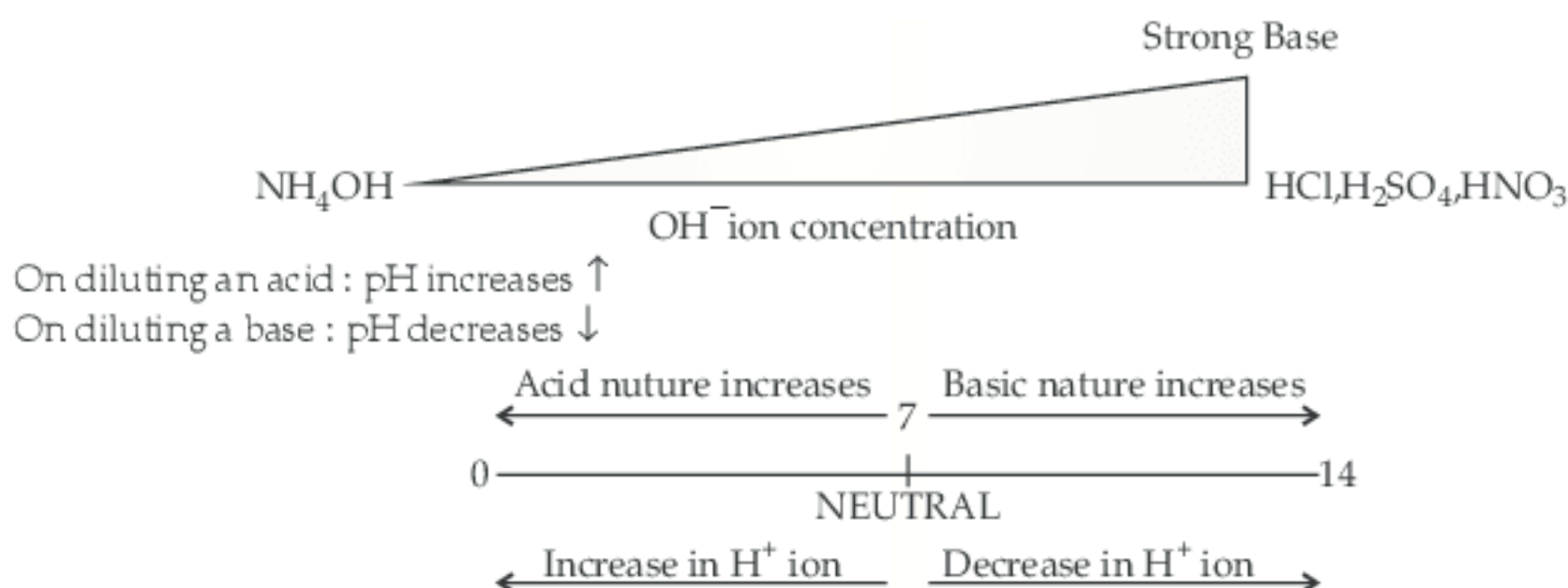
**pH Scale :** A scale for measuring  $\text{H}^+$  ion concentration in a solution. *p* in pH stands for 'potenz' a German word which means power.

pH = 7  $\rightarrow$  neutral solution

pH less than 7  $\rightarrow$  acidic solution

pH more than 7  $\rightarrow$  basic solution





### Importance of pH in everyday life

- Plants and animals are pH sensitive
    - Our body works within the pH range of 7 – 7.8.
    - When pH of rain water is less than 5.6, it is called acid rain.
    - plants require a specific pH range for their healthy growth.
  - pH of the soil
- **Salts :** Salts are formed when an acid and base reacts with each other Types of Salts :

#### 1. Common Sal (NaCl) :

##### Preparation :



#### 2. Bleaching Powder ( $CaOCl_2$ ) : It is produced by the action of chlorine on dry slaked lime.



##### Uses :

- Bleaching cotton and linen in textile industry.
  - Bleaching wood pulp in paper factories.
  - Oxidizing agent in chemical industries.
  - Disinfecting drinking water.
- #### 3. Baking Soda (Sodium Hydrogen Carbonate) ( $NaHCO_3$ ) :



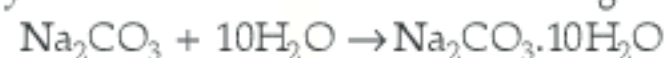
Baking soda

- It is mild non-corrosive base.
- When it is heated during cooking :



##### Uses :

- For making baking powder (mixture of baking soda and tartaric acid). When baking powder is heated or mixed with water,  $CO_2$  is produced which causes bread and cake to rise making them soft and spongy.
  - An ingredient in antacid.
  - Used in soda acids, fire extinguishers.
- #### 4. Washing Soda ( $Na_2CO_3 \cdot 10H_2O$ ) : Recrystallization of sodium carbonate gives washing soda. It is a basic salt.



##### Uses :

- In glass, soap and paper industry.
  - Manufacture of borax.
- #### 5. Plaster of Paris (Calcium sulphate hemihydrates) ( $CaSO_4 \cdot \frac{1}{2}H_2O$ ) :
- On heating gypsum ( $CaSO_4 \cdot 2H_2O$ ) at 373K, it loses water molecules and becomes Plaster of Paris (POP).

It is white powder and on mixing with water it changes to gypsum.



##### Uses :

- Doctors use POP for supporting fractured bones.
- For making toys, material for decoration.

## Know the Terms

- Those substances which turn blue litmus solution red are called acidic. The term 'acid' has been derived from the Latin word '*acidus*' which means sour. Acids are sour in taste. They give  $H^+$  ions in aqueous solution.

Example :  $HCl, H_2SO_4, HNO_3, CH_3COOH$ .



- Those substances which change their colour (or odour) in acidic or basic solutions are called **indicators**.
- The acids which are obtained from minerals are called **mineral acids**. Those acids which are obtained from plants and animals are called **organic acids**. Those acids which contain minimum amount of water are called **concentrated acids**.
- The acids which ionise almost completely are called **strong acids**, *e.g.*, mineral acids.
- The acids which ionise only partially or to a lesser extent are called **weak acids**, *e.g.*, organic acids.
- Substances that furnish hydroxide ions ( $\text{OH}^-$ ) in aqueous solution are called **bases**. Bases have bitter taste and produce blue colour in litmus solution.
- The substances / bases which ionise completely to furnish  $\text{OH}^-$  ions are called **strong bases**, *e.g.*,  $\text{KOH}$ ,  $\text{NaOH}$  etc. The bases which ionise only partially are called **weak bases**, *e.g.*,  $\text{Mg}(\text{OH})_2$ ,  $\text{Cu}(\text{OH})_2$  etc.
- Water soluble bases are called **alkalies**, *e.g.*,  $\text{NaOH}$ ,  $\text{KOH}$ . Thus, all alkalies are bases but all bases are not alkali.
- When a concentrated acid or base is diluted, a vigorous reaction takes place. The process is called **dilution**. It is an exothermic process as a lot of heat is produced.
- The process of forming ions in aqueous solution is called **ionisation**. All ionic compounds like  $\text{NaCl}$ ,  $\text{NaNO}_3$ ,  $\text{Na}_2\text{SO}_4$  form ions in aqueous solution.
- A **universal indicator** is a mixture of many different indicators which shows a gradual but well marked series of colour changes over a very wide range of change in concentration of  $\text{H}^+$  ions.
- **pH** is the scale for measuring hydrogen ion concentration. The concentrations of  $\text{H}^+$  are generally small, therefore concentrations of  $\text{H}^+$  are expressed in terms of pH. pH is defined as negative logarithm of  $\text{H}^+$  concentration or  $\text{H}_3\text{O}^+$  concentration.

$$\text{pH} = -\log [\text{H}^+] \text{ or } \text{pH} = -\log [\text{H}_3\text{O}^+]$$

- The reaction in which base or basic oxide reacts with acid or acidic oxide is called **neutralisation reaction**.



- A salt is an ionic compound that results from the neutralization reaction of an acid and a base. Salts are composed of related numbers of cations and anions, so that, the product is electrically neutral.

## TOPIC-1

### Acid, Bases and Salts

#### Very Short Answer Type Questions

(1 mark each)

- [A] Q.1. Write the chemical name and formula of the compound which is used as an antacid.

[KVS 2017]

Ans. Sodium bicarbonate,  $\text{NaHCO}_3$   $\frac{1}{2} + \frac{1}{2}$

- [R] Q.2. Name the acid present in ant sting.

[Board Term-I Set (C1), 2010]

[DDE 2017] [NCERT Exemplar]

Ans. Formic acid (Methanoic acid)  $\text{HCOOH}$  1

[CBSE Marking Scheme, 2010]

- [A] Q.3. Which solution is used to dissolve gold?

[DDE 2017]

Ans. Aqua-regia (3 parts  $\text{HCl}$  : 1 parts  $\text{HNO}_3$ ) 1

- [U] Q.4. What happens when egg shell is added to nitric acid?

[NCERT Exemplar] [DDE 2017]

Ans. Egg shell is made up of Calcium carbonate. When added to nitric acid it gives effervescence due to the evolution of  $\text{CO}_2$  gas.



- [U] Q.5. Fresh milk has a pH of 6. When it changes into curd (Yogurt), will its pH value increases or decreases? Why? [Board Term-I Set-C2, 2010]

Ans. When milk changes into curd, its pH will decrease. Because curd contain acid so  $\text{H}^+$  increases and thus pH will decrease. 1

- [A] Q.6. How will you test a gas which is liberated when  $\text{HCl}$  acid reacts with an active metal?

[DDE 2017]

Ans. It liberates  $\text{H}_2$  gas which burns with a pop sound. 1

- [U] Q.7. Which gas is usually liberated when an acid reacts with a metal? [Board Term-I Set-14, 2011]

Ans. Hydrogen gas. 1

- [A] Q.8. When conc. acid is added to water, whether the process is exothermic or endothermic?

[DDE 2017]

Ans. After adding acid to water, dissociation of acid take place forming hydration of ions. As breaking of bonds, needs some energy to proceed, It is endothermic reaction. 1

- [R] Q.9. Why does flow of acid rain water into a river make the survival of aquatic life in the river difficult? [DDE 2017]

Ans. When pH of rain water is less than 5.6 it is called acid rain. Living organisms can survive only in a narrow range of pH change. 1

- [R] Q.10. What is the pH of gastric juices released during digestion? [DDE 2017]

Ans. The pH of gastric acid is 1.5 to 3.5 in the human Stomach. 1



**Q. 11.** Which is a stronger acid, with pH = 5 or with pH = 2 ? [Board Term-I Set-A1, 2010]

**Ans.** pH = 2 (lower the pH, stronger the acid). 1

**Q. 12.** What is the effect of an increase in concentration of  $H^+$  ions ? 1 M HCl or 1 M  $CH_3COOH$ .

[Board Term-I, Outside Delhi Set II, 2009]

**Ans.** 1 M HCl has a higher concentration of  $H^+$  ions, because when HCl dissolves in water it dissociates completely into ions while  $CH_3COOH$  is a weak acid and does not dissociate into ions completely. 1

**Q. 13.** Why does tooth decay start when the pH of mouth is lower than 5.5 ?

[Board Term-I Set-C2, 2010]

**Ans.** At lower pH below 5.5, the calcium phosphate of enamel of tooth gets corroded. 1

**Q. 14.** How is the concentration of hydronium ions ( $H_3O^+$ ) affected, when a solution of an acid is diluted ? [NCERT Exemplar]

**Ans.** When a solution of an acid is diluted *i.e.*, water is added to it, the concentration of  $H_3O^+$  ions per unit volume decreases. 1

## Short Answer Type Questions-I

(2 marks each)

**Q. 1.** What is meant by the term pH of a solution ? The pH of rain water collected from two cities A and B was found to be 6 and 5 respectively. The water of which city is more acidic ?

[Board Term-I 2013, 11, Set-C2, 2010]

**Ans.** pH of a solution is a measure of the  $H^+$  concentration in a solution. Lesser the pH, more acidic is the solution. Thus, rain water of city B is more acidic. 2

**Q. 2.** Given below are the pH values of different liquids 7.0, 14.0, 4.0 and 2.0. Which of these could be that of (a) Lemon juice (b) Distilled water (c) Sodium hydroxide solution (d) Tomato juice. [KVS 2017]

**Ans.** (a) Lemon juice — pH 2.0

(b) Tomato juice — pH 4.0

(c) Distilled water — pH 7.0

(d) Sodium hydroxide solution — pH 14.0

$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$

**Q. 3.** What is alkali ? Give an example.

[Board Term-I Set-31, 2011]

**Ans.** A base which is soluble in water is known as alkali. 1

**Example :** NaOH, KOH.

1 + 1

**Q. 4.** Classify the following into acidic oxides and basic oxides :

$Na_2O$ ,  $SO_2$ ,  $MgO$ ,  $CO_2$

[Board Term-I Set-WHISGOB, 2014]

**Ans.** Acidic oxides —  $SO_2$ ,  $CO_2$

Basic oxides —  $Na_2O$ ,  $MgO$

1 + 1

[CBSE Marking Scheme, 2014]

**Q. 5.** Write one word/term for the following :

(i) Water soluble base

(ii) A substance which dissociates on dissolving in water to produce hydrogen ions. [ $H^+(aq)$  ions]

(iii) A reaction between an acid and a base to form salt and water.

(iv) A substance which dissociates on dissolving in water to produce hydroxide ions [ $OH^-$  ions]

[Board Term-I Set-1ZHNPNO, 2016]

**Ans.** (i) Alkali

(ii) Acid

(iii) Neutralization reaction

(iv) Base

$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$

[CBSE Marking Scheme, 2016]

**Q. 6.** What is the change in pH values of milk when it changes into curd ? Explain.

[Board Term-I Set-WJ7QPA9, 2013]

**Ans.** pH decreases.

It is due to the formation of lactic acid in curd. Since, acids generally have a low pH value, when milk changes to curd its pH will decrease. 1 + 1

[CBSE Marking Scheme, 2013]

**Q. 7.** Why does distilled water not conduct electricity, whereas rain water does ? [NCERT 2017]

**Ans.** Distilled water does not have free ions to conduct electricity. As rain water contains salts which ionise to form free mobile ion, so they conduct electricity. 2

**Q. 8.** Explain why sour substances are effective in cleaning Copper vessels ? [DDE 2017]

**Ans.** Copper metal slowly reacts with water, carbon dioxide and oxygen present in air to form basic copper carbonate which is green in colour. Its layer slowly gets deposited on the surface of the metal. Now as lemon is acidic, hence when we rub the tarnished copper vessel with lemon, the basic copper oxide or copper carbonate reacts with the acid present in lemon to form a salt which is washed away with water.

**Q. 9.** What is the reaction called when an acid reacts with base to produce salt and water ? Give example also. [DDE 2017]

**Ans.** Neutralisation Reaction.

**Example :**

$NaOH + HCl \longrightarrow NaCl + H_2O$

Sodium Hydrochloric Sodium Water

hydroxide acid chloride 1 + 1

**Q. 10.** Why pickles and curd are not stored in Copper and brass utensils ? [DDE 2017]

**Ans.** Sour substances like pickles and curd are acidic in nature, *i.e.*, they have acids in them. So, when they are kept in brass or copper vessels, they react with them and form poisonous or better to say toxic



elements which may prove harmful for human body. So, they are not kept in metal containers. 2

**Q.11. What is the role of toothpastes in preventing cavities ? [DDE 2017]**

**Ans.** Fluoride is a very safe and effective way to help prevent tooth decay, so it is an important ingredient in toothpaste and mouthwashes. It works by making the enamel more resistant to acids produced by the bacteria living on the teeth and gums. 2

**Q.12. Explain why, an aqueous solution of sodium sulphate is neutral while an aqueous of sodium carbonate is basic in nature.**

[Board Term-I Set-WDCXXOV, 2016]

**Ans.** Sodium sulphate is a neutral salt because it is made from strong acid and strong base.

Sodium carbonate is a basic salt because it is made from strong base and weak acid.

