



# Acids, Bases & Salts

CH 2 Science | Class 10

Notes + 10 Years Integrated PYQ's



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# Acids, Bases and Salts

## Sour or bitter?

The sour and bitter tastes of food are due to acids and bases, respectively, in them.

### Litmus

- Acid turns BLUE litmus RED !
- Base turns RED litmus BLUE !

TRICK - AB Road → Acid turns BLUE litmus RED

### Indicators

- An indicator tells us whether the given substance is an acid or a base by the change in its colour!
- For now, we need to know about 3 types of indicators :

#### A) Natural Indicators

- ❖ Indicators which are obtained naturally are called natural indicators, for example : Litmus, red, cabbage, turmeric, onion, vanilla, clove, etc.

#### B) Olfactory Indicators

- ❖ Substances which change their odour with acid and base are called olfactory indicators.
- Vanilla, cloves, onion, etc.

## ① Synthetic Indicators

- ♦ Synthetic indicators are obtained from artificial substances that are synthesized in laboratories.
- Example: Methyl Orange, Phenolphthalein.

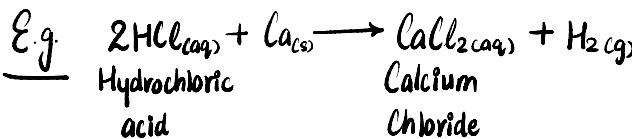
## Acids

- ♦ Acids have a sour taste.
- They can change colour of blue litmus to red.
- It ionises on dissolving in water.
- ♦ Acids present in plants and animals are organic/weak acids.
- ♦ Dilution of concentrated acid is an exothermic process.
- ♦ Acids produce  $H^+$  [Hydronium] ions when dissolved in water.
- ♦ Acid solutions conduct electricity.

## Chemical Properties of Acid

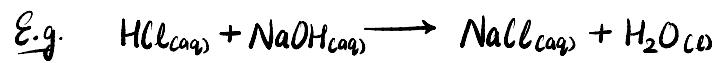
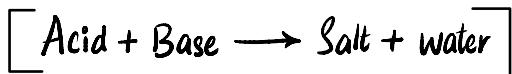
### 1) Reaction of acid with metal

- By reaction of acid with metal.
- Salt corresponding to metal and dihydrogen gas are produced.



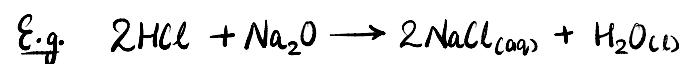
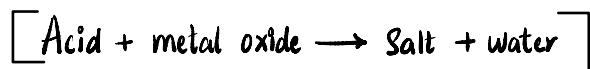
### 2) Reaction of Acids with Base

- Salt and water are formed by reaction of acid with base.
- This is called neutralisation reaction.



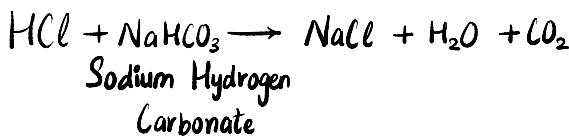
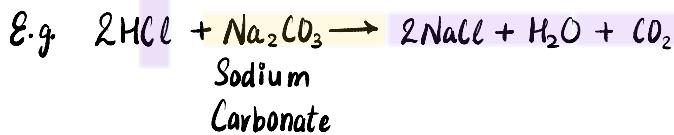
### 3) Reaction of Acids with metal oxide

→ This reaction is similar to acid and base reaction which means that by reaction of acid with metal oxide, salt and water are formed.



### 4) Reaction of Acids with metal carbonate or metal hydrogen carbonate

→ Acid + metal carbonate / metal hydrogen carbonate → salt + water + carbon dioxide gas.



## Bases

→ Bases have a bitter taste.

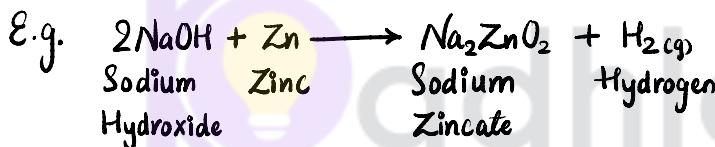
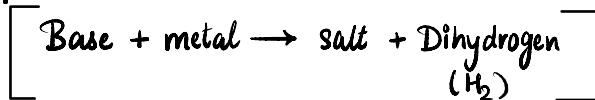
- A common property of all the bases (alkalis) is that they all produce hydroxide ions ( $\text{OH}^-$ ) ions when dissolved in water.

- ♦ A base can neutralise an acid.
- ♦ Bases feel soapy to touch.
- ♦ A base soluble in water is called an alkali.

