

DATE:
06 AUG 2020

SUBJECT : SCIENCE

CHAPTER-6:
ACIDS, BASES AND SALTS

TOPIC-1:

ACIDS

ACIDS

POINTS TO BE DISCUSSED:

1. DEFINITION OF ACIDS
2. MEANING OF THE WORD ACIDS
3. TASTE OF ACIDS
4. SOURCES OF ACIDS
5. TYPES OF ACIDS
6. ORGANIC ACIDS & EXAMPLES
7. INORGANIC OR MINERAL ACIDS &
EXAMPLES
8. STRONG ACIDS AND WEAK ACIDS
9. CONCENTRATED ACID AND DILUTE ACID
10. FORMATION OF MINERAL ACIDS

ACIDS

1. DEFINITION OF ACIDS:

The Chemical substances having sour taste are called Acids. All acid contain a compulsory element and that is Hydrogen. This hydrogen is replaceable.

2. **Meaning of word Acid:** It means 'Sour'

3. **Taste of acids:** Sour

4. **Sources of Acids:** raw tomatoes, green mangoes, lemons, tamarind (imli), vinegar, orange, apple etc

5. **Types of Acids:** It has two types based on sources.

(a) Organic Acids and

(b) Inorganic or mineral acids

ACIDS

Organic acids : The acids that come from living things such as plants and animals are called organic acids.

Examples : acetic acid, citric acid, lactic acid etc.

(a) Some organic acids and their sources

Acids	sources
Acetic acid	Vinegar
Citric acid	Lemon, orange
Lactic acid	Sour Milk, curd
Malic acid	Apple
Oxalic acid	Tomato, spinach
Tannic acid	Tea
Tartaric acid	Tamarind

NOTE: Organic acids are generally weak acids.

ACIDS

(b) **Inorganic acids or Mineral acids:**

The acids that are formed from minerals found on land, water and air are called mineral acids.

Example: Some common mineral acids are

- (i) Hydrochloric acid (HCl)
- (ii) Sulphuric acid (H₂SO₄)
- (iii) Nitric acid (HNO₃)
- (iv) Carbonic Acid (H₂CO₃)

NOTE : Most of the inorganic acids/mineral acids are strong acids.

Strong Acids: The acids that are completely ionized in liquid water (dissociate into ions in water completely) are called strong acids.

Example : Hydrochloric acid (HCl), Sulphuric acid (H₂SO₄), Nitric acid (HNO₃), Hydrobromic acid(HBr), Hydroiodic acid(HI)

ACIDS

Weak Acids: The Acids that are ionized incompletely in liquid water (dissociate into their ions in water incompletely) are called weak acids. There are many weak acids.

Example:

- carbonic acid (H_2CO_3)
- Hydrofluoric acid (HF)
- Acetic acid (CH_3COOH)
- Formic acid (HCOOH)
- Phosphoric acid (H_3PO_4) etc.

Concentrated acids: It is not same with the term strong acid. A concentrated acid contain very little water.

Dilute Acid: It is not same with the term weak acid. A dilute acid contains large percentage of water.

ACIDS

QUESTIONS : HOME ASSIGNMENT

1. What do you understand by acid?
2. What is the taste of an acid?
3. Name the main two types of acid
4. What do you mean by
 - (a) organic acid
 - (b) Mineral acids
 - (c) Strong acids
 - (d) Weak acids
 - (e) concentrated acid
 - (f) Dilute acid
5. Give examples of any five strong acids and five examples of weak acids.
6. Name any six organic acids and write their sources.
7. Name the element that is always found in an acid.
8. Name the acids found in tea, tamarind, apple

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TOPIC-2:
PROPERTIES OF ACIDS

PROPERTIES OF ACIDS

PHYSICAL PROPERTIES

1. Acids are sour to taste
2. Acids are corrosive. They can destroy or eat away metals and other substances. Mineral acids can burn skin and damage clothes.
3. Most acids are soluble in water
4. Acids turn blue litmus paper red

IMPORTANT NOTE:

(a) Since acids are corrosive, they are usually stored in glass containers.

(b) since acids are soluble in water, so depending on amount of water present, it is divided in two category namely **CONCENTRATED ACID & DILUTE ACIDS**

(c) Both weak and strong acids can be either dilute or concentrated.