[CBSE Marking Scheme, 2016] 2

**Q.13. Name the gas which is liberated when an acid reacts with a metal. Illustrate with an example. How will you test the presence of this gas ?**

[Board Term-I Set-2ZGOVVV, 2015]

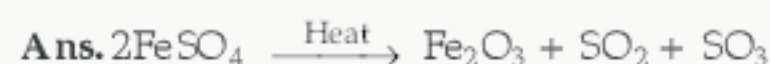
**Ans.** Hydrogen gas.

When zinc reacts with dilute hydrochloric acid, Colourless gas with pop up sound is evolved.



$\frac{1}{2} + 1 + \frac{1}{2}$

**Q.14. Give chemical equation to show the changes that occur when green coloured ferrous sulphate crystals are heated. Mention the change observed as well as reason for this change. [Board Term-I Set-3R6WRQL, 2013]**



Crystals lose their colour, due to loss of water of crystallization on heating. 1 + 1

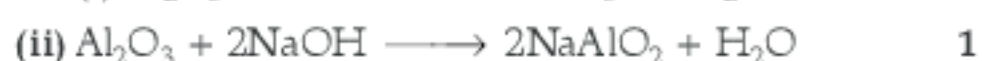
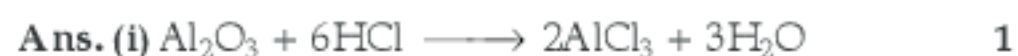
[CBSE Marking Scheme, 2013]

**Q.15. 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 ? [Board Term-I Set-A1, 2013, 11, 2010]**

**Ans.** The fruit may be a citrus fruit or its juice may contain an acid, that is why the traces of acid remained in the knife that turned the blue litmus red. 2

**Q.16. Write chemical equations that show aluminium oxide reacts with acid as well as base.**

[Board Term-I Set-31, 2011]



**Q.17. Hold one moist and one dry strip of blue litmus paper over dry HCl acid gas. Which strip will turn red and why ? [DDE 2017]**

**Ans.** Dry strip of litmus and dry HCl do not contain any water so do not get ionized, but in the presence of a drop of water, HCl is ionized and release proton, that turns blue litmus to red. 2

**Q.18. A student prepared solutions of (i) an acid and (ii) a base in two separate beakers. She forgot to label the solutions and litmus paper is not available in the laboratory. Since both the solutions are colourless, how will she distinguish between the two ?**

[NCERT Exemplar 2017]

**Ans.** These solutions can be tested by using universal indicators. If solution (i) turns red it is an acid and If solution (ii) remains colourless it is a base. 1 + 1

**Q.19. Why do acids not show acidic behaviour in the absence of water ? [NCERT 2017]**

**Ans.** Acids do not show acidic behaviour in the absence of water because the dissociation of hydrogen ions from an acid occurs in the presence of water only. 2

**Q.20. Dry HCl gas does not change the colour of dry blue litmus paper. Give reasons.**

[NCERT Exemplar; Board Term-I Set-20, 2011]

**Ans.** In dry state, HCl gas does not give any  $\text{H}^+$  ions. It does not behave as an acid. That is why the colour of litmus paper does not change. 2

**Q.21. While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid.**

[Board Term-I Set-18, 2011 Set-C1, 2010]

**Ans.** Dilution of concentrated acid is an exothermic process. If water is added to a concentrated acid, the heat generated may cause the mixture to splash out and cause burns. When the acid is added to water slowly with constant stirring, the mixture will not splash out. 2

**Q.22. HCl and  $\text{HNO}_3$  show acidic characteristics in aqueous solution while alcohol and glucose solutions do not. Give reasons.**

[Board Term-I Set-11, 2011; Set-B1, 2010]

**Ans.** HCl and  $\text{HNO}_3$  produce  $\text{H}^+$  in aqueous solution. Hence, they show acidic character.

Alcohol and glucose do not produce  $\text{H}^+$  in aqueous solution, hence they do not show acidic character. 1 + 1

**Q.23. Though the compounds such as glucose and alcohol have hydrogen atoms in their molecules yet they are not categorised as acids. Why ?**

[Board Term-I Set-26, 2011] [NCERT]

**Ans.** Glucose and alcohol do not produce  $\text{H}^+$  ions, when dissolved in water. The acids contain hydrogen. When acid is dissolved in water, produce  $\text{H}^+$  ion. 2

**Q.24. Match the acids given in Column (A) with their correct source given in column (B)**

Column (A)	Column (B)
(a) Lactic acid	(i) Tomato
(b) Acetic acid	(ii) Lemon
(c) Citric acid	(iii) Vinegar
(d) Oxalic acid	(iv) Curd

[NCERT Exemplar 2017]

**Ans. (a)** Lactic acid — Curd

**(b)** Acetic acid — Vinegar



(c) Citric acid — Lemon

(d) Oxalic acid — Tomato  $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$

**Q. 25.** You might have seen lemon or tamarind juice being used to clean tarnished surface of copper vessels. Explain why these sour substances are effective in cleaning the vessels ?

[Board Term-I Set-25, 2011]

**Ans.** Lemon juice contains citric acid and tamarind contains tartaric acid. These acids react with basic layer of copper carbonate on the surface to form soluble salts which are easily removed and surface shines. 2

**Q. 26.** When a drop of orange juice is added to pure water, how the pH value will vary for water ? If a drop of lemon juice is also added, will there be any more change in the pH value ?

[Board Term-I Set-36, 2011; Set-C2, 2010]

**Ans.** Orange and lemon are citrus fruits which contain citric acid in their juices. 1

When these juices are added to pure water the acid will release  $H^+$  ions on dissociation and the pH value will decrease from 7 as the acidity increases. 1

**Q. 27.** While constructing a house, a builder selects marble flooring and marble table tops for the kitchen where vinegar and juice of lemon, tamarind etc. are more often used for cooking. Will you agree to this selection and why ?

[Board Term-I Set-A2, 2010]

**Ans.** No, the substance like vinegar, tamarind etc. contain acids which when accidentally fall on marble will react with the marble causing discoloration etc. 2

## Short Answer Type Questions-II

(3 marks each)

**Q. 1.** How are bases different from alkalis ? Are all bases alkalis ? [DDE 2017]

**Ans.** Bases are substances that react with acids and neutralises them. They are usually metal oxides, metal hydroxides, metal carbonates or metal hydrogen carbonates. Many bases are insoluble, they do not dissolve in water. If a base does dissolve

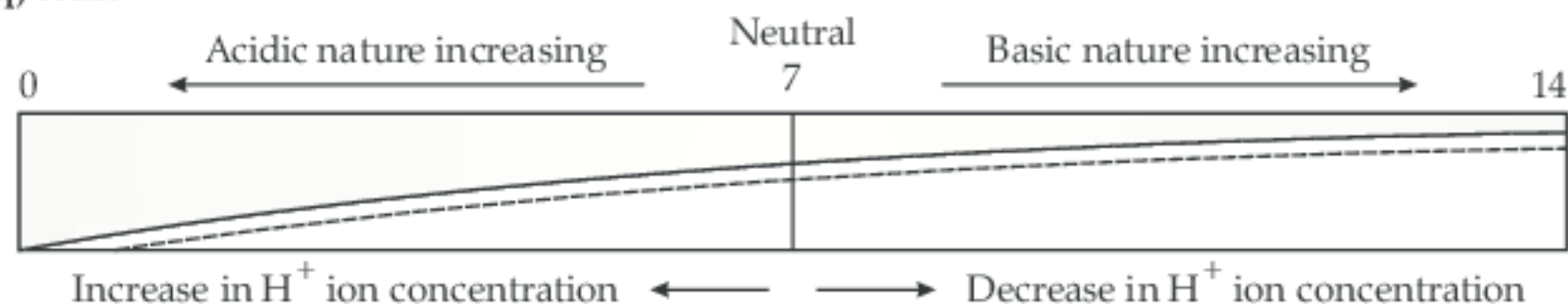
in water, it is known as alkali.

Alkali as well as base neutralises acid, as alkali produce  $OH^-$  ions in the water whereas bases such as copper oxide and ferrous do not produce  $OH^-$  ions. All alkali are bases but not all bases are alkali.

2 + 1

**Q. 2.** Indicate with the help of a diagram the variation of pH with change in concentration of  $H^+$  (aq) and  $OH^-$  (aq) ions. [DDE 2017]

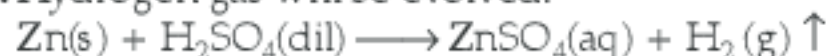
**Ans.**



3

**Q. 3.** When zinc metal is 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 involved and also write a test to detect the gas formed. [NCERT Exemplar 2017]

**Ans.** Hydrogen gas will be evolved.



Test for  $H_2$  Gas — Bring a burning match stick near the gas jar. It burns with a popsound. 1 + 1 + 1

**Q. 4.** Differentiate between strong and weak acids. Identify the strong and weak acids from the following list of acids : hydrochloric acid, acetic acid, formic acid, nitric acid. [NCERT Exemplar]

[Board Term-I Set-16, 2012]

**Ans.** Acids which ionize completely in aqueous solution—strong acids.  $\frac{1}{2}$

Acids which ionize partially in aqueous solution—weak acids  $\frac{1}{2}$

Hydrochloric acid, nitric acid—strong acid  $\frac{1}{2} + \frac{1}{2}$

Acetic acid, formic acid—weak acid  $\frac{1}{2} + \frac{1}{2}$

[CBSE Marking Scheme, 2012]

**Q. 5.** (i) Write the name given to bases that are highly soluble in water. Give an example.

(ii) How is tooth decay related to pH ? How can it be prevented ?

(iii) Why does bee-sting cause pain and irritation ? Rubbing of baking soda on the sting area gives relief. How ? [Board Term-I Set-15, 2012]

**Ans.** (i) Alkali.  $\frac{1}{2}$   
NaOH or KOH  $\frac{1}{2}$

(ii) Tooth decay starts when the pH of the mouth is lower than 5.5. It can be prevented by using tooth pastes which are generally basic. 1

(iii) Bee-sting has acid that causes pain and irritation. Baking soda being alkaline, neutralises acid and gives relief. [CBSE Marking Scheme, 2012] 1

**Q. 6.** (i) Two solutions X and Y are tested with universal indicator. Solution X turns orange whereas solution Y turns red. Which of the solutions is a stronger acid ?

(ii) State the meaning of strong acids and weak acids. Give one example of each.

[Board Term-I Set-L7ZSVLH, 2016]

**Ans. (i)** Solution Y is a stronger acid.

**(ii) Strong acid :** An acid which dissociates completely in water and produces a large amount of hydrogen ions. *e.g.*, HCl.

**Weak acid :** An acid which dissociates partially in water and produces small amount of hydrogen ions. *e.g.*,  $\text{CH}_3\text{COOH}$ .

[CBSE Marking Scheme, 2016] 1 + 1 + 1

**Q. 7.** Name the acid present in the following :

(i) Tomato, (ii) Vinegar, (iii) Tamarind

[Board Term-I Set-2ZGOVVV, 2015]

**Ans. (i)** Tomato — Malic acid and citric acid

(ii) Vinegar — Acetic acid

(iii) Tamarind — Tartaric acid and citric acid. 1 + 1 + 1

**Q. 8.** A liquid has a pH less than 7 which represent an acidic solution :

(i) State the nature of solution, if its pH increases from 7 to 14.

(ii) Mention the ion whose concentration increases with the increase in pH value.

(iii) Suggest a method that is generally used for measuring the pH value.

[Board Term-I Set-45, 2012]

**Ans. (i)** Increase in the strength of alkali. So the nature of solution will be basic. 1

(ii) Hydroxide ion or hydroxyl ion or  $\text{OH}^-$  ion. 1

(iii) A paper impregnated with the universal indicator is generally used to measure the pH of a solution. 1

[CBSE Marking Scheme, 2012]

**Q. 9.** Five solutions A, B, C, D and E showed pH as 4, 7, 1, 11 and 9 respectively when tested with universal indicator. Which solution is : [NCERT]

(i) Neutral

(ii) Strongly alkaline

(iii) Strongly acidic

(iv) Weakly acidic and

(v) Weakly alkaline

[Board Term-I Set-C2, 2010]

**Ans.** Arrange the pH in increasing order of Hydrogen ion concentration.

(i)  $B \rightarrow 7$

(ii)  $D \rightarrow 11$

(iii)  $C \rightarrow 1$

(iv)  $A \rightarrow 4$

(v)  $E \rightarrow 9$ .  $\frac{1}{2} \times 5 = 2\frac{1}{2}$

Arrangement: D, E, B, A, C or 11, 9, 7, 4, 1.  $\frac{1}{2}$

**Q. 10. (i)** Giving reason for each, state which of the following will conduct electricity and which will not :

(a) A solution of glucose

(b) Dil. Hydrochloric acid ?

(ii) If acetic acid and hydrochloric acid of same concentration are taken, which of the two is a stronger acid and why ?

(iii) How is the strength of an acid affected when some water is added to it? [Board Term-I Set-47, 2012]

**Ans. (i)** (a) Solution of glucose will not conduct electricity because it does not have ions.

(b) Dil. HCl will conduct electricity because it produces  $\text{H}^+$  ions in water.  $\frac{1}{2} + \frac{1}{2}$

(ii) HCl is stronger because it gives rise to more  $\text{H}^+$  ions than acetic acid. 1

(iii) The strength of the acid decreases. 1

[CBSE Marking Scheme, 2012]

**Q. 11.** 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 : [Board Term-I Set-50, 2012]

Name of the solution	Colour change with phenolphthalein	Colour change with blue litmus
1. Sodium carbonate		
2. Hydrochloric acid		
3. Sodium chloride		

**Ans.**

Name of the solution	Colour change with phenolphthalein	Colour change with blue litmus
1. Sodium carbonate	turns pink	no change
2. Hydrochloric acid	no change	turns red
3. Sodium chloride	no change	no change

[CBSE Marking Scheme, 2012]  $1 \times 3 = 3$

**Q. 12.** 10 ml of water and 5 ml of sulphuric acid are to be mixed in a beaker.

(i) State the method that should be followed.

(ii) Why should this method be followed ?

(iii) What is this process called ?

[Board Term-I Set-48, 2012]

**Ans. (i)** The acid must slowly be added to water. 1

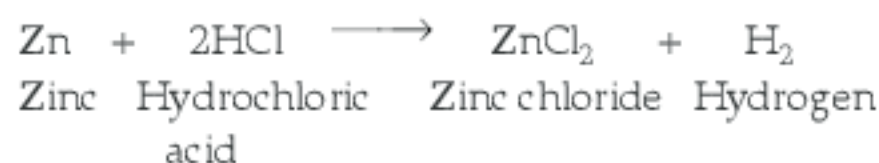
(ii) Otherwise the mixture may splash out causing burns, as a lot of heat is generated in this process. 1

(iii) Dilution of the acid. 1

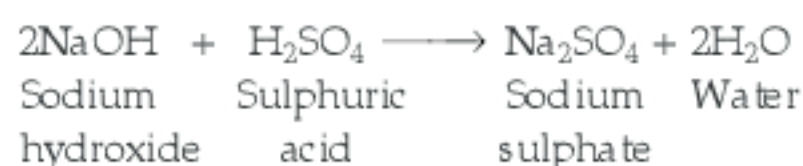
**Q. 13.** Illustrate any three chemical properties of acids with examples.