## Chemical Properties of Base

### 1) Reaction of base with metal

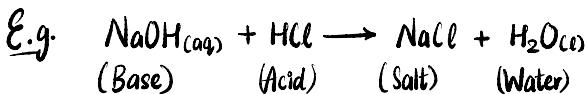
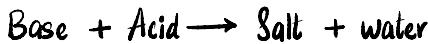
- ♦ When a base reacts with a metal, then a metal salt and hydrogen gas are formed.



- Not all metals react with bases to form salts and hydrogen gas.

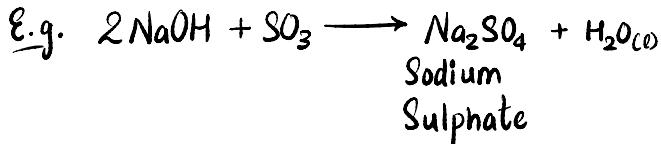
### 2) Bases react with Acids

- ♦ When base reacts with an acid, salt and water are formed.



### 3) Reaction of Base with non-metal oxide

- ♦ This reaction is similar to the neutralisation reaction, that is, salt and water are formed by reaction of base with non-metal oxide.



## Q U E S T I O N S

1. Why should curd and sour substances not be kept in brass and copper vessels?
2. Which gas is usually liberated when an acid reacts with a metal? Illustrate with an example. How will you test for the presence of this gas?
3. Metal compound A reacts with dilute hydrochloric acid to produce effervescence. The gas evolved extinguishes a burning candle. Write a balanced chemical equation for the reaction if one of the compounds formed is calcium chloride.



## Answers

1) Curd and sour substance should not be kept in brass and copper vessels as these and other sour food contains acid which react with metal vessels to form poisonous metal compounds that cause food poisoning and adversely affect health.

2) i) Hydrogen ( $\text{H}_2$ ) is liberated when an acid reacts with a metal.

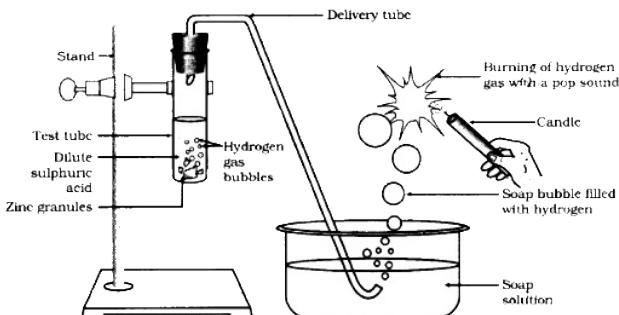
ii) Illustration:

→ Set up apparatus, shown in given figure.

→ Take some zinc granules in test tube.

→ Add slowly, 5 ml dilute hydrochloric acid

→ Soon, reaction between zinc and hydrochloric acid starts and hydrogen gas is evolved.

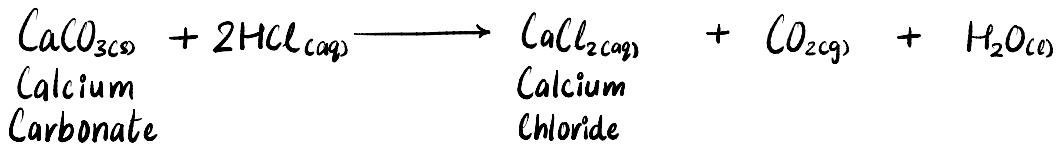


### iii) $H_2$ gas test:

- $H_2$  gas is not soluble in water.
- It gets trapped into bubbles, when passed through soap solution.
- Bring burning candle near soap bubble with the gas filled in it.
- The bubble of soap bursts and hydrogen gas burns with pop sound.

3) While end product is calcium chloride and carbon dioxide gas is formed, metal compound A must be calcium carbonate.

• Hence, reaction between calcium carbonate and hydrochloric acid is



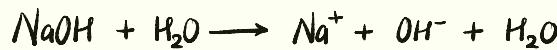
## What happens to an Acid or a Base in a Water Solution?

→ When an acid or a base is dissolved in water, they get dissociated into ions.



- As there is an increase in the protons in the aqueous solutions, the solution is acidic in nature.