(d) The dissolving of an acid in water produces a large amount of heat. If water is added to a concentrated strong acid, the amount of heat generated may cause an explosion. For this reason dilute acids are prepared by adding the concentrated acid slowly to water while stirring

PROPERTIES OF ACIDS

CHEMICAL PROPERTIES:

1. REACTION OF ACIDS WITH METALS

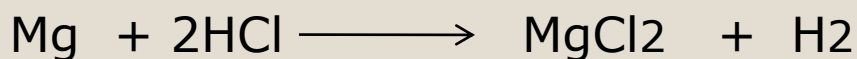
Acids react with some metals to form salts and hydrogen gas. Heat is also generated in the reaction.

Reaction:

Metal + Acid \longrightarrow Salt + Hydrogen

Example :

Magnesium + Hydrochloric acid \longrightarrow
magnesium chloride +
hydrogen



NOTE: AN ACTIVITY ON THIS REACTION IS AS UNDER:

Activity : To observe the reaction between an acid and metal

Materials needed: Magnesium ribbon, Hydrochloric acid, test tubes, Splinter

Method : Take a piece of magnesium ribbon in a test tube. Then let us put 5ml of dilute hydrochloric acid to the test tube.

Observation:

1. on touching test tube you will feel warm.
2. Bubbles are produced.
3. If a burning splinter is brought near the gas, the gas burns with a " pop sound". It indicates the presence of hydrogen gas.

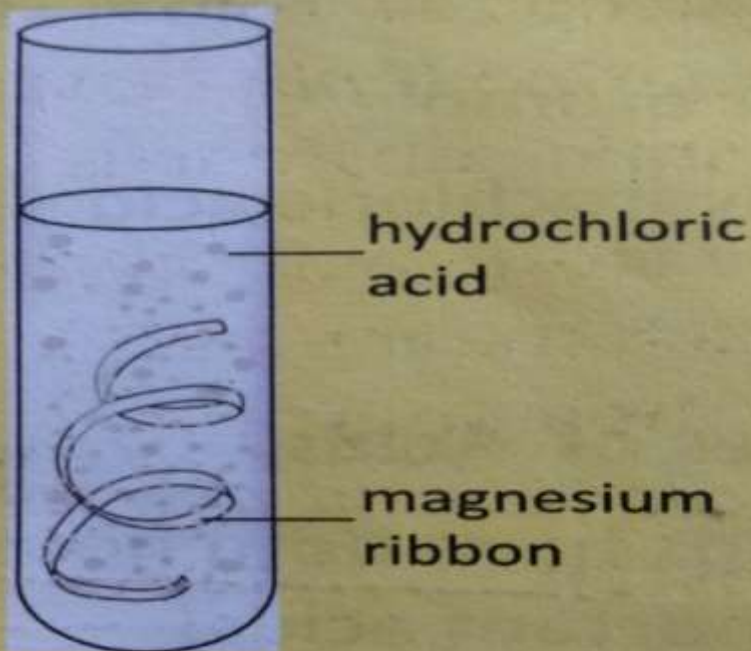


Fig. 6.1 The reaction between magnesium and hydrochloric acid

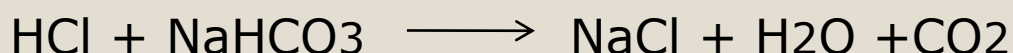
PROPERTIES OF ACIDS

2. REACTION OF ACIDS WITH CARBONATES AND BICARBONATES:

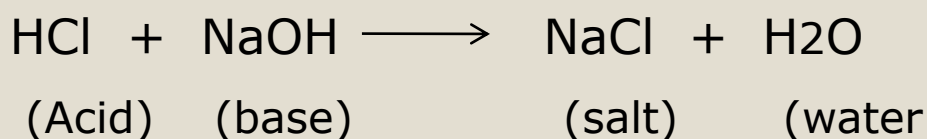
Acids react with carbonates and bicarbonates to form a salt, water and carbon dioxide.

Example :

Hydrochloric acid + sodium bicarbonate \longrightarrow
sodium chloride + water + carbon dioxide



3. Acid reacts with base to produce salt and water. Reaction is shown below



QUESTIONS: HOME ASSIGNMENT

Q1. Write any four physical properties of Acid

Q2. Write any two chemical properties of Acid. Also write the necessary chemical equations.

Q3. Why should we add acids in water very slowly?

Q4. How can we dilute a concentrated acid?