[Board Term-I Set-WH1SGOB, 2014]

**Ans. (i)** They react with metals to give out hydrogen gas. *e.g.*,

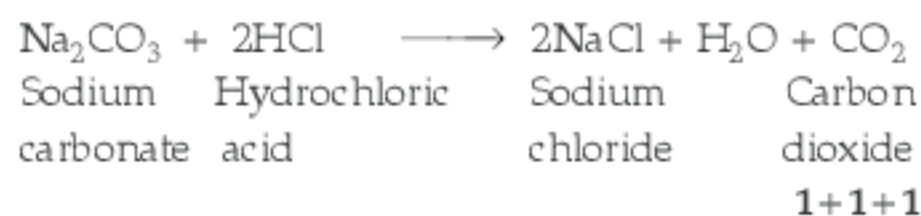


(ii) They react with bases to form salt and water. *e.g.*,



(iii) They react with metal carbonates to liberate  $\text{CO}_2$  gas.



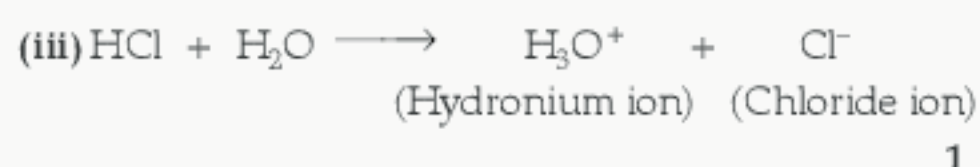


**Q.14.** Sugandha prepares HCl gas in her school laboratory using certain chemicals. She puts both dry and wet blue litmus papers in contact with the gas.

- Name the reagents used by Sugandha to prepare HCl gas.
- State the colour changes observed with the dry and wet blue litmus paper.
- Show the formation of ions when HCl gas combines with water. [Board Term-I Set-48, 2012]

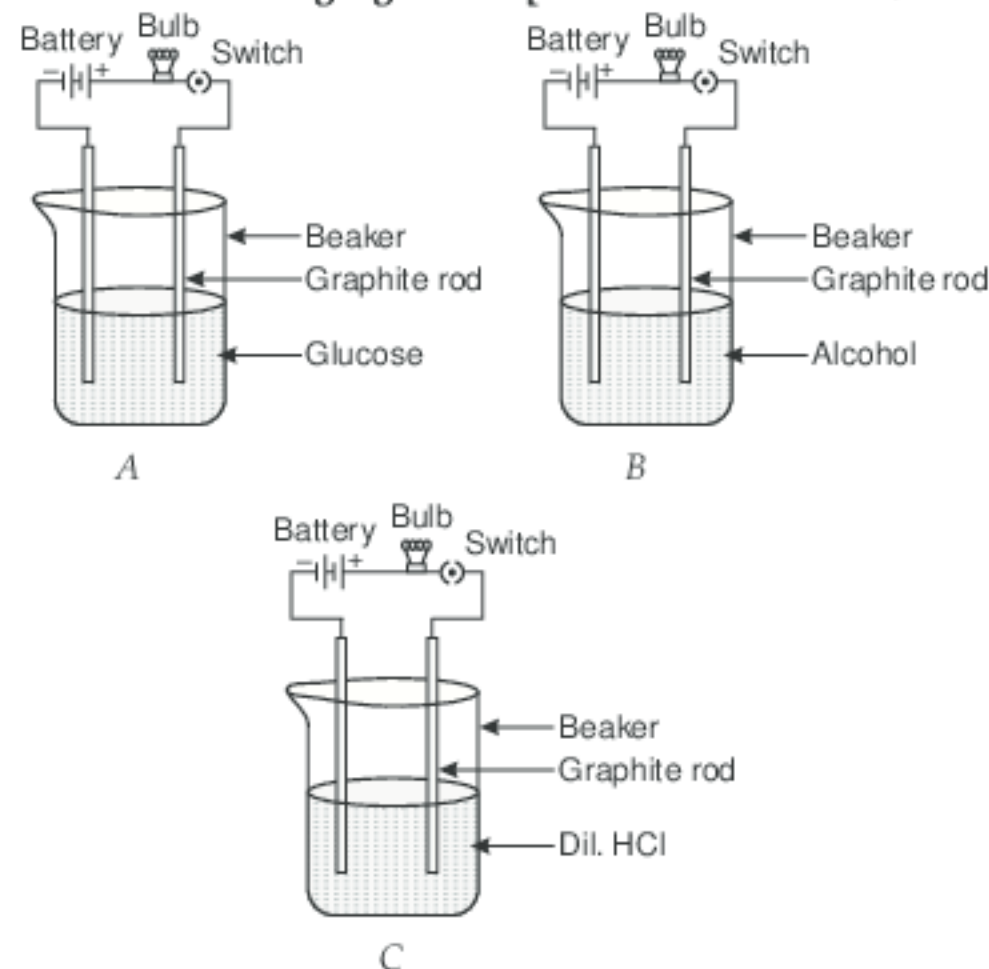
**Ans. (i)** Solid sodium chloride and conc. sulphuric acid. 1

- Dry litmus — no change ½  
Wet blue litmus — changes to red ½



[CBSE Marking Scheme, 2012]

**Q.15.** A student takes three beakers A, B and C filled with aqueous solution of glucose, alcohol and hydrochloric acid respectively as shown in the following figure : [Board Term-I Set-48, 2012]



- State your observation in terms of glowing of bulb when the switch is on.
- Justify your observations by giving reason in each case.
- Mention the change noticed with appropriate reason if the content of beaker B is replaced by sodium hydroxide solution.

**Ans. (i)** Bulb A and B do not glow but bulb C glows. 1

- Glucose and alcohol solutions do not conduct electricity as they do not have ions. 1

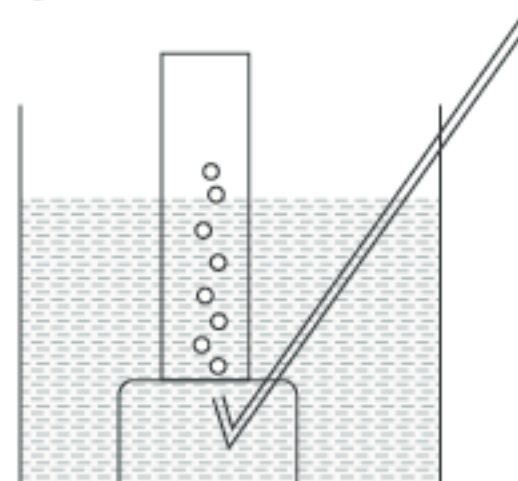
Dil. HCl contains ions so the flow of ions is responsible for the flow of current.

- After replacement, bulb glows in B as NaOH solution contains ions ( $\text{Na}^+$  and  $\text{OH}^-$  ions). 1

[CBSE Marking Scheme, 2012]

**Q.16.** A metal is treated with dilute sulphuric acid. The gas evolved is collected by the method shown in the figure :

[Board Term-I Set-NS9SX1D, Set-51, 2012]



- Name the gas.
- Is the gas soluble or insoluble in water ?
- Is the gas lighter or heavier than air ?
- How will you test the gas ?
- If the metal used above is zinc then write the chemical equation for the evolution of gas.
- Write one industrial use of the gas evolved.

**Ans. (i)** Hydrogen gas.

- Is soluble in water.
- It is lighter than air.
- Test for  $\text{H}_2$  Gas - Bring a burning matchstick near the gas jar. It burns with a pop sound.
- $\text{Zn(s)} + \text{H}_2\text{SO}_4(\text{dil}) \longrightarrow \text{ZnSO}_4(\text{aq}) + \text{H}_2(\text{g}) \uparrow$
- Liquid hydrogen is used as a fuel in rockets. 3

**Q.17.** Explain the action of dilute hydrochloric acid on the following with chemical equation :

- magnesium ribbon
- sodium hydroxide
- crushed egg shells

[Board Term-I Set-OQKPLGV, 2016]

**Ans. (i)**  $\text{Mg} + 2\text{HCl} \longrightarrow \text{MgCl}_2 + \text{H}_2$   
Hydrogen gas is produced.

**(ii)**  $\text{HCl} + \text{NaOH} \longrightarrow \text{NaCl} + \text{H}_2\text{O}$   
Neutralisation reaction

**(iii)**  $2\text{HCl}(\text{aq}) + \text{CaCO}_3(\text{s}) \longrightarrow \text{CaCl}_2(\text{aq}) + \text{H}_2\text{O} + \text{CO}_2$   
Calcium chloride is formed.

[CBSE Marking Scheme, 2016] 1 + 1 + 1

**Detailed Answer :**

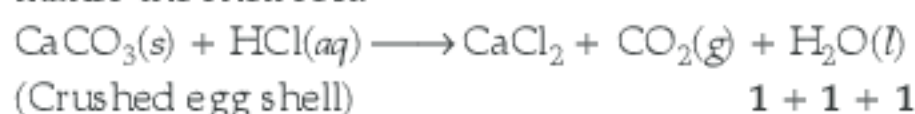
- Dilute hydrochloric acid reacts with magnesium to form magnesium chloride and  $\text{H}_2$  gas is liberated.



- Reaction between dilute hydrochloric acid and sodium hydroxide is a neutralisation reaction. Sodium chloride salt and water are formed.



- (iii) Egg shells are made of calcium carbonate,  $\text{CaCO}_3$ . Dilute hydrochloric acid dissolves the  $\text{CaCO}_3$  and makes the shell soft.



**Q. 18. (a) What is the action of litmus on :**

- (i) dry ammonia gas
- (ii) Solution of ammonia gas in water

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

- (i) ferrous sulphate
- (ii) aluminium chloride.

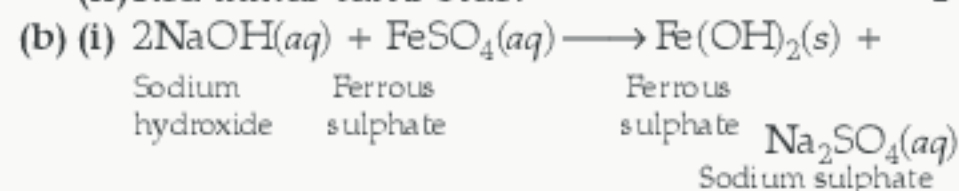
Give balanced chemical equations.

[Board Term-I Set-1ZHNPNO, 2016]

**Ans. (a) (i) No change in colour.**

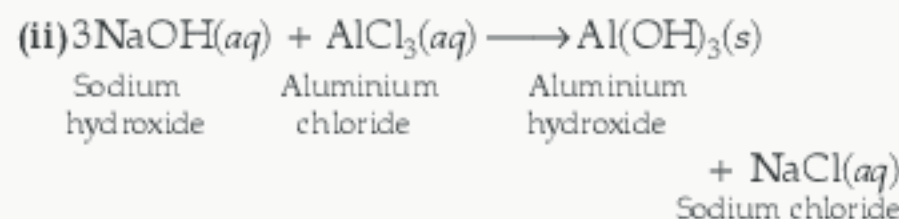
**(ii) Red litmus turns blue.**

**1**



**Observation :**

**(ii) dirty gelatinous green precipitate of  $\text{Fe}(\text{OH})_2$  will be formed.**



**Observation :**

**(ii) White precipitate of  $\text{Al}(\text{OH})_3$  will be formed.**

[CBSE Marking Scheme, 2016] **1 + 1**

**Q. 19. Draw a neat and labelled diagram to show the following activity :**

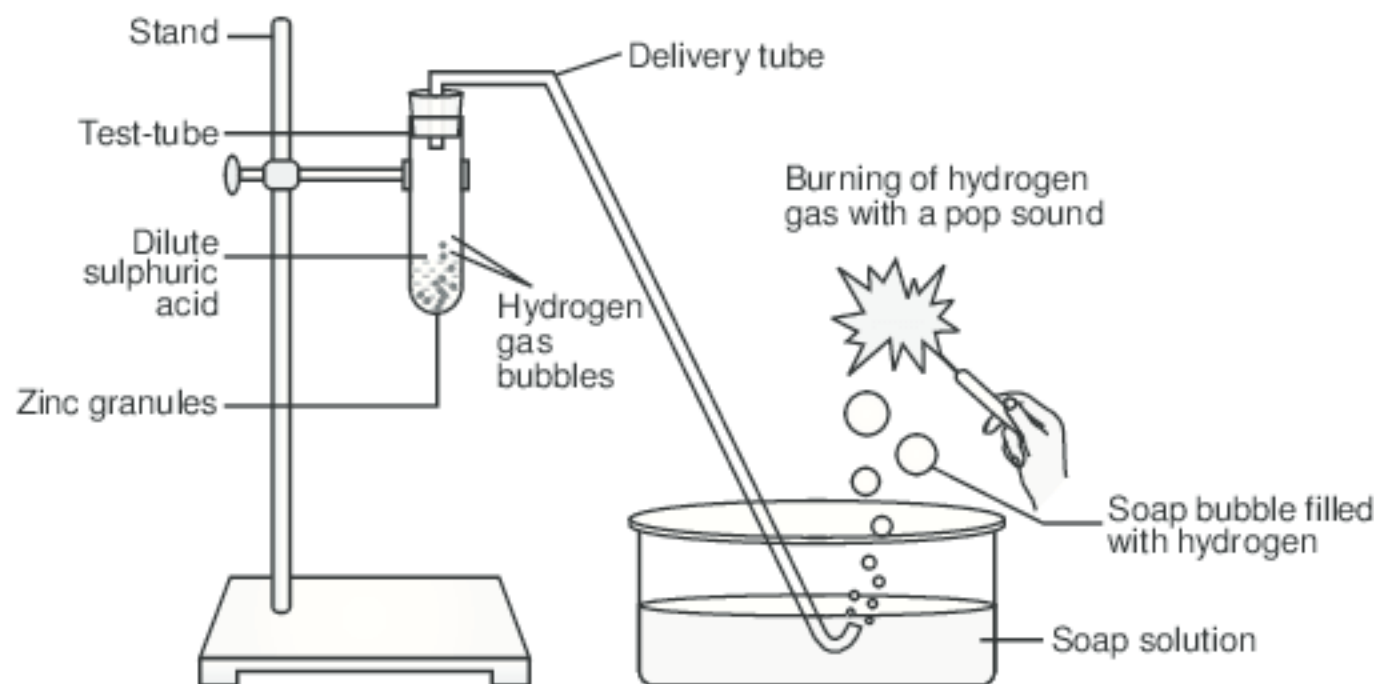
**Action of dilute sulphuric acid on zinc granules.**

[NCERT Exemplar]

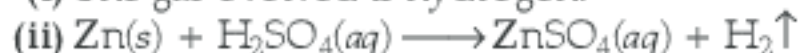
- (i) Name the gas evolved.
- (ii) How will you test for the gas ?