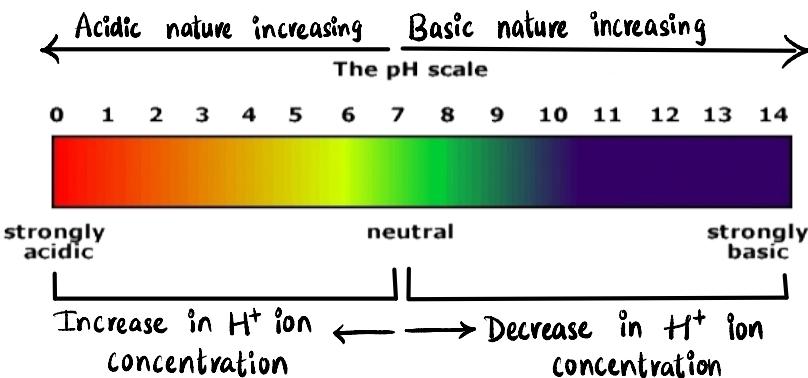
- Similarly, when  $\text{NaOH}$  (Base) is dissolved in water, it gets dissociated as,



## Alkalies

- All bases do not dissolve in water.
- An alkali is a base that dissolves in water.
- They are soapy to touch, bitter and corrosive.
- Don't taste or touch them as they may cause harm. (~~Poison~~ और उत्पादन)

# pH Scales



- A scale for measuring hydrogen ion concentration in a solution, called pH scale has been developed.
- On the pH scale we can measure pH from 0 (very acidic) to 14 (very alkaline). pH should be thought of simply as a number which indicates the acidic or basic nature of a solution.
- Higher the hydronium ion concentration, lower is the pH value.
- In pure water the concentration of  $H^+$  and  $OH^-$  ions are equal.
- Hence, pure water is neither acidic nor basic, it is neutral.
- The solution having high concentration of hydrogen ions has a low pH value.
- On the other hand, solution having low concentration of  $H^+$  ions has a high pH value.

- If  $pH < 7$ , solution is acidic
- If  $pH > 7$ , solution is basic
- If  $pH = 7$ , solution is neutral

# Importance of pH in everyday Life

## 1) Importance of pH in existence of living beings

- Our body works within the pH range of 7.0-7.8.
- When pH of rain water is less than 5.6, it is called acid rain.

## 2) Importance of pH in soil

- Soil whose pH is between 6.5-7.3, growth and development of plants is good.
- If less than 6.5 it's acidic and more than 7.3 is called alkaline soil.

## 3) Importance of pH in digestion

- HCl is secreted in the stomach, pH changes between 1 and 3.
- At this low volume of pH the enzyme named pepsin becomes active.
- Sometimes due to more secretion of HCl, there is pain or irritation in the stomach, "i.e. acidity".
- Antacids help us get rid of this.

## 4) pH change leads to tooth decay

- Tooth decay starts when pH of the mouth is lower than 5.5.
- Tooth enamel is made up of calcium phosphate and is the hardest substance in the body.
- The bacteria present in the mouth degrade the left over food particles and produces acid.
- To protect tooth decay, toothpastes which are basic in nature are used to neutralize the excess acid.

# Some naturally occurring acids

Natural source	Acid	Natural source	Acid
Vinegar	Acetic acid	Sour milk (Curd)	Lactic acid
Orange	Citric acid	Lemon	Citric acid
Tamarind	Tartaric acid	Ant sting	Methanoic acid
Tomato	Oxalic acid	Nettle sting	Methanoic acid

## Salts

Sodium Chloride

Sodium Hydroxide

Bleaching Powder

Baking Soda

Washing Soda

Plaster of Paris

- Salts of a strong acid and base are neutral with pH value of 7.
- On other hand,

→ Strong acid, weak base → (acidic)  
pH less than 7.

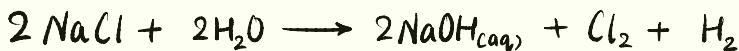
→ Strong base, weak acid → (basic)  
pH more than 7.

## SODIUM CHLORIDE ( $\text{NaCl}$ )

- \* The common salt thus obtained is an important raw material for various materials of daily use, such as sodium hydroxide, baking soda, washing soda, bleaching power and many more.

# Sodium Hydroxide

- When electricity is passed through an aqueous solution of sodium chloride (Brine), it decomposes to form sodium hydroxide.
- This is called "Chlor-alkali process".



## Different uses of these products

- 1)  $\text{H}_2$  → fuels, ammonia for fertilizers
- 2)  $\text{Cl}_2$  → Water treatment, pesticides, swimming pool.
- 3)  $\text{NaOH}$  → Soaps, detergents, de-greasing metals, paper making.
- 4)  $\text{HCl}$  → for cleaning steel, ammonium, chloride, medicines
- 5) Bleach → household bleaches, bleaching fabric.