Q5. What gas is produced when metal (say Mg) reacts with acid (say HCl). How will you ensure its conformity?

Q6. What gas is produced when acids react with carbonate or bicarbonate? How will you ensure its conformity?

Q7. What is formed when dilute hydrochloric acid is added to chalk powder(calcium carbonate). Write the balance chemical equation for this reaction.

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TOPIC-3:

USES OF ACIDS

SOME IMPORTANT USES OF ACIDS

Acids have both household and industrial uses. Different Acids have different uses.

1. Uses of Hydrochloric acid(HCl):

- Used to clean and remove rust from the surfaces of iron and steel
- Used as a cleaning agent(for example, in toilet cleaning liquid)
- Used to manufacture glue.
- It is present in the stomach, help in digestion

2. Uses of sulphuric Acid (H₂SO₄):

- Used to manufacture fertilisers, drugs, dyes,paints,detergent, paper and several useful chemicals
- Used to refine petroleum
- Used in the textile and leather industries
- Used to make car batteries

3. Uses of Nitric acids (HNO₃):

- Used in the manufactured of fertilizers and explosives
- Traditionally used in the extraction and purification of gold and silver

4. Uses of Acetic acid (vinegar):

- Used in cooking and in the food industry for flavouring and pickling
- Used in the production of synthetic fibres

QUESTION:HOME ASSIGNMENT

Q1. Write any five household uses of acids

Q2. Write any four industrial use of acids

Q3. Write any three uses of Hydrochloric acid

Q4. Write any three uses of Sulphuric acid

Q5. Write any two uses of Nitric acid

Q6. Write any three uses of Acetic acid

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TOPIC-4:
BASES & ITS PROPERTIES

BASES

POINTS TO BE DISCUSSED

1. DEFINITION OF BASE
2. EXAMPLES OF BASES
3. TYPES : WEAK AND STRONG BASES
4. ALKALIS
5. PROPERTIES OF BASES

BASES: Definition-Metal oxides and metal hydroxides are called Bases . Or The chemical substances having bitter taste are called bases.

Examples:

1. Sodium hydroxide (NaOH)
2. Calcium Oxide (CaO)
3. Potassium hydroxide (KOH)
4. Calcium Hydroxide : $\text{Ca}(\text{OH})_2$
5. Sodium Bicarbonate (NaHCO_3)

BASES

Alkalis: Most bases are not soluble in water. There are some bases that dissolve in water and these bases are called Alkalis.

Thus all alkalis are bases but all bases are not alkalis.

Examples of Alkalis:

1. Sodium hydroxide (NaOH)
2. Potassium hydroxide (KOH)
3. Calcium Hydroxide : $\text{Ca}(\text{OH})_2$
4. Ammonium hydroxide (NH_4OH)

Strong bases and Weak bases: Strong bases produces more ions in water and weak bases produce less ions in water.

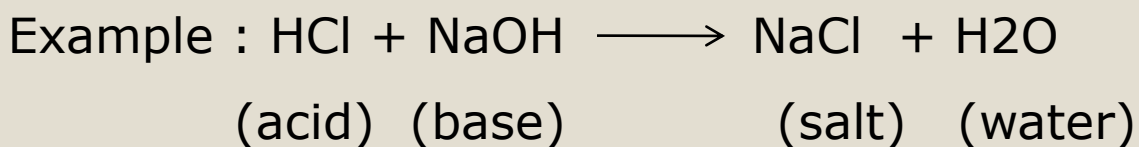
Example : KOH , NaOH are strong bases
:Ammonia (NH_3) weak base

PROPERTIES OF BASES

Properties:

1. Bases are bitter to taste.
2. They are soapy or slippery to the touch
3. Alkalis such as sodium hydroxide and potassium hydroxide are corrosive. They are called caustic soda and caustic potash. Caustic means corrosive.
4. Bases turn red litmus paper blue.
5. Base reacts with acid to neutralize each other.(Acid –Base reaction)

In Acid-Base Reaction Salt and Water are produced.



Note: 1. Bases have chemically opposite properties to acids.

USES OF BASES

SODIUM HYDROXIDE (NaOH)

1. Used in the preparation of soap and detergents
2. Used to manufacture paper, plastic and textiles
3. Used in extraction of aluminium from its ore

CALCIUM HYDROXIDE (Ca(OH)₂)

1. Used to whitewash buildings
2. Used to treat