[Board Term-I Set-WDCXXOV, 2016]

**Ans.**



**(i) The gas evolved is hydrogen.**



**Test for  $\text{H}_2$  gas :** The presence of  $\text{H}_2$  gas can be tested by passing the gas through soap solution and then bringing a burning splinter near the soap bubbles filled with the gas. If the gas burns with a pop sound, it is hydrogen.

**1 + 2**

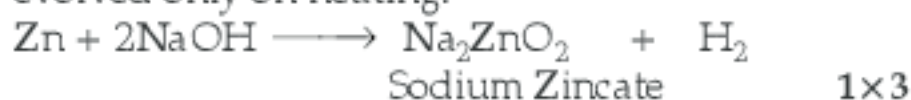
**Q. 20. In the following schematic diagram for the preparation of hydrogen gas as shown in figure, what would happen if following changes are made ?**

- (i) In place of zinc granules, same amount of zinc dust is taken in the test-tube.
- (ii) Instead of dilute sulphuric acid, dilute hydrochloric acid is taken.
- (iii) Sodium hydroxide is taken in place of dilute sulphuric acid and the test-tube is heated.

[Board Term-I Set (B1), 2010]

**Ans.** For Diagram See Topic 1 S.A.T.Q. II Q. no. 16

- (i) Hydrogen gas will evolve with greater speed.
- (ii) Almost same amount of gas is evolved.
- (iii) If sodium hydroxide is taken, hydrogen gas will be evolved only on heating.



**Q. 21. A few crystals of copper sulphate are heated in B / F dry boiling tube :**

- (i) What is the colour before and after heating ?
- (ii) What is the reason for the colour change ?
- (iii) Can its original colour be restored ? How ?

[Board Term-I Set (45), 2012]

**Ans. (i) Blue and white respectively.** 1  
**(ii) Water of crystallization is lost on heating.** 1  
**(iii) Yes, by adding water.** 1

[CBSE Marking Scheme, 2012]

**Q. 22. While eating food, you happen to spill some curry on your white shirt. You immediately scrub it with soap. What happens to its yellow colour on scrubbing with soap ? Why ? What happens to this stain when the shirt is washed with plenty of water ?**

**Ans.** The colour changes from yellow to reddish brown. 1  
 Soap is basic in nature and the colour of turmeric changes from yellow to reddish brown in basic medium. The stain turns yellow again. 2

**Q. 23. After drinking excess of cold drink, a person suffered from acidity. Explain.**



**Ans.** Cold drinks contain carbon dioxide dissolved in them under pressure. Some amount of the gas escapes when a bottle of cold drink is opened while a portion of it remains dissolved. Carbon dioxide

dissolved in water forms a weak acid, carbonic acid. Consumption of excess of cold drink causes accumulation of carbonic acid in the stomach which is responsible for the development of acidity. 3

## Long Answer Type Questions

(5 marks each)

**Q.1.** (i) Define pH scale. Draw a figure showing variation of pH with the change in concentration of  $H^+(aq)$  and  $OH^-(aq)$  ions.

(ii) Mention the range of pH of acidic solution, basic solution and neutral solution respectively.

[Board Term-I Set-WDCXXOV, 2016]

[NCERT Exemplar]

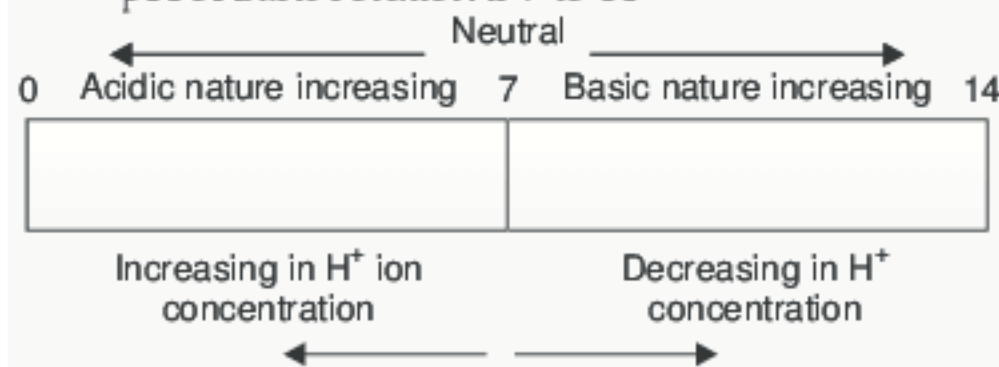
**Ans.** (i) Scale for measuring  $[H^+]$  concentration in a solution is called pH scale.

Refer to below figure.

(ii) pH of Neutral solution is 7

pH of Acidic solution is 0 to below 7

pH of Basic solution is 7 to 14



[CBSE Marking Scheme, 2016] 5

**Q.2.** (i) Define universal indicator. For what purpose it is used?

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

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

[Board Term-I Set-1ZHNPNO, 2016]

**Ans.** (i) Universal indicator is a mixture of many different indication (or dyes) which give different colours at different pH values of the entire pH scale. The colour produced by universal indicator is used to find the pH value of acid or base by matching the colour with the colours on pH colour chart.

(ii) Solution A is acidic and will turn litmus solution from blue to red.

Solution B is basic and will turn phenolphthalein from colourless to pink.

(iii) Green colour will be obtained.

[CBSE Marking Scheme, 2016] 5

**Q.3.** (i) Explain why is hydrochloric acid a strong acid and acetic acid, a weak acid. How can it be verified?

(ii) Explain why aqueous solution of an acid conducts electricity.

(iii) You have four solutions A, B, C and D. The pH of solution A is 6, B is 9, C is 12 and D is 7,

(a) Identify the most acidic and most basic solutions.

(b) Arrange the above four solutions in the increasing order of  $H^+$  ion concentration.

(c) State the change in colour of pH paper on dipping in solution C and D.

[Board Term-I Set (31), 2012]

**Ans.** (i) HCl will give rise to more  $H^+$  ions and  $CH_3COOH$  produces less  $H^+$  ions on dissociation. The colour of pH paper depends on the concentration of  $H^+$  ion. Colour becomes red for high  $H^+$  concentration. 1

(ii) Aqueous solution of acids have  $H^+$  ions which carry electric current through the solution. 1

(iii) (a) Most acidic — A, Most basic — C  $\frac{1}{2} + \frac{1}{2}$

(b) C, B, D, A / C < B < D < A  $\frac{1}{2} + \frac{1}{2}$

(c) In C- blue, In D- green  $\frac{1}{2} + \frac{1}{2}$

[CBSE Marking Scheme, 2012]

**Q.4.** (a) In a tabular form, write the colours of the following indicators in presence of acid and bases : Litmus solution, phenolphthalein solution, methyl orange solution.

(b) Classify the following given solutions A and B in acidic and basic, giving reason.

Solution A :  $[H^+] (<) [OH^-]$ .

Solution B :  $[H^+] (>) [OH^-]$ .

[Board Term-I Set-2ZGOVVV, 2015]

**Ans.** (a)

Indicators	Acid	Base
Litmus solution	Blue to Red	Red to Blue
Phenolphthalein	Colourless	Pink
Methyl orange	Yellow	Pink

(b) Solution A — Basic solution

Because,  $[H^+]$  is lesser than  $1.0 \times 10^{-7}$ .

Solution B — Acidic solution

Because  $[H^+]$  is greater than  $1.0 \times 10^{-7}$  m 5

**Q.5.** Account for the following :

(i) State the relation between hydrogen ion concentration of an aqueous solution and its pH.

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

(iii) Which has a higher pH value, 1 M HCl or 1 M NaOH solution?

(iv) Tooth enamel is one of the hardest substances in our body. How does it undergo damage due to



eating chocolates and sweets ? What should we do to prevent it ?

(v) How do  $[H^+]$  ions exist in water ?

[Board Term-I 2016 Set-OQKPLGV]

**Ans. (i)** If  $H^+$  ion concentration is more, pH will be less and vice versa or pH of a solution is inversely proportional to  $H^+$  ion concentration or  $pH = -\log(H^+)$ .

(ii) This solution is neutral.

(iii) 1M NaOH solution.

(iv) When the pH in the mouth is below 5.5, bacteria present in the mouth produce acids by degradation of sugar and corrode the tooth enamel. It can be prevented by using tooth pastes which are generally basic.

(v) As hydronium  $[H_3O]^+$  ion.

[CBSE Marking Scheme, 2016] 5

**Q. 6. (i)** Acids as well as bases ionize in water. Name the ions produced by each in water.

(ii) If we have hydrochloric acid and acetic acid of equal concentration, which will be a stronger acid and why ?

(iii) How will the concentration of hydrogen ions gets affected if an acid is diluted ?

[Board Term-I Set-WJ7QPA9, 2013]

**Ans. (i)**  $H^+/H_3O^+$  and  $OH^-$  respectively.

(ii) Hydrochloric acid will be a stronger acid, because it produces more  $H^+$  ions.

(iii) Concentration of  $H^+$  decreases with increase in dilution. 2+2+1

**Q. 7. (i)** Bee-sting leaves a chemical substance that causes pain and irritation. Name the chemical substance. Identify the type of substance which may give relief on the sting area when applied on it.

(ii) Mention the pH value below which tooth decay begins. How this fall below this value ? Explain the ill effect of the acidic medium in the mouth. How can this be prevented ?

(iii) What are strong acids and weak acids ? Give an example of each. [Board Term-I Set-36, 2012]

**Ans. (i)** Methanoic acid ( $HCOOH$ ). Use of Baking soda can give relief on the stung area when applied on it.  $\frac{1}{2} + \frac{1}{2}$

(ii) Tooth enamel, made of calcium phosphate does not dissolve in water, but it is corroded when pH is below 5.5 (acidic). 1

Bacteria present in the mouth produce acids by degradation of sugar and food particles remaining in the mouth. It can be prevented by using tooth paste, which is generally basic to neutralise excess acid. 1

(iii) **Strong acids :** Those acids that give rise to more  $H^+$  ion concentration, e.g.  $HCl$ ,  $H_2SO_4$ ,  $HNO_3$ . 1

**Weak acids :** Those acids that give rise to less  $H^+$  ion concentration, e.g. acetic acid, lactic acid. 1

[CBSE Marking Scheme, 2012]

**Q. 8. (i)** A local magician was showing magic in a village street. He took egg shell and poured a solution over it. As a result, effervescence were formed. When he took a burning matchstick over it, it went off :

(a) Identify the solution poured and the substance present in egg shell.

(b) What is the reason behind effervescence ?

(c) Write its balanced chemical equation.

(d) Give the common name of the substance present in the egg shell.

(ii) Draw a labelled diagram to show that acid solution in water conducts electricity.

[Board Term-I Set-3R6WRQL, 2013]

**Ans. (i) (a)** Solution is an acid. Substance in egg shell is calcium carbonate.

(b) Effervescence is due to the evolution of  $CO_2$  gas.

(c)  $2HNO_3 + CaCO_3 \longrightarrow 2Ca(NO_3)_2 + H_2O + CO_2$

(d) Lime stone. 1+1+1+ $\frac{1}{2}$

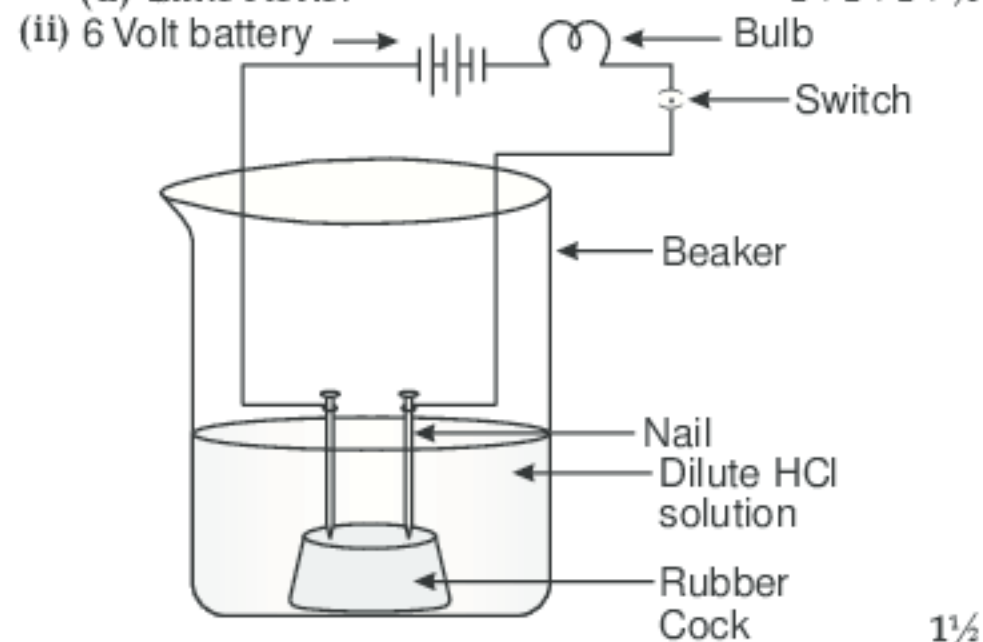


Fig. Acid solution in water conducts electricity

**Q. 9. (i)** Name the gas which is liberated when an acid reacts with a metal. How will you test the presence of this gas ?

(ii) Write the chemical equation for the reaction of zinc metal with :

(a) hydrochloric acid and

(b) with sodium hydroxide. Write the chemical name of salt obtained in each case.

(iii) Identify the acid and base for ammonium chloride salt. What would be the nature of this salt ? Mention the pH range of this salt.

[Board Term-I Set-31, 2012]

**Ans. (i)** Hydrogen burns with pop sound.  $\frac{1}{2} + \frac{1}{2}$

(ii) (a)  $Zn(s) + 2HCl \longrightarrow ZnCl_2(aq) + H_2(g)$   $\frac{1}{2} + \frac{1}{2}$   
Zinc chloride

(b)  $Zn(s) + NaOH \longrightarrow Na_2ZnO_2 + H_2$   $\frac{1}{2} + \frac{1}{2}$   
Sodium Zincate

(iii)  $HCl, NH_4OH \Rightarrow NH_4OH + HCl \longrightarrow NH_4Cl + H_2O$   $\frac{1}{2} + \frac{1}{2}$

Nature of salt-acidic as it is formed by neutralisation of strong acid and weak base.

Its pH value will be less than 7 (pH range 1-6)  $\frac{1}{2} + \frac{1}{2}$

[CBSE Marking Scheme, 2012]



**Q. 10.** (a) Five solutions A, B, C, D and E when tested with universal indicator showed pH as 4, 1, 11, 7 and 9 respectively. Which solution is :

- (i) neutral (ii) strongly alkaline  
(iii) strongly acidic (iv) weakly acidic  
(v) weakly alkaline ?

Arrange the solutions in increasing order of  $H^+$  ion concentration.

(b) Name the acid and base from which the following salts have been formed.

- (i) Sodium acetate (ii) Ammonium chloride  
[Board Term-I Set (37), 2012]

**Ans.** (a) (i) Solution D (ii) Solution C  
(iii) Solution B (iv) Solution A  
(v) Solution E  $5 \times \frac{1}{2} = 2\frac{1}{2}$   
Increasing order C, E, D, A, B  $\frac{1}{2}$

- (b) (i) Acid —  $CH_3COOH$  (Acetic acid)  
Base —  $NaOH$  (Sodium hydroxide) 1  
(ii) Acid —  $HCl$  (Hydrochloric acid)  
Base —  $NH_4OH$  (Ammonium hydroxide) 1  
[CBSE Marking Scheme, 2012]

**Q. 11.** (i) Mention the pH range within which our body works. Explain how antacids give relief from acidity. Write the name of one such antacid.