## Bleaching Powder

- 1) Chlorine is produced during the electrolysis of aqueous sodium chloride (brine).
- 2) This chlorine gas is used for the manufacture of bleaching powder.
- 3) Bleaching powder is produced by the action of chlorine on dry slaked lime  $[\text{Ca}(\text{OH})_2]$ .



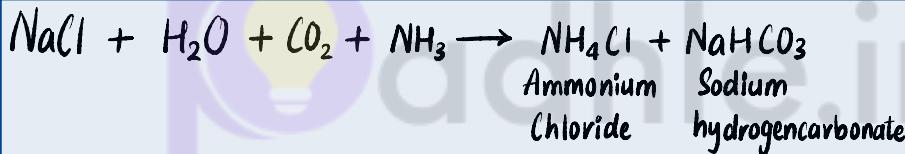
## Uses

- 1) For bleaching cotton and linen in textile industries.
- 2) As an oxidizing agent.
- 3) For disinfecting drinking water.
- 4) for manufacturing chloroform ( $\text{CHCl}_3$ ).

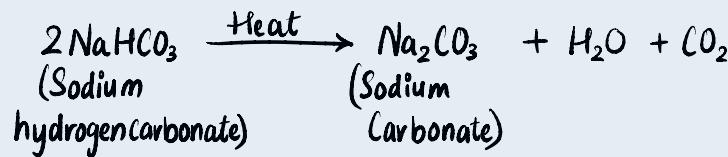
## Baking Soda ( $\text{NaHCO}_3$ )

- ⇒ The soda commonly used in the kitchen for making tasty crispy pakoras is baking soda, also added for faster cooking.
- ⇒ It is a mild non-corrosive base

## Preparation

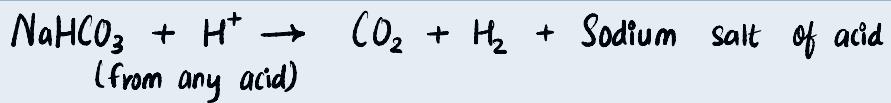


When it is heated during cooking:



## Uses

- 1) for making baking powder, which is a mixture of baking soda (sodium hydrogencarbonate) and a mild edible acid such as tartaric acid.
- When baking powder is heated or mixed in water:



- 2) Sodium hydrogen carbonate is also an ingredient in antacids as it is alkaline, neutralizes excess acid in stomach.
- 3) It is also used in soda-acid fire extinguishers.

## Washing Soda ( $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ )

- Recrystallisation of sodium carbonate gives washing soda.
- It is also a basic salt.

### Uses

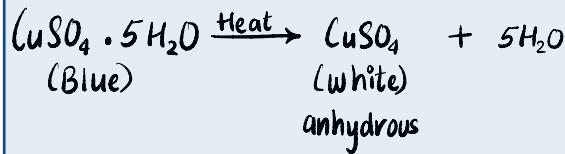
- 1) Used in glass, soap and paper industries.
- 2) Used in the manufacture of borax.
- 3) Used as a cleaning agent for domestic purposes and also to remove permanent hardness of water.

### Water of Crystallisation

- Water of crystallisation is fixed number of water molecules present in one formula unit of a salt.
- For example: Chemical formula for hydrated copper sulphate is  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ .
  - five water molecules are present in one formula unit of copper sulphate.

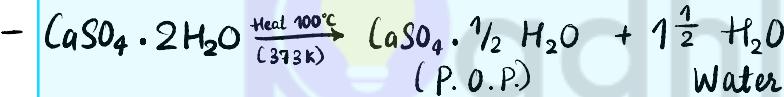
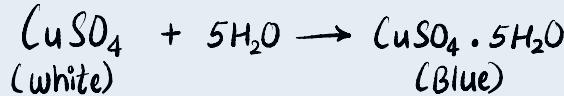
- On strong heating Blue  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  turns white.
- On dehydrating,  $\text{CuSO}_4$  turns blue on adding water.

Ex.



Not explained  
in NCERT

## On dehydrating



- It is white powder.
- Should be stored in moisture-proof container.

## Uses

- 1) In hospitals for setting fractured bones.
- 2) In making toys, cosmetics, chalks, casts for statues.
- 3) As fire-proofing material.
- 4) Ceiling of houses.
- 5) Sealing air gaps.

## Q U E S T I O N S

1. What is the common name of the compound  $\text{CaOCl}_2$ ?
2. Name the substance which on treatment with chlorine yields bleaching powder.
3. Name the sodium compound which is used for softening hard water.
4. What will happen if a solution of sodium hydrocarbonate is heated? Give the equation of the reaction involved.
5. Write an equation to show the reaction between Plaster of Paris and water.



## Answers

1) Bleaching powder.