(ii) How will the pH of fresh milk change as it turns to curd ? Explain your answer. [NCERT]

(iii) A milkman adds a very small amount of baking soda to fresh milk. Why does this milk take longer time to set as curd ? [NCERT] [KVS 2017]

(iv) Mention the nature of tooth pastes. How do they prevent tooth decay ? [Board Term-I Set (39), 2012]

**Ans.** (i) 7.0–7.8.  $\frac{1}{2}$

During indigestion, stomach produces too much acid which causes pain. Antacids are alkaline and so neutralize the excess acid. 1

Milk of Magnesia  $\frac{1}{2}$

(ii) The pH will decrease. The milk when changes to curd becomes more acidic because of lactic acid. Lesser the pH value, more is the acidic nature.

(iii) pH will decrease, so that milk does not get spoilt / sour / when changed into curd. 1

Because enzymes which can change milk to curd does not work in alkaline pH. 1

(iv) Tooth pastes are alkaline in nature. They neutralize the excess acid produced by bacteria in mouth. 1

[CBSE Marking Scheme, 2012]

**Q. 12.** (i) Write balanced chemical equations only for the following chemical properties of acids :

- (a) When an acid reacts with a metal.  
(b) When an acid reacts with a metal bicarbonate.  
(c) When an acid reacts with a base.

(ii) Three solutions A, B and C has pH values 5, 8 and 10 respectively. Amongst the three, which solution has maximum hydrogen ion concentration ? Classify the nature of the three solutions as acidic or basic.

[Board Term-I Set (44), 2012]

**Ans.** (i) (a)  $Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2$  1

(b)  $HCl + NaHCO_3 \longrightarrow NaCl + H_2O + CO_2$  1

(c)  $HCl + NaOH \longrightarrow NaCl + H_2O$  1

(ii) A has maximum  $[H^+]$  concentration 1

A is acidic.  $\frac{1}{2}$

B and C are basic in nature.  $\frac{1}{2}$

[CBSE Marking Scheme, 2012]

## TOPIC-2

### Salts, Their Properties and Uses

#### Very Short Answer Type Questions

(1 mark each)

**Q. 1.** Write the name of the products formed by heating gypsum at 373 K. Write one use of it.

[KVS, 2017]

**Ans.** Plaster of Paris and water.

Use— It is used for plastering fractured bone.  $\frac{1}{2} + \frac{1}{2}$

**Q. 2.** Write an equation to show the reaction between Plaster of Paris and water. [NCERT Exemplar]

**Ans.**  $CaSO_4 \cdot \frac{1}{2}H_2O + 1\frac{1}{2}H_2O \longrightarrow CaSO_4 \cdot 2H_2O$   
Plaster of Paris Gypsum 1

**Q. 3.** Name a salt which does not contain water of crystallisation. [Board Term-I Set (C2), 2010]

[DDE 2017]

**Ans.** Baking soda. 1

**Q. 4.** Name two constituents of Baking Powder.

[DDE 2017]

**Ans.** Baking powder is a mixture of baking soda and a mild edible acid like tartaric acid. 1

**Q. 5.** How would you distinguish between baking powder and washing soda by heating ?

[NCERT Exemplar 2017]

**Ans.** Baking powder ( $NaHCO_3$ ) on heating produces carbon dioxide which extinguishes a burning matchstick. It also give sodium carbonate and water vapour.



When washing soda ( $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ ) is heated it does not produce carbon dioxide but it loses water of Crystallisation molecules.



**Q.5.** Name the sodium compound which is used for softening hard water. [NCERT Exemplar]

**Ans.** Sodium carbonate. 1

**Q.6.** Which by-product of chloralkali process is used for manufacturing bleaching powder?

[DDE 2017]

**Ans.** Bleaching powder is produced by the action of chlorine on dry slaked lime. 1

**Q.7.** What is the common name of the compound  $\text{CaOCl}_2$ ? [NCERT Exemplar]

**Ans.** Bleaching powder. 1

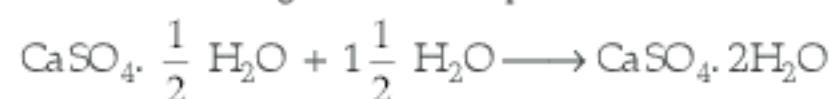
**Q.8.** What would be the colour of litmus in a solution of sodium carbonate?

[Board Term-I Set (C2), 2010]

**Ans.** The colour of litmus in a solution of sodium carbonate is blue. 1

**Q.9.** Plaster of Paris should be stored in a moisture proof container. Explain why? [NCERT, 2017]

**Ans.** The Plaster of Paris should be stored in a moisture-proof container as it absorbs water from moisture and turn into hard substance (Gypsum) as shown in the following chemical equation.



(Plaster of Paris) (Gypsum) 1 + 1

## Short Answer Type Questions-I

(2 marks each)

**Q.1.** Why does bleaching powder smell strongly of chlorine and does not dissolve completely in water? [DDE 2017]

**Ans.** When exposed to air, bleaching powder gives a smell of chlorine. This is because bleaching powder reacts with carbon dioxide from the atmosphere to produce calcium carbonate and chlorine gas. 2

**Q.2.** What is bleaching powder? How is it prepared? List two uses of bleaching powder.

[Board Term-I Set-38, 2011]

**Ans.** Bleaching powder is calcium oxychloride. It is prepared by the action of chlorine on dry slaked lime.  $\frac{1}{2} + \frac{1}{2}$



Bleaching  
power

**Uses :**

(i) Used for bleaching cotton and linen in the textile industry and wood pulp in paper industry etc.

(ii) It is used for disinfecting the drinking water.  $\frac{1}{2} + \frac{1}{2}$

**Q.3.** What is baking powder? How does it make the cake soft and spongy? [KVS 2017]

**Ans.** Baking Powder is a mixture of sodium hydrogen carbonate and tartaric acid. On heating it liberates  $\text{CO}_2$  which makes the cake soft and spongy. 1 + 1

**Q.4.** How washing soda is prepared from baking soda? [DDE 2017]

**Ans.** Recrystallization of sodium carbonate gives washing Soda. It is a basic salt.



**Q.6.** Give two important uses of washing soda and baking Soda. [NCERT]

**Ans.** Uses of Washing Soda :

(i) In glass, Soap and paper industry.

(ii) Manufacture of Borax.

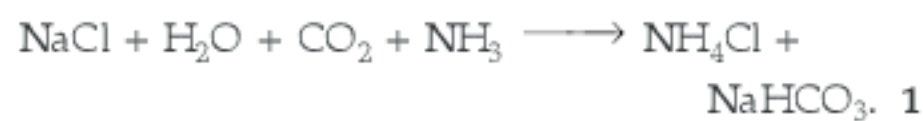
**Uses of Baking Soda :**

(i) An ingredient in antacid.

(ii) Used in Soda acids, fire extinguishers. 1 + 1

**Q.7.** Write the chemical formula of baking soda. How is baking soda prepared? Write the reaction which takes place when it is heated during cooking. [Board Term-I Set-C1, 2011, 2010]

**Ans.** The chemical formula of baking soda is  $\text{NaHCO}_3$ .  $\frac{1}{2}$   
It is prepared by using sodium chloride.



**On heating :**



**Q.8.** Name the gas evolved when sodium hydrogen carbonate is made to react with dilute hydrochloric acid. How will you test the gas?

[Board Term-I Set-23, 2011]

**Ans.** Carbon dioxide ( $\text{CO}_2$ ). 1

Pass this gas to lime water, it turns lime water milky. 1

**Q.8.** A white powder is added while baking breads and cakes to make them soft and fluffy. What is the name of the powder? What are the main ingredients in it? What are the functions of each ingredient? [DDE 2017]

[Board Term-I Set (15), 2011 Set (C1), 2010]

**Ans.** Baking powder.  $\frac{1}{2}$

Baking soda and an edible acid like tartaric acid.  $\frac{1}{2}$

Baking soda ( $\text{NaHCO}_3$ ) is used to release  $\text{CO}_2$  gas when heated.  $\frac{1}{2}$

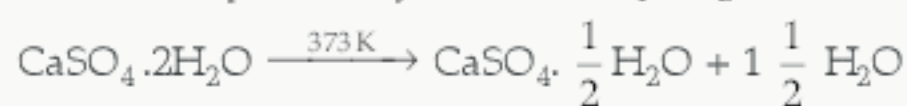
Tartaric acid is used to avoid the bitter taste by reacting with the  $\text{Na}_2\text{CO}_3$  formed.  $\frac{1}{2}$

**Q.10.** Write the chemical name and formula of gypsum. What happens when gypsum is heated at 373 K. Write chemical equation for the reaction. [DDE 2017]

[Board Term-I Set-OQKPLGV, 2016]



**Ans.** Calcium sulphate dihydrate;  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$   $\frac{1}{2} + \frac{1}{2}$



Gypsum

Plaster of Paris

[CBSE Marking Scheme, 2016]

**Detailed Answer :**

Chemical name of gypsum—Calcium sulphate dihydrate  $\frac{1}{2}$

Chemical formula of gypsum— $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$   $\frac{1}{2}$

When Gypsum is heated at 373 K, it will form plaster of paris and water.



(Gypsum)

(Plaster of Paris)

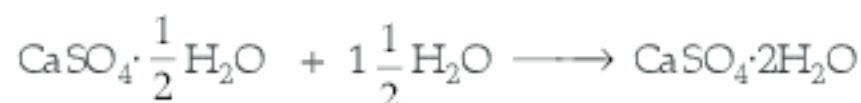
1 + 1

**Q. 11.** State the chemical name of Plaster of Paris. Write a chemical equation to show the reaction between Plaster of Paris and water.

[Board Term-I Set (28), 2011]

**Ans.**  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  (Calcium sulphate hemihydrate)

When plaster of paris reacts with water, gypsum is formed. 1



Plaster of Paris

Gypsum

1

**Q. 12.** Classify the following salts as acidic, basic or neutral :

(i) NaCl

(ii)  $\text{Na}_2\text{SO}_4$

(iii)  $\text{CaCl}_2$

(iv)  $\text{K}_2\text{CO}_3$  [DDE-2014]

**Ans.** (i) Acidic salt –  $\text{CaCl}_2$

(ii) Basic salt –  $\text{K}_2\text{CO}_3$

(iii) Neutral salt – NaCl,  $\text{Na}_2\text{SO}_4$   $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$

**Q. 13.** Classify the following salts into acidic, basic and neutral—

Potassium sulphate, ammonium chloride, sodium carbonate, sodium chloride.

[Board Term-I Set-C2, 2010]

**Ans.** Neutral Salts : Potassium sulphate, sodium chloride  $\frac{1}{2} + \frac{1}{2}$

Basic Salts : Sodium carbonate  $\frac{1}{2}$

Acidic Salts : Ammonium chloride.  $\frac{1}{2}$

**Q. 14.** Explain why, an aqueous solution of sodium sulphate is neutral while an aqueous solution of sodium carbonate is basic in nature.

[DDE-2015, Board Term-I Set-5X7289R, 2014]

**Ans.** Sodium sulphate when dissolves in water forms strong acid and strong base so its aqueous solution is neutral while sodium carbonate when dissolves in water forms an alkaline solution which turns red litmus blue. It shows that its aqueous solution is basic in nature. 2

**Q. 15.** The colour of copper sulphate solution changes when an iron nail is dipped in it. State the reason giving chemical equation for the reaction involved. [Board Term-I Set-14, 2011]

**Ans.**  $\text{CuSO}_4 + \text{Fe} \longrightarrow \text{FeSO}_4 + \text{Cu}$  1

(Blue)

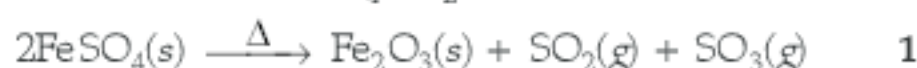
(Green)

Iron is more reactive than copper. Hence it displaces copper from copper sulphate and due to formation of  $\text{FeSO}_4$ , the colour changes from blue to green. 1

**Q. 16.** A green coloured hydrated metallic salt on heating loses its water of crystallisation and gives the smell of burning sulphur. Identify the salt and write down the reaction involved.

[Board Term-I Set (B1), 2011, 2010]

**Ans.** Green vitriol :  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$  1

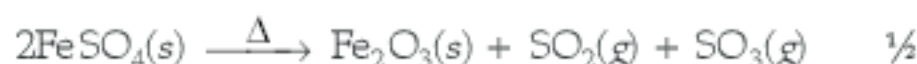


**Q. 17.** What is the colour of  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$  crystals ? How does this colour change upon heating ? Give balanced chemical equation for the changes.

[Board Term-I Set (29), 2011 Set (B1), 2010]

**Ans.**  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$  is green in colour and loses water of crystallisation when it is heated.

It is then decomposed to  $\text{Fe}_2\text{O}_3$  (brown coloured),  $\text{SO}_2$  and  $\text{SO}_3$ . 1



**Q. 18.** Crystals of a substance changed their colour on heating in a closed vessel but regained after sometime, when they were allowed to cool down. [Board Term-I Set (33), 2011]

(i) Name one such substance.

(ii) Explain the phenomenon involved.

**Ans.** (i)  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$   $\frac{1}{2}$



(Blue)

(White)

(ii) Explanation : On heating, crystal loses water of crystallisation and regain it on cooling. 1

**Q. 19.** An aluminium cane is used to store ferrous sulphate solution. It is observed that in few days, holes appeared in the cane. Explain the cause for this observation and write the chemical reaction to support your answer.

[Board Term-I Set-34, 2011]

**Ans.** Aluminium is more reactive than iron. Aluminium from the walls can react with ferrous sulphate to form its sulphate and iron is precipitated.



**Q. 20.** (i) What would be the colour of the solution when copper oxide and dilute hydrochloric acid are mixed ?

(ii) Write a chemical equation which represents that the effect of a base is nullified by an acid and vice-versa. [Board Term-I Set-41, 2011]

**Ans.** (i) It is blue green. 1



**Q. 21.** How will you prove that a given salt is a carbonate of a metal ?

[Board Term-I Set-24, 2011]



**Ans.** To salt, add few drops of dilute HCl or  $\text{H}_2\text{SO}_4$ , if colourless gas is evolved with brisk effervescence and on passing it through lime water, the lime water

turns milky, the gas is  $\text{CO}_2$  and salt is a carbonate of metal. 2

## Short Answer Type Questions-II

(3 marks each)

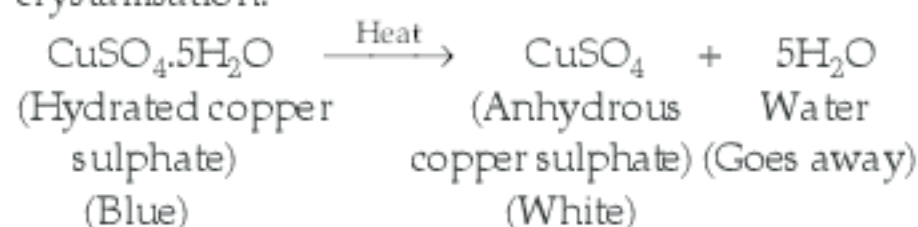
- Q. 1.** (i) What is meant by the term hydrated salt?  
 (ii) Give two examples of hydrated salt which are white and state their chemical formula. [DDE 2017]  
 [Board Term-I Set (37), 2012]

**Ans.** (i) Salt that contains water of crystallisation. 1  
 (ii) Washing soda —  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$   $\frac{1}{2} + \frac{1}{2}$   
 Gypsum —  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$   $\frac{1}{2} + \frac{1}{2}$   
 Plaster of paris —  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ .

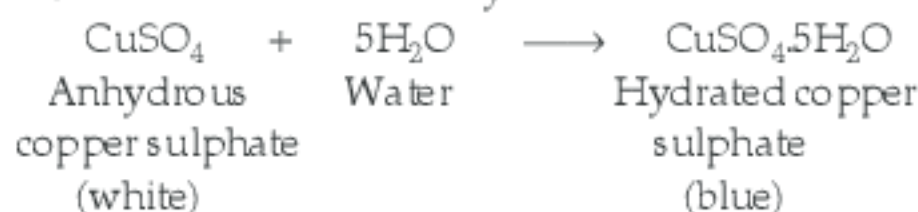
[CBSE Marking Scheme, 2012]

- Q. 2.** Define water of crystallisation with two examples. How will you prove their existence in the examples given by you? [DDE-2015]

**Ans.** Water of crystallisation is a fixed number of water molecules present in one formula unit of a salt. One formula unit of copper sulphate contains five water molecules ( $5\text{H}_2\text{O}$ ). The water molecules which form part of the structure of a crystal are called water of crystallisation.



\* Due to loss of water of crystallisation.



\* By adding water 1 + 1 + 1

- Q. 3.** A sanitary worker uses a white chemical having strong smell of chlorine gas to disinfect the water tank.

- (i) Identify the chemical compound, write its chemical formula.  
 (ii) Give chemical equation for its preparation.  
 (iii) Write its two uses other than disinfection.

[Board Term-I Set-L7ZSVLH, 2016]

**Ans.** (i) Bleaching powder —  $\text{CaOCl}_2$   
 (ii)  $\text{Ca}(\text{OH})_2 + \text{Cl}_2 \longrightarrow \text{CaOCl}_2 + \text{H}_2\text{O}$   
 (iii) Two uses other than disinfection are :

(a) Paper industries (b) Chemical Industries.

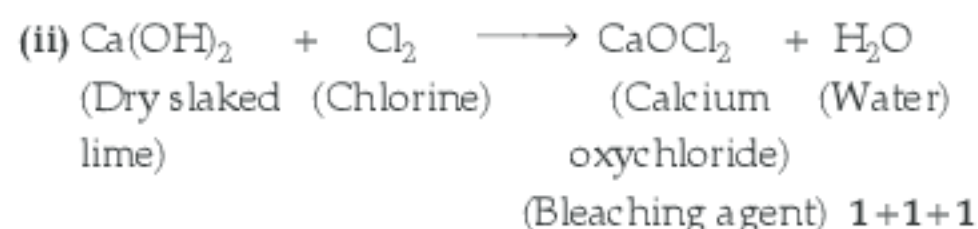
[CBSE Marking Scheme, 2016] 1 + 1 + 1

- Q. 4.** 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 dry slaked lime to give a compound 'Y' which is used as bleaching agent in textile industry.

[Board Term-I Set 2ZGOVVV, 2015]

[NCERT Exemplar 2017]

**Ans.** (i) X = Chlorine gas, Y = Calcium oxychloride



- Q. 5.** What is meant by water of crystallization? How many molecules of water are present in hydrated copper sulphate? Write its formula. What colour change do you observe when it is heated? [Board Term-I Set (43), 2012]

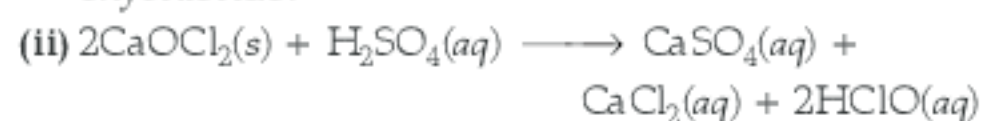
**Ans.** Water of crystallization is the fixed number of water molecules present in one formula unit of salt. 1

- (i) Five molecules of water.  $\frac{1}{2}$   
 (ii) Formula —  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$   $\frac{1}{2}$   
 (iii) When heated, its colour changes from blue to white. [CBSE Marking Scheme, 2012] 1

- Q. 6.** (i) How chloride of lime chemically differs from calcium chloride?

- (ii) What happens when chloride of lime reacts with sulphuric acid? Write chemical equation involved.  
 (iii) Mention two uses of chloride of lime. [DDE-2014]

**Ans.** (i) Chemically chloride of lime is known as calcium oxychloride.



Hypochlorous acid Nascent oxygen  
 Coloured Substance + [O]  $\longrightarrow$  Colourless.

- (iii) (a) Bleaching powder is used for bleaching purposes in textile and paper industry and in laundry.

(b) It is also used as a disinfectant for water. 1 + 1 + 1

- Q. 7.** A gas X reacts with lime water and forms a compound Y which is used as bleaching agent in the chemical industry. Identify X and Y. Give the chemical equation of the reaction involved.

[KVS 2017]

**Ans.** X is Chlorine

Y is  $\text{CaOCl}_2$  (Calcium oxychloride) used as bleaching agent.



- Q. 8.** Write the chemical formula of bleaching powder. Write balanced chemical equation involved in the preparation of bleaching powder and write its three uses. [Board Term-I Set (36) 2012]



**Ans.** Chemical formula —  $\text{CaOCl}_2$   $\frac{1}{2}$   
 Chemical equation —  
 $\text{Ca(OH)}_2 + \text{Cl}_2 \longrightarrow \text{CaOCl}_2 + \text{H}_2\text{O}$  1  
**Uses :**  
 (i) For bleaching cotton and linen in textile industry  $\frac{1}{2}$   
 (ii) As an oxidising agent in a chemical industry.  $\frac{1}{2}$   
 (iii) For disinfecting water.  $\frac{1}{2}$   
**[CBSE Marking Scheme, 2012]**

**[A] Q.9.** (i) A white powder is an active ingredient of antacids and is used in preparation of baking powder. Name the compound and explain that how it is manufactured. Give chemical equation.

(ii) Write a chemical equation to show the effect of heat on this compound.

**[Board Term-I, 1ZHNPN0, 2016]**

**Ans.** (i) Compound is  $\text{NaHCO}_3$ /baking soda/sodium hydrogen carbonate  
 Manufacture -  $\text{NH}_3 + \text{NaCl} + \text{H}_2\text{O} + \text{CO}_2 \longrightarrow \text{NH}_4\text{Cl} + \text{NaHCO}_3$

(ii)  $2\text{NaHCO}_3 \xrightarrow{\text{Heat}} \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$   
**[CBSE Marking Scheme, 2016] 3**

**Detailed Answer :**

(i) The Compound is  $\text{NaHCO}_3$  (Sodium hydrogen carbonate)(Commonly known as baking soda)

**Manufacturing Sodium hydrogen carbonate :**

$\text{NH}_3 + \text{NaCl} + \text{H}_2\text{O} + \text{CO}_2 \longrightarrow \text{NH}_4\text{Cl} + \text{NaHCO}_3$

(ii) On heating, Baking Soda decomposes into Sodium carbonate, water and carbon dioxide.

$2\text{NaHCO}_3 \xrightarrow{\Delta} \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$   
 1 + 1 + 1

**[U] Q.10.** "Sodium hydrogen carbonate is a basic salt" Justify the statement. How is it converted into washing soda ? Explain.

**[Board Term-I Set-41, 2012]**

**Ans.** It is a salt produced by the neutralization reaction between a strong base ( $\text{NaOH}$ ) and a weak acid ( $\text{H}_2\text{CO}_3$ ), hence it is a basic salt. 1

It is heated strongly to produce sodium carbonate.

$2\text{NaHCO}_3 \xrightarrow{\Delta} \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$  1

Sodium carbonate is recrystallized to produce washing soda.

$\text{Na}_2\text{CO}_3 + 10\text{H}_2\text{O} \longrightarrow \text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  1  
**[CBSE Marking Scheme, 2012]**

**[A] Q.11.** A student dropped few pieces of marble in dilute hydrochloric acid, contained in a test-tube. The evolved gas was then passed through lime water.

What change would be observed in lime water ?

What will happen if excess of gas is passed through lime water ?

**[Board Term-I Set-12, 2012]**

**Ans.**  $\text{CaCO}_3 + 2\text{HCl} \longrightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$  1  
 Marble is calcium carbonate and on reacting with  $\text{HCl}$  releases  $\text{CO}_2$ .

$\text{Ca(OH)}_2 + \text{CO}_2 \longrightarrow \text{CaCO}_3 + \text{H}_2\text{O}$   
 (Lime water) (White ppt)

Lime water turns milky due to the formation of white precipitate of  $\text{CaCO}_3$ . On passing excess  $\text{CO}_2$ , milkiness disappears because  $\text{Ca(HCO}_3)_2$  is formed which is soluble in water. 1

$\text{CaCO}_3 + \text{H}_2\text{O} + \text{CO}_2 \longrightarrow \text{Ca(HCO}_3)_2$  1  
 Soluble in water

**[CBSE Marking Scheme, 2012]**

**[U] Q.12.** What happens when a solution of baking soda is heated ? Write chemical equation for the same. Name the product which is responsible for making the bread or cake spongy and fluffy.

**[Board Term-I Set-44, 2012]**

**Ans.** When baking soda is heated, it decomposes to produce sodium carbonate, water and  $\text{CO}_2$  gas. 1

$2\text{NaHCO}_3 \xrightarrow{\Delta} \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$  1

$\text{CO}_2$  gas produced during the reaction makes the cake or bread spongy and fluffy. 1

**[CBSE Marking Scheme, 2012]**

**[U] Q.13.** State what happens when :

(i) Gypsum is heated at 373 K.

(ii) Blue crystals of copper sulphate are heated.

(iii) Excess of carbon dioxide gas is passed through lime water. **[Board Term-I Set-IN14K9B, 2014]**

**Ans.** (i) It loses water molecules and becomes calcium sulphate hemihydrate  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  or plaster of Paris.

(ii) Blue copper sulphate crystals on heating lose water of crystallisation and become white. When these crystals are left open, will absorb moisture from air and regain blue colour.

(iii) On passing  $\text{CO}_2$  gas through lime water, insoluble calcium carbonate is formed. On passing excess of  $\text{CO}_2$ , soluble calcium bicarbonate is formed.

$\text{Ca(OH)}_2(\text{aq}) + \text{CO}_2(\text{g}) \longrightarrow \text{CaCO}_3(\text{s}) + \text{H}_2\text{O}(\text{l})$   
 Insoluble

$\text{CaCO}_3(\text{s}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l}) \longrightarrow \text{Ca(HCO}_3)_2(\text{aq})$   
 Soluble 1+1+1

**[CBSE Marking Scheme, 2014]**

**[U] Q.14.** (i) Write the chemical formula of each of the following :

(a) Plaster of Paris

(b) Gypsum.

(ii) How can plaster of Paris be converted into gypsum ? **[KVS 2017]**

(iii) List any one use of plaster of Paris. **[Board Term-I Set (49), 2012]**

**Ans.** (i) (a)  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$

(b)  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$   $\frac{1}{2} + \frac{1}{2}$

(ii) By mixing with water

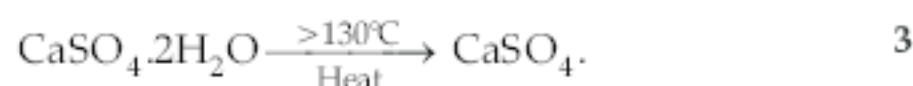
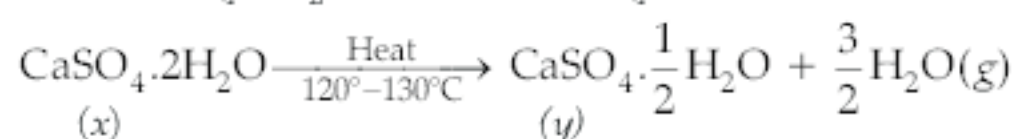
$\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O} + 1\frac{1}{2}\text{H}_2\text{O} \longrightarrow \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  1



- (iii) For making toys, for supporting fractured bones. 1  
[CBSE Marking Scheme, 2012]

**Q. 15.** A compound 'x' on losing partial crystallization of water gives compound 'y' which is used for making chalk and other pottery articles. But when 'x' is strongly heated, it gives 'z' which is used as drying agent. Identify x, y, z and write the chemical equation.

**Ans.** A commonly used compound for making chalks and other pottery articles is plaster of paris. Its chemical formula is  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ . It is obtained by  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  on partial losing water of crystallization by controlled heating at  $120^\circ\text{--}130^\circ\text{C}$ . When  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  is strongly heated, it loses whole of water of crystallisation and gives anhydrous calcium sulphate. Thus 'x' is  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ; y is  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$  and 'z' is  $\text{CaSO}_4$ .



**Q. 16.** Mention the products produced when an acid reacts with a base. Give equation of an example of the reaction involved. What is this kind of reaction known as? [DDE-2015]

**Ans.** The reaction between an acid and a base that gives a salt and water is known as a neutralisation reaction.



1+1+1

**Q. 17.** Name the three products of 'chlor-alkali' process. Write one commercially or industrially

important material each that can be prepared from each of these products. [Board Term-I Set-40, 2012]

**Ans.** The three products are :

Sodium hydroxide ( $\text{NaOH}$ ), Chlorine ( $\text{Cl}_2$ ) and Hydrogen ( $\text{H}_2$ ). 1

$\text{NaOH}$  — for soaps and detergents and paper making or artificial fibers.

$\text{Cl}_2$  — PVC, pesticides, CFCs. 1

$\text{H}_2$  — fuels, margarine,  $\text{NH}_3$  for fertilizers. 1

[CBSE Marking Scheme, 2012]

**Q. 18. (a)** Crystals of a substance changed their colour on heating in a closed test-tube but regained it after sometime when they were allowed to cool down. Name the substance and write its formula and explain the phenomenon involved. [KVS 2017]

**(b)** Name the acid and base that would be used to prepare the following salts :

(i) Potassium sulphate

(ii) Ammonium chloride.

[Board Term-I Set-40, 2012]

**Ans. (a)** Copper sulphate crystals ( $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ )

5 molecules of water are present in one formula unit of copper sulphate. When heated, it loses its water and salt turns white. 1

**(b) Basic Salt :**

(i) Base —  $\text{KOH}$  (Potassium hydroxide)  $\frac{1}{2}$

Acid —  $\text{H}_2\text{SO}_4$  (Sulphuric acid)  $\frac{1}{2}$

(ii) Base —  $\text{NH}_4\text{OH}$  (Ammonium hydroxide)  $\frac{1}{2}$

Acid —  $\text{HCl}$  (Hydrochloric acid)  $\frac{1}{2}$

[CBSE Marking Scheme, 2012]

## Long Answer Type Questions

(5 marks each)

**Q. 1.** Give suitable reasons for the following statements :

(i) Rain water conducts electricity but distilled water does not.

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

(iii) A tarnished copper vessel regains its shine when rubbed with lemon.

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

(v) An aqueous solution of sodium chloride is neutral but an aqueous solution of sodium carbonate is basic. [Board Term-I Set-NS9SX1D; 2016]

Set 2ZGOVVV; 2015

Set IN14KGB, 2014]

**Ans. (i)** Distilled water does not conduct electricity because it does not contain any ionic compound like acids, bases or salts dissolved in it.