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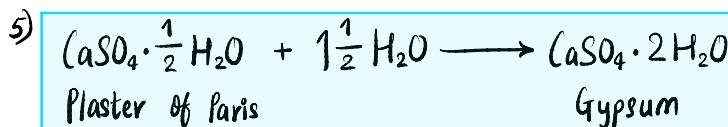
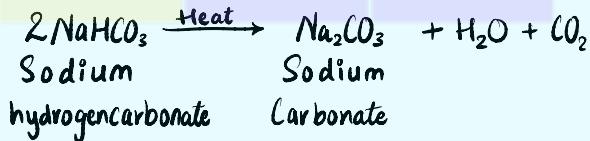
2) Slaked lime  $\text{Ca}(\text{OH})_2$

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3) Sodium Carbonate

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4) If a solution of sodium carbonate is heated it will give sodium carbonate and carbon dioxide gas is evolved.



# 1 Mark Questions

Q.1 Fresh milk has a pH of 6. When it changes into curd (yogurt), will its pH value increase or decrease? Why?

[1M, 2009]

A.1 When fresh milk changes to curd, its pH value **decreases** because of the formation of lactic acid.

---

Q.2 How does the flow of acid rain water into a river make the survival of aquatic life in the river difficult?

[1M, 2008]

A.2 The flow of acid rain water into a river makes the survival of aquatic life in the river difficult by **lowering the pH of river water**.

---

Q.3 Which of the following observations is true about dilute solution of acetic acid?

- (a) It smells like vinegar and turns red litmus blue
- (b) It smells like onion and turns blue litmus blue
- (c) It smells like orange and turns red litmus blue

(d) It smells like vinegar and turns blue litmus red

[1M, 2012]

A.3 (d)

---

Q.4 A student prepared 20% sodium hydroxide solution in a beaker containing water. The observations noted by him are given below.

- (I) Sodium hydroxide is in the form of pellets.
- (II) It dissolves in water readily.
- (III) The beaker appears cold when touched from outside.
- (IV) Red litmus paper turns blue when dipped into the solution.

The correct observations are:

- (a) (I), (II), and (III)
- (b) (II), (III) and (IV)
- (c) (III), (IV) and (I)
- (d) (I), (II) and (IV)

[1M, 2013]

A.4 (d)

---

Q.5 In an experiment to study the properties of acetic acid, a student takes about 2 ml of acetic acid in a dry test tube. He adds about 2 ml of water to it and shakes the test tube well. He is likely to observe that:

- (a) The acetic acid dissolves readily in water.
- (b) The solution becomes light orange.
- (c) Water floats over the surface of acetic acid.
- (d) Acetic acid floats over the surface of water.

[1M, 2013]

A.5 (a)

---

Q.6 A student adds 4 ml of acetic to a test tube containing 4 ml of distilled water. He then shakes the test tube and leaves it to settle. After about 10 minutes he observes:

- (a) A layer of water over the layer of acetic acid
- (b) A layer of acetic acid over the layer of water
- (c) A precipitate settling at the bottom of the test tube
- (d) A clear colourless solution

[1M, 2012]

A.6 (d)

---

Q7. How will you test for the gas which is liberated when hydrochloric acid reacts with an active metal  
[1M, 2017]

A.7 When hydrochloric acid reacts with metals, it produces hydrogen gas.



Reaction

When a match stick lightened placed near hydrogen gas puts out a pop sound. Hence, this is how we can test the gas liberated.

---

Q.8 Which is a stronger acid, with pH=5 or pH= 2?  
[1M, 2010]

A.8 pH=2 is the stronger acid as the concentration of hydrogen ions in it is more than that of an acid having pH=5. As we go down the pH scale, (below 7), acidic character increases.

---

Q.9 Why does tooth decay start when pH of mouth is lower than 5.5?  
[1M, 2010]

A.9 When the pH in the mouth falls below 5.5, tooth decay starts. Bacteria present in the mouth produce acid by degradation of sugar and food particles which remain in the mouth after eating. The acid produced in the mouth attacks the enamel thereby, creating tooth decay.

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Q.10 Why does flow of acid rain water into a river make the survival of aquatic life in the river difficult ?

[1M, 2017]

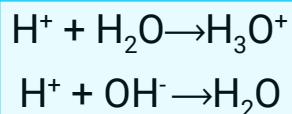
A.10 Acid rain water, if mixed with river water, lowers its pH **below 5.6**, i.e., makes river water **acidic**. But the living body works normally within a pH range of **7-7.8**. That's why flow of acid rain water to rivers makes the survival of aquatic life in the river difficult.

---

Q.11 How the concentration of hydronium ions is affected when an acid is diluted?

[NCERT Exemplar]

A.11 The concentration of hydronium ions **decreases** when an acid is **diluted** because on **adding** water the **H<sup>+</sup> ions** of the acid and hydroxyl ions of water react to form water molecules and the concentration of hydronium ions decreases.



Q.12 Baking soda is a mixture of :

- (a) Sodium carbonate and acetic acid
- (b) Sodium carbonate and tartaric acid
- (c) Sodium hydrogen carbonate and tartaric acid
- (d) Sodium hydrogen carbonate and acetic acid

[1M, 2020]

A.12 (c) Sodium hydrogen carbonate and tartaric acid

---

Q.13 The chemical formula of Plaster of Paris is:

- |   |  |
|---|--|
| (a) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$   | (b) $\text{CaSO}_4 \cdot \text{H}_2\text{O}$   |
| (c) $\text{CaSO}_4 \cdot 1/2\text{H}_2\text{O}$ | (d) $2\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ |

[1M, 2020]

---

A.13 (c)  $\text{CaSO}_4 \cdot 1/2\text{H}_2\text{O}$

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# 2 Marks Questions

Q.14 A compound which is prepared from gypsum has the property of hardening when mixed with a proper quantity of water. Identify the compound. Write the chemical equation for its preparation. For what purpose is it used in hospitals?

[2M, 2009]

**A.14** The compound is Plaster of Paris i.e calcium sulphate hemihydrate ( $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ )



Calcium Sulphate Dihydrate (Gypsum)

Calcium sulphate Hemihydrate (Plaster of Paris)

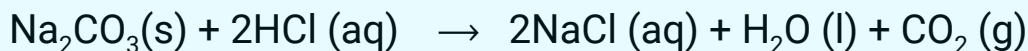
Use in hospital : It is used as plaster for supporting fractured bones in the right position.

Q.15 What is observed when 2 mL of dilute hydrochloric acid is added to 1 g of sodium carbonate taken in a clean and dry test tube? Write a chemical equation for the reaction involved.

[2M, 2019]

**A.15** When 2 mL of dilute HCl is added to 1 g of sodium carbonate,  $\text{CO}_2$  is evolved with brisk effervescence along with the formation of water and sodium chloride salt.

## Reaction



Q.16 Blue litmus solution is added to two test tubes A and B containing dilute HCl and NaOH solution respectively. In which test tube a colour change will be observed? State the colour change and give its reason

[2M, 2019]

**A.16.** The colour change will be observed in test tube A only. The colour of blue litmus solution becomes red as acid turns blue litmus red.

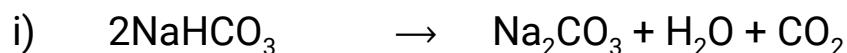
Q.17 Write the chemical formula for washing soda. How may it be obtained from baking soda? Name an industrial use of washing soda other than washing clothes.

[2M, 2008]

**A.17** Washing soda :  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

Baking soda is heated to obtain washing soda.

*“Washing Soda ko ‘Haye Garmi’ suna diya, to wo baking soda ban gaya. Pehle dhone ke kaam aaya, ab khane ke (exam me mat likh ke aana ye)”*



soda)

---

Q.18 What is alkali? Give an example.

[2M, 2008]

**A.18** Bases that are soluble in water are called Alkalies. all alkalies are bases but all bases are not Alkalies.

Ex : Sodium hydroxide, Potassium hydroxide,etc .

---

Q.19 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

[2M, 2016]

**A.19 i)** alkali

**ii)** hydrochloric acid [HCl]

**iii)**  $NaOH \text{ (aq)} + HCl \text{ (aq)} \rightarrow NaCl \text{ (aq)} + H_2O \text{ (l)}$

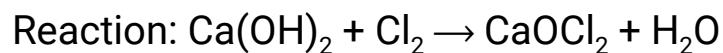
**iv)** Sodium Hydroxide(NaOH)

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Q.20 Write the chemical formula for bleaching powder. How is bleaching powder prepared? For what purpose is it used in paper factories?

[2M, 2008]

**A.20** The chemical name of bleaching powder is calcium oxychloride and its chemical formula is  $\text{CaOCl}_2$ . It is prepared by passing chlorine gas through dry slaked lime.



It is used :

- (i) as a disinfectant and germicide especially in the sterilization of drinking water.
- (ii) for manufacture of chloroform.

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Q.21 What is the chemical formula for Plaster of Paris? How is it prepared? State the common and chemical names of the compound formed when Plaster of Paris is mixed with water.