(ii) When we overeat, excess of acid is produced in the stomach which causes burning sensation.

(iii) Copper vessels tarnish due to formation of basic copper carbonate which gets neutralized when rubbed with lemon and the copper vessel regains its shine.

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

(v) Sodium chloride is a salt of strong acid  $\text{HCl}$  and strong base  $\text{NaOH}$ , so it is neutral.

Sodium carbonate is a salt of weak acid  $\text{H}_2\text{CO}_3$  and strong base  $\text{NaOH}$ , so it is basic. 5

[CBSE Marking Scheme, 2014]

**Q. 2. (a)** Write the chemical formula of hydrated copper sulphate and anhydrous copper sulphate. Giving an activity to illustrate how these two are inter convertible.

**(b)** Write chemical names and formulae of plaster of paris and gypsum.

[Board Term-I, Set - A85V2IL, 2015]



**Ans. (a)** Hydrated copper sulphate –  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

Anhydrous copper sulphate –  $\text{CuSO}_4$ .

**Activity : (i)** Heat a few crystals of copper sulphate in a dry boiling tube.

(ii) Add 2-3 drops of water on the sample of Copper sulphate obtained after heating.

After heating, water is removed and salt turns white.

If crystals are moistened again with water, blue colour reappears. Water of crystallization is fixed number of water molecules present in one formulae unit of a salt. Five water molecules are present in one formula unit of copper sulphate.

(b) Calcium sulphate hemihydrate –  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$

Calcium sulphate dihydrate –  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ .

3 + 2 [CBSE Marking Scheme 2015]

**Q.3. (i)** What is the chemical name and chemical formula of plaster of paris ?

(ii) Write a reaction between Plaster of Paris and water.

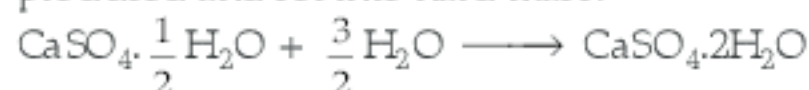
(iii) Write two uses of washing soda.

(iv) What is chlor-alkali process ? Name two products obtained during this process. [NCT-2014]

**Ans. (i)** Chemical name of Plaster of Paris is Calcium sulphate hemihydrate.

Chemical formula of Plaster of paris =  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ .

(ii) When it is mixed with water, crystals of gypsum are produced and set into hard mass.



Plaster of Paris

Gypsum

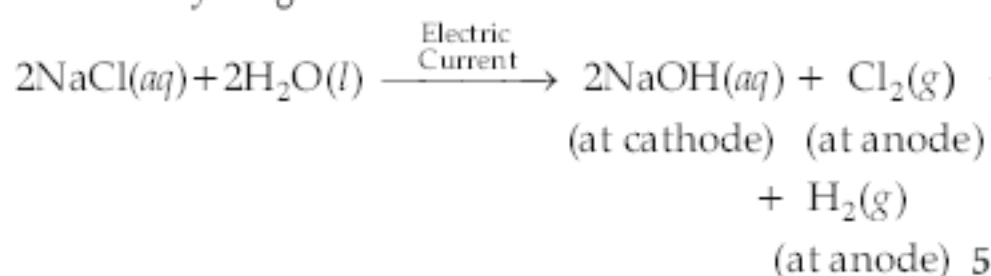
(iii) **Uses of Washing Soda :**

(a) It is used in softening of hard water.

(b) It is used as cleaning agent for domestic purposes.

(iv) Caustic Soda ( $\text{NaOH}$ ) is obtained by the electrolysis of aqueous solution of sodium chloride (called brine) and the process is called chlor-alkali.

Products obtained during this process are chlorine and hydrogen.



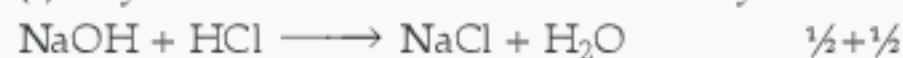
**Q.4. (i)** Identify the acid and the base whose combination forms the common salt that you use in your food. Write its formula and chemical name of this salt. Name the source from where it is obtained.

(ii) What is rock salt ? Mention its colour and the reason due to which it has this colour.

(iii) What happens when electricity is passed through brine ? Write the chemical equation for it.

[Board Term-I Set-15, 2012]

**Ans. (i)** Hydrochloric acid and sodium hydroxide.



$\text{NaCl}$ , sodium chloride, Ocean water.  $\frac{1}{2} + \frac{1}{2}$

(ii) Deposits of solid salt are found in several parts of the world. These large crystals are called rock salt. 2  
Colour of rock salts is brown, due to impurities.



[CBSE Marking Scheme, 2012]

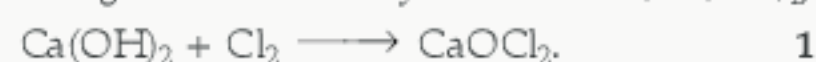
**Q.5. (a)** Write the common name of  $\text{CaOCl}_2$ . How is it prepared ? Write the chemical equation of the reaction involved in the process. Give any two uses of it.

(b) Write the chemical name of washing soda. How is it prepared ? Give the relevant chemical equations.

[Board Term-I Set-15, 2012]

**Ans. (a)** The common name of  $\text{CaOCl}_2$  is Bleaching powder.  $\frac{1}{2}$

By passing chlorine into dry slaked lime ( $\text{Ca(OH)}_2$ )



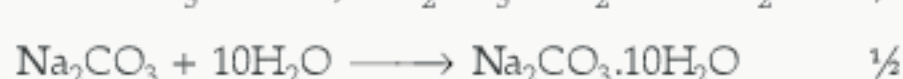
**Two uses :**

(i) Used for bleaching cotton and linen in the textile industry and wood pulp in paper industry etc.  $\frac{1}{2}$

(ii) It is used for disinfecting drinking water.  $\frac{1}{2}$

(b) Washing Soda —  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$   $\frac{1}{2}$

By heating baking soda, sodium carbonate is obtained, its recrystallisation gives washing soda. 1



[CBSE Marking Scheme, 2012]

**Q.6. (i)** Write the chemical name and chemical formula of washing soda.

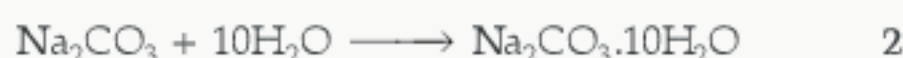
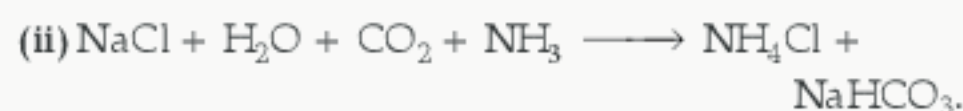
(ii) How is it obtained from sodium chloride ? Give equations of the reaction.

(iii) Why is it called a basic salt ? Give its any one use.

[Board Term-I 2012]

**Ans. (i)** Chemical name — Sodium carbonate decahydrate

Formula —  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$   $\frac{1}{2} + \frac{1}{2}$



(iii) It is a basic salt because when dissolved in water, it gives a strong base  $\text{NaOH}$ .

It is used as a cleaning agent, in paper and glass industry. [CBSE Marking Scheme, 2012] 2

**Q.7.** Write the chemical name and formula of common salt. List two main sources of common salt in nature. Write any three uses of common salt. How is it connected to our struggle for freedom ? [Board Term-I Set WHISGOB, 2014]

**Ans.** Sodium chloride NaCl.

Common salt from sea water and Rock salt.

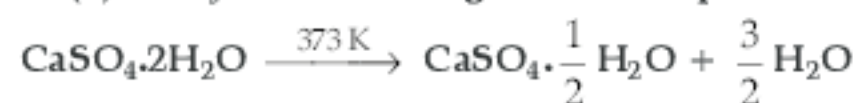
**Uses of common salt :**

- (i) As a raw material for making a large number of useful chemicals in industry as sodium hydroxide, sodium bicarbonate, sodium carbonate, hydrochloric acid.
- (ii) Used in cooking food. It is essential in our food for the proper functioning of nervous systems, the movement of muscles and the production of HCl in our stomach for the digestion of food.
- (iii) Used as a preservative in pickles.
- (iv) Used in the manufacture of soap. **(Any three)**  
Mahatma Gandhi's Dandi March was for the procurement of common salt for common man.  
It is the most essential product of daily use. **5**

[CBSE Marking Scheme, 2014]

**Q.8.** Write the chemical name of  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  and  $\text{Na}_2\text{CO}_3$ . Write the significance of  $10\text{H}_2\text{O}$ . Mention the term used for water molecules attached with a salt. With the help of a chemical equation, explain the method of preparation of

**Q.9.** (a) Study the following chemical equation :



Name the reactant and the product and mention one use of the product.

(b) The following salts are formed by the reaction of an acid with a base :

(i) Sodium chloride

(ii) Ammonium nitrate.

Identify the acid and the base and tabulate your answer in the format given below :

S. No.	Salt	Acid	Base	Nature
(i)	Sodium chloride			
(ii)	Ammonium nitrate			

**Ans.** (a) Reactant : Gypsum

Product : Plaster of Paris

Use : As plaster for supporting the fractured bones.

(b)

S. No.	Salt	Acid	Base	Nature
(i)	Sodium chloride	Hydrochloric acid	Sodium hydroxide	Neutral
(ii)	Ammonium nitrate	Nitric acid	Ammonium hydroxide	Acidic $\frac{1}{2} \times 6 = 3$

**Q.10.** We use colours dissolved in water during Holi and clothes gets spoiled. Many colours used to celebrate Holi are oxidized metals or industrial dyes mixed with engine oil. Doctors say these are harmful colours which should be banned for usage. Manufacturers mix dyes with colours, and sell them for their profits. Holi revellers can make their Holi colourful by using natural colours available in the market. Natural colours start fading when they come in contact with sunrays.

(i) Why doctors say that synthetic colours are harmful ?

(ii) What are natural colours ?

both  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  and  $\text{Na}_2\text{CO}_3$ . Also list two uses of  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ .

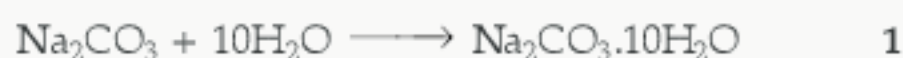
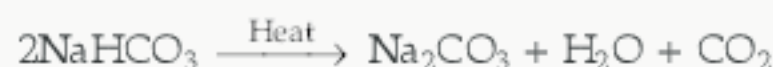
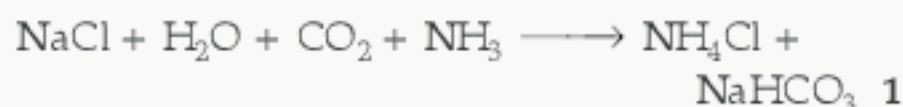
[Board Term-I Set (38), 2012]

**Ans.**  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  — Sodium carbonate decahydrate.

$\text{Na}_2\text{CO}_3$  — Anhydrous sodium carbonate.  $\frac{1}{2} + \frac{1}{2}$

$10\text{H}_2\text{O}$  — Water of crystallization which impacts shape and colour to the crystals. **1**

**Preparation :**



**Uses :**

- (i) Used in glass, soap and paper industries.
- (ii) Used in the manufacture of borax.
- (iii) Used as a cleansing agent for domestic purpose. **(Any two) 1**

[CBSE Marking Scheme, 2012]



## High Order Thinking Skills (HOTS) Questions

**Q.1.** Tooth enamel is the hardest substance in our body. Name the compound of which it is made up of. At what pH of the mouth it gets corroded? State the role of bacteria present in the mouth. Suggest a method to prevent tooth decay. 3

**Ans.** Tooth enamel is made up of compound calcium phosphate. Its pH is 5.5.

Bacteria present in the mouth works on the leftover food particles and produce acid. Tooth pastes are used for neutralising the excess acid.  $1\frac{1}{2} + 1\frac{1}{2}$

**Q.2.** 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? [NCERT Exemplar] 3

**Ans.** Sodium hydroxide (NaOH) is a commonly used base and is hygroscopic, i.e., it absorbs moisture from the atmosphere and becomes sticky. 1

The acidic oxides react with base to give salt and water. 1



**Q.3.** A compound of sodium 'X' is used in kitchen to make pakoras crispy. It is also used to remove acidity in stomach.

(i) Identify the compound 'X' and write its chemical formula.

(ii) What chemical reaction occurs on heating it during the cooking foods. 3

**Ans.** (i) 'X' is sodium hydrogen carbonate (Baking soda)  $\text{NaHCO}_3$ .  $1\frac{1}{2}$



**Q.4.** A yellow powder 'A' gives a pungent smell when left in open. It is a good oxidising agent and is used for bleaching cotton linen in textile industries. Identify A and give its method of preparation. What is its commercial name? 3

**Ans.** The given compound 'A' is calcium oxychloride because it is a oxidising agent and in open it reacts with  $\text{CO}_2$  to give pungents mell of chlorine gas.



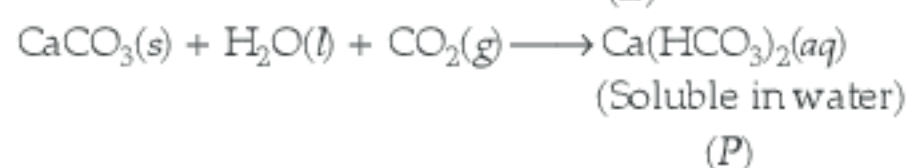
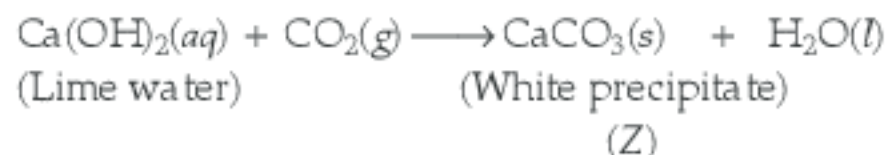
It is prepared by the action of dry slaked lime with chlorine gas.



Calcium oxychloride is commercially known as Bleaching powder.  $1\frac{1}{2} + 1\frac{1}{2}$

**Q.5.** A compound X is bitter in taste. It is a component of washing powder and 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  $\text{CO}_2$  is passed, milkiness disappears due to formation of P. Identify X, Y, Z and P. [NCERT Exemplar] 3

**Ans.**  $\text{Na}_2\text{CO}_3(s) + 2\text{HCl}(aq) \longrightarrow 2\text{NaCl}(aq) + \text{H}_2\text{O}(l) + \text{CO}_2(g)$   
(X) (Y)  $\text{CO}_2(g)$



**Q.6.** You are provided with three test tubes A, B and C which contain distilled water, acidic solution and basic solution respectively. If you are given blue litmus paper only, how will you identify the contents of each test tube? 3

**Ans.** Put blue litmus paper in all the three test tubes. In one test tube it will turn red that is acid.

Now Put red Litmus paper in other two test tubes. The one which turn blue is base and the third one is distilled water, as it turned paper neither red nor blue. 3

**Q.7.** A compound 'P' forms the enamel of teeth. It is the hardest substance of the body. It doesn't dissolve in water but gets corroded when the pH is lowered below 5.5.

(i) Identify the compound 'P'.

(ii) How does it undergo damage due to eating of chocolate and sweets? What should we do to prevent tooth decay? [DDE-2014] 3

**Ans.** (i) The compound 'P' is calcium phosphate.

(ii) It undergoes damage when the bacteria present in the mouth work on the left over food particles and produce acid.