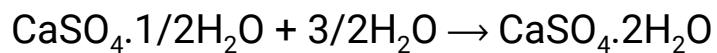
[2M, 2008]

A.21 The chemical formula of this compound is  $\text{CaSO}_4 \cdot 1/2\text{H}_2\text{O}$   
(Calcium sulphate hemihydrate)

It is prepared by heating gypsum ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ) at 300 degree celcius.

When plaster of paris is mixed with water it forms gypsum.

(*Jab gypsum heat kiya, to plaster of paris mila. Jab plaster of paris me paani dala, to gypsum mila. Aap Chronology Samjhiye. Exam me mat likdhena ye!*)



## 3 Marks Questions



Q.22 Identify the acid and the base from which sodium chloride is obtained. Which type of salt is it? When is it called rock salt? How is rock salt formed?

[3M, 2019]

**A.22** i) The acid and the base from which sodium chloride is obtained are HCl and NaOH respectively.

- ii) It is a neutral salt as pH of its aqueous solution is 7.
- iii) Sodium chloride is also found in nature in solid form (large crystals). These large crystals are often brown due to impurities. This

is called rock salt.

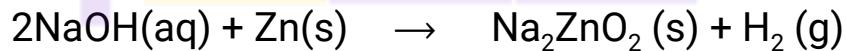
iv) Beds of rock salt were formed when seas of bygone ages dried up.

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Q.23 2 mL of sodium hydroxide solution is added to a few pieces of granulated zinc metal taken in a test tube. When the contents are warmed, a gas evolves which is bubbled through a soap solution before testing. Write the equation of the chemical reaction involved and the test to detect the gas. Name the gas which will be evolved when the same metal reacts with dilute solution of a strong acid.

[3M, 2018]

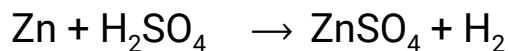
**A.23** The equation of chemical reaction involved :



Sodium Zincate

Test to detect the gas : Hydrogen gas is evolved whose presence can be confirmed by bringing a burning candle near the mouth of the test tube. Hydrogen gas burns with pop sound.

When the same metal reacts with dilute solution of a strong acid, hydrogen gas is evolved.



Q.24 The pH of a salt used to make tasty and crispy pakoras is **9**. Identify the salt and write a chemical equation for its formation. List its two uses.

[3M, 2018]

**A.24** The pH of salt used to make tasty and crispy pakoras is **9**.

The baking soda is most commonly used in making tasty pakoras because **it's basic in nature**. It's chemically known by the name **sodium bicarbonate**.

The reaction that take place during cooking of food and adding baking soda in it is as follows:



1.  $\text{NaHCO}_3$  - Sodium bicarbonate
2.  $\text{Na}_2\text{CO}_3$  - Sodium carbonate
3.  $\text{H}_2\text{O}$  - Water ( pata hai you know lekin ye likh ke aana hai)

Uses of Baking Soda are:

- Acts as an antacid which is used to treat stomach upset and indigestion
- Due to the formation of soapy foam, it is used in fire extinguishers
- **It is used in making baking soda.**

---

Q.25 Name three products of the chlor-alkali process. State two uses of each of these products.

[3M, 2020]

**A.25** The three products of the chlor-alkali process are Sodium Hydroxide(NaOH), chlorine( $\text{Cl}_2$ ) and hydrogen( $\text{H}_2$ ).

→Uses of sodium hydroxide (NaOH):

1. It is used in the manufacturing of paper.

2. It is used for making soaps and detergents.

→Uses of chlorine ( $\text{Cl}_2$ ) At anode

1. It is used in the production of bleaching powder.

2. It is used in the production of hydrochloric acid (HCl).

→Uses of hydrogen ( $\text{H}_2$ ) At cathode

1. It is used as a fuel for rockets.

2. It is used in the hydrogenation of oils to obtain vegetable ghee.

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# 5 Marks Questions

Q.26 State reason for the following statements:

- (i) Tap water conducts electricity whereas distilled water does not.
- (ii) Dry hydrogen chloride gas does not turn blue litmus red whereas dilute hydrochloric acid does.
- (iii) During summer season, a milk man usually adds a very small amount of baking soda to fresh milk.
- (iv) For a dilution of acid, acid is added into water and not water into acid.
- (v) Ammonia is a base but does not contain hydroxyl group.

[5M, 2015]

**A.26** (i) Tap water contains ions which conduct electricity, distilled water does not contain ions.

(ii) Dry HCl does not form ions but HCl gives  $H^+$  and  $Cl^-$ .

(iii) Baking soda does not allow milk to change to lactic acid which makes milk sour.

(iv) Adding water to acid is highly **exothermic**. Therefore water is added to acid very slowly with cooling.

(v) Ammonia dissolves in water and forms  $OH^-$  Therefore, it is basic in nature.

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Q.27 Equal length of magnesium ribbon are taken in two test tubes 'A'

and 'B'.  $\text{H}_2\text{SO}_4$  is added to test tube 'A' and  $\text{H}_2\text{CO}_3$  in the test tube 'B' in equal amounts:

- (a) Identify the test tube showing vigorous reaction.
- (b) Give reason to support your answer.
- (c) Name the gas liberated in both the tubes. How will you prove its liberation?
- (d) Write chemical equations for both reactions.
- (e) Out of the two acids taken above
  - (i) which one will have lower pH value.
  - (ii) lower  $\text{H}^+$  concentration respectively.

[5M, 2013]

**A.27** (a) A will show vigorous reaction.

- (b) It is because  $\text{H}_2\text{SO}_4$  is a strong acid.
- (c) Hydrogen gas will be formed. Bring a burning splinter near the gas. It will burn with a 'pop' sound. It shows gas liberated is hydrogen.



(e) 'A' ( $\text{H}_2\text{SO}_4$ ) will have lower pH.

'B' ( $\text{H}_2\text{CO}_3$ ) will have lower concentration of  $\text{H}^+$

- Q.28 (a) What is the importance of pH in everyday life?
- (b) How are sodium hydroxide and  $\text{Cl}_2$  (Chlorine) gas produced from common salt. What is this process called?

[5M, 2017]

**A.28** (a) (i) Living organisms can survive only in a narrow range of pH change. Acidic rain water when flows into the rivers, it lowers the pH value of river water and makes the survival of aquatic life in such river water difficult. Plants require a specific pH range for their healthy growth.

(ii) Our stomach and intestines work in a specific pH range. Stomach acts in a slightly acidic medium while the small intestine digests the food in slightly alkaline medium.

(iii) Tooth decay starts when the pH of the mouth is lower than 5.5.

(b) When electricity is passed through an aqueous solution of sodium chloride (called brine), it decomposes to form sodium hydroxide. This process is called the Chlor-alkali process because the products formed are chlorine and alkali  $\text{NaOH}$ .



$\text{Cl}_2$  gas is given off at the anode and  $\text{H}_2$  gas at the cathode while

sodium hydroxide solution is formed near the cathode.

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## Assertion Reasoning

Rule : Assertion is labelled as (A) and the Reason is labelled as (R).

Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :

- (a) Both (A) and (R) are true and (R) is the correct explanation of the assertion (A).
- (b) Both (A) and (R) are true, but (R) is not the correct explanation of the assertion (A).
- (c) (A) is true, but (R) is false.
- (d) (A) is false, but (R) is true

Q.1 Assertion : A substance that can either act as an acid or a base is called an amphotelyte.

Reason : Bisulfite ion ( $\text{HS}^-$ ) and Bicarbonate ion ( $\text{HCO}_3^-$ ) are amphotelytes.

A.1 (b) Both (A) and (R) are true, but (R) is not the correct explanation of the assertion (A).

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Q.2 Assertion (A): Salts are the products of an acid- base reaction.

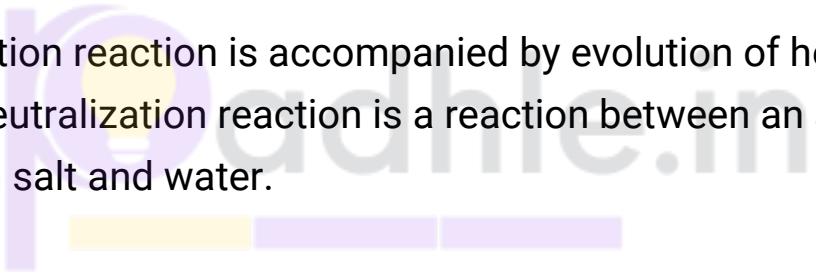
Reason (R): Salt may be acidic or basic.

A.2 (b) Both (A) and (R) are true, but (R) is not the correct explanation of the assertion (A).

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Q.3 Neutralization reaction is accompanied by evolution of heat.

Reason (R): Neutralization reaction is a reaction between an acid and a base to form salt and water.

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A.3 (b) Both (A) and (R) are true, but (R) is not the correct explanation of the assertion (A).

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Q.4 Assertion (A): The substance which shows the nature of a solution as acidic or basic with the change in colour are called indicators.

Reason (R): Red litmus turns blue in a solution containing vitamin 'C'.

A.4 (c) (A) is true, but (R) is false.