To prevent tooth decay, toothpastes (basic) are used which neutralises the excess acid.  $1 + 1 + 1$

**Q.8.** (a) You are given two solutions A and B. The pH of solution A is 6 and pH of solution B is 8.

(i) Identify the acidic and basic solution.

(ii) Which solution has more  $\text{H}^+$  ion concentration? Give reasons for your answer.

(b) Why is HCl a stronger acid than acetic acid? Explain. [Board Term-I Set (38), 2012] 3

**Ans.** (a) (i) Acidic — Solution A  $\frac{1}{2}$

Basic — Solution B  $\frac{1}{2}$

(ii) Solution A because  $\text{H}^+$  ion concentration is higher in acidic solutions. 1

(b) When same concentration of HCl and acetic acid are taken (one molar), then these produce different amounts of  $\text{H}^+$  ion (as HCl dissociates completely). HCl gives more  $\text{H}^+$  but acetic acid gives less  $\text{H}^+$  ions (as this does not dissociate completely). 1

[CBSE Marking Scheme, 2012]



Q. 9. (a) Rahul has been stung by a honey bee and is in great pain. What could be the reason for this burning pain ? State the type of chemical compound that can be applied on the affected area to give relief to Rahul.

(b) Write the name and formula of each of the following :

(i) an acidic salt

(ii) a basic salt

(iii) a neutral salt. [Board Term-I Set (49), 2012] 3

Ans. (a) (i) Bee-sting injects methanoic acid.  $\frac{1}{2}$

(ii) A mild base like baking soda will give relief. 1

(b) (i) Ammonium chloride,  $\text{NH}_4\text{Cl}$   $\frac{1}{2}$

(ii) Sodium carbonate,  $\text{Na}_2\text{CO}_3$   $\frac{1}{2}$

(iii) Sodium chloride,  $\text{NaCl}$ .  $\frac{1}{2}$

[CBSE Marking Scheme, 2012]

Q. 10. A substance X used as an antacid reacts with hydrochloric acid to produce a gas Y which is used in extinguishing fire.

(i) Name the substance X and gas Y.

(ii) Write a balanced equation of the reaction between X and hydrochloric acid.

[Board Term-I Set-3R6WRQL, 2013] 3

Ans. (i) X – Sodium hydrogen carbonate or baking soda.  
Y –  $\text{CO}_2$

(ii)  $\text{NaHCO}_3 + \text{HCl} \longrightarrow \text{NaCl} + \text{H}_2\text{O} + \text{CO}_2 \uparrow$   
 $1 + 1 + 1$

[CBSE Marking Scheme, 2013]

Q. 11. (a) A metal compound 'X' reacts with dil  $\text{H}_2\text{SO}_4$  to produce effervescence. The gas evolved extinguishes a burning candle. If one of the compound formed is calcium sulphate, then what is 'X' and the gas evolved ? Also write a balanced chemical equation for the reaction which occurred.

(b) (i) Name one antacid. How does it help to relieve indigestion in stomach ?

(ii) A farmer treats the soil with quick lime or calcium carbonate. What is the nature of soil ? Why does the farmer treat the soil with quick lime ? [Board Term-I Set (42), 2012] 5

Ans. (a)  $\text{A} \rightarrow \text{CaCO}_3$  (Limestone)  $\frac{1}{2}$   
Gas  $\rightarrow \text{CO}_2$   $\frac{1}{2}$

Equation :  $\text{CaCO}_3 + \text{H}_2\text{SO}_4 \longrightarrow \text{CaSO}_4 + \text{H}_2\text{O} + \text{CO}_2$  1

(b) (i) **Milk of Magnesia** : It is basic in nature. Stomach produces dil.  $\text{HCl}$ . When suffering from indigestion, more acid is produced, this causes irritation. Antacid neutralises some acid and then gives relief.  $1\frac{1}{2}$

(ii) **Soil is acidic** : Farmer wants to neutralise some acid and hence adds basic substances like  $\text{CaO}$  or  $\text{CaCO}_3$  to it.  $1\frac{1}{2}$

[CBSE Marking Scheme, 2012]

Q. 12. A compound which is prepared from gypsum, has the property of hardening when mixed with right quantity of water : [Board Term-I Set (31), 2012]

(i) Identify the compound and write its chemical formula.

(ii) Write the chemical equation for its preparation.

(iii) List any two uses of the above compound. 3

Ans. (i) Plaster of Paris / Calcium sulphate hemihydrate

$\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$ . 1

(ii)  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O} \xrightarrow[373\text{K}]{\text{Heat}} \text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O} + 1\frac{1}{2} \text{H}_2\text{O}$

(iii) Used as a plaster for supporting fractured bones.  $\frac{1}{2}$   
Used for making toys / statues / decorative items.  $\frac{1}{2}$

[CBSE Marking Scheme, 2012]

Q. 13. A white powder is added while baking breads and cakes to make them soft and fluffy. Write the name of the powder. Name its main ingredients. Explain the function of each ingredient. Write the chemical reaction taking place when the powder is heated during baking. [Board Term-I Set (39), 2012] 3

Ans. Baking powder.  $\frac{1}{2}$

Baking soda and tartaric acid.  $\frac{1}{2} + \frac{1}{2}$

On heating or mixing with water, sodium bicarbonate reacts with hydrogen ion from acid and releases  $\text{CO}_2$  that makes the cake soft and fluffy. 1

Tartaric acid is used to avoid the bitter taste by reacting with  $\text{Na}_2\text{CO}_3$  formed.

$\text{NaHCO}_3 + \text{H}^+ \xrightarrow[\text{From acid}]{\text{Heat}} \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$  [CBSE Marking Scheme, 2012]  $\frac{1}{2}$

Q. 14. (i) Dry pellets of a base 'X' when kept in open absorbs moisture and turns sticky. The compound is also formed by chlor-alkali process. Write chemical name and formula of X. Describe chlor-alkali process with balanced chemical equation. Name the type of reaction that occurs when X is treated with dilute hydrochloric acid. Write the chemical equation.

(ii) While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid ? [Board Term-I Set (36), 2012] 5

Ans. (i) X –  $\text{NaOH}$  (Sodium hydroxide)  $\frac{1}{2}$

When electricity is passed through an aqueous solution of sodium chloride, it decomposes to form sodium hydroxide. 1

$2\text{NaCl} + 2\text{H}_2\text{O} \longrightarrow 2\text{NaOH} + \text{Cl}_2 + \text{H}_2$  1

Neutralisation reaction  $\frac{1}{2}$

$\text{NaOH} + \text{HCl} \longrightarrow \text{NaCl} + \text{H}_2\text{O}$   $\frac{1}{2}$

(ii) Acid should be added slowly to water with constant stirring. If water is added to a concentrated acid, the heat generated may cause the mixture to splash out and cause burns. The glass container may also break due to excessive local heating.  $1\frac{1}{2}$

[CBSE Marking Scheme, 2012]



## Value Based Questions

**Q.1.** Naman and Raghav performs an experiment in which they mixed concentrated sulphuric acid with water. Naman mixes water to acid and Raghav mixes acid to water slowly with constant stirring. Mention the suitable reason for selecting the one which you find is a correct method and discarding the one which is wrong. 4

[Board Term-I Set (45), 2012]

**Ans.** The correct method is opted by Raghav *i.e.*, mixing of conc.  $H_2SO_4$  to water slowly with constant stirring. 1

The reaction is highly exothermic and heat generated is evenly distributed in the water. 1

In the other method opted by Raman, the heat generated may cause the mixture to splash out and causes burns. The glass container may also break due to excessive local heating. 1

[CBSE Marking Scheme, 2012]

**Q.2.** Ravi's father is a Botanist. He extracted a purple dye from a plant in the laboratory which acts as an acid base indicator. When he adds this purple dye with acids, it changes to red colour. But when a small amount of base is added to this dye, it changes its colour to blue. Ravi was very excited to see that colours were changing accordingly with the solution. He observed the magic and asked some questions from his father.

(i) What is an indicator?

(ii) Name the plant from which his father extracted the dye.

(iii) 'Some natural substances are good source of indicators.' Suggest some examples to justify the statement. 3

**Ans.** (i) Indicators are the substances which change their colour in different types of substances. 1

(ii) Lichen. 1

(iii) Examples of natural indicators :

(a) Beetroot extract shows same colour in all sour substances and different colour in bitter substances.  $\frac{1}{2}$

(b) Turmeric gives yellow spot on a cloth but when washed with soap, the colour of the spot changes to red.  $\frac{1}{2}$

**Q.3.** One day Lucky's mother after taking meal felt pain and irritation in her stomach. His father was out of station. He was an intelligent boy. He remembered his teacher's statement and gave her mother some baking soda solution, which gave her relief from pain and irritation of stomach.

(i) Which information given by the teacher help him to select the baking soda as remedy?

(ii) State any two values that you have learned from this passage. [NCT-2014]

**Ans.** (i) Pain and irritation in stomach is due to excessive secretion of a strong acid, called the hydrochloric

acid. Baking soda is a mild base and neutralises the excessive acid, thereby giving relief from pain.

(ii) (a) Careful learning in the class.

(b) Remembrance of teacher's knowledge and use of right knowledge at right place. 1 + 2

**Q.4.** Farmers are using a large number of pesticides and fertilizers 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. Do you agree with this statement? Why should we avoid eating fruits and vegetables without washing them properly? 3

**Ans.** Plants require a specific pH range for their healthy growth. However by using a large number of pesticides and fertilizers, the pH of the soil changes which makes it more acidic or basic. So in the long run the soil becomes infertile. This also leads to the soil erosion causing damage to the environment. Hence, excessive use of these pesticides and fertilizers should be restricted as it is causing damage to the soil as well as environment. 2

**Associated Value :** The learner understands the need to wash the vegetables and fruits properly before eating them. 1

**Q.5.** Acids are the substances which turn blue litmus solution red and are sour in taste. There are different types of acids like mineral acids, organic acids, dilute acids and concentrated acids. All living things are very sensitive to acids and too much acids can kill cells or stop proper working of the cells. Concentrated acids are very dangerous and should never be handled without protection.

(i) What are organic acids? Give two examples.

(ii) Why concentrated acids are dangerous?

(iii) Comment on the statement — "Regular drinking of cold drinks and eating of chocolates should be avoided." Give a valid reason to justify. 3

**Ans.** (i) The acids which are obtained from plants and animals are called organic acids.

Citric acid is obtained from lemon.

Vinegar contains acetic acid.

(ii) Concentrated acids are very hot when they fall on any object (clothes or skin), they burn the object.

(iii) Cold drinks, chocolates and sweets are most harmful for health as well as tooth. They produce acids in mouth which are responsible for tooth decay. It has been noticed that tooth gets dissolved in the cold drinks if kept for longtime.  $1 \times 3 = 3$

**Q.6.** Brushing our teeth twice a day is a well-known saying. Justify this statement. 2

**Ans.** 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. The best way to prevent this is to clean the teeth using toothpaste which are generally



basic. These can neutralize the excess acid and prevent tooth decay.

**Associated Value :** The learner will be motivated to keep her teeth properly cleaned. 2

**Q.7.** A group of students, while on excursion trip is camping on the hills. One morning, they find themselves engulfed in a thick blanket of snow. One of the senior member of the group suggests to sprinkle common salt on the ice slit covering the pavement. Answer the following questions.

- What is the purpose of sprinkling common salt on ice slit?
- Can we use any other substance in place of common salt?
- What values are associated with the passage? 3

**Ans.** (i) When common salt is sprinkled on icy roads, ice/snow starts melting from the surface because freezing point of water is lowered. The softened ice/snow can be easily cleared from the roads.

- Calcium chloride can be used in place of common salt. It can lower the freezing point up to  $55^{\circ}\text{C}$ .

- Associated values are scientific knowledge, caring, helping and supporting nature etc. 1 + 1 + 1

**Q.8.** One day a magician came in a village. He said that he can cook rice without using flame. He took an empty pot and put some rice in it. He added water to the pot and after sometime, he took the rice out. The rice were cooked. The villagers were surprised but Seema, girl of that village, was not. She also performed the same magic and told that it is a science, not a magic.

- Give three qualities exhibited by Seema in the above passage.

- How she cooked the rice without using flame? 3

**Ans.** (i) Qualities shown by Seema are :

- Good knowledge of Science
- Good thinker
- No blind faith on magician.

- With rice, she added some lime particles. When she added water to it, an exothermic reaction occurs. The heat evolved during the reaction cooked the rice.  $1\frac{1}{2} + 1\frac{1}{2}$

## Practical Based Questions

**Experiment 1 :** To study the properties of acids and bases (HCl and NaOH) by their reaction with :

- Litmus solution (Blue/Red)
- Zinc metal
- Solid sodium carbonate

**2 :** To find the pH of the following samples by using pH paper / Universal indicator :

- Dilute Hydrochloric Acid
- Dilute NaOH solution
- Dilute Ethanoic Acid solution
- Lemon Juice
- Water
- Dilute Sodium Bicarbonate solution

**Q.1.** Which colour is produced in pH paper when we put a drop of distilled water on it? What is the pH of distilled water?

**Ans.** Colour - Green, pH- neutral; 7 1+1

**Q.2.** What will be the action of liquid antacid on litmus paper? Is it acidic or basic?

**Ans.** It will turn red litmus blue as it is basic in nature. 1+1

**Q.3.** Write two properties of a base based on taste and reaction with metals.

**Ans.** Base is bitter in taste and produces hydrogen gas when reacted with metals. 1+1

**Q.4.** The pH of the solution is less than 7. What does it indicate? What is the pH of 1M HCl solution?

**Ans.** It indicates that the given solution is acidic in nature. The pH of 1M HCl solution is zero. 1+1

**Q.5.** On opening the soda bottle, the dissolved  $\text{CO}_2$  comes out. Would the pH of the solution increase or decrease as the gas comes out? Explain your answer either way. [NCERT]

**Ans.**  $\text{CO}_2$  is acidic oxide. As  $\text{CO}_2$  comes out of the solution, acidic character of solution decreases and as such pH increases. 2

**Q.6.** Write two precautions required while finding the pH of the samples.

**Ans.** (i) Wash the test-tubes and other glass apparatus thoroughly with distilled water, before use.

- All solutions should be freshly prepared. 1+1

**Q.7.** Bottle A contains oxalic acid and bottle B contains sodium carbonate solution. When pH paper is dipped in each of the solutions, the colour seen in A and B respectively be \_\_\_\_\_.

**Ans.** The colour of pH paper is orange in acidic medium while it is blue in basic medium. 1+1

**Q.8.** To test the presence of an acid with a strip of red litmus paper you would \_\_\_\_\_.

**Ans.** Since red litmus shows no colour change with acids, it is first to be changed to blue litmus. So, first dip the strip in alkaline solution and then use it to test the sample. 1+1

**Q.9.** What happens when phenolphthalein is added to an acidic solution?

**Ans.** No colour change is observed. It gives pink colour in basic solution. 1+1



Q. 10. Which of the following statement is not correct ? Why ?

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

- (i) Water will represent 7 on this scale.
- (ii) Nitric acid will represent 1 on this scale.
- (iii) Sulphuric acid will represent 14 on this scale.
- (iv) Washing soda will represent 9 on this scale.

Ans. Incorrect statement : Sulphuric acid will represent 14 on this scale. Acids have the pH between 0-7.

1+1

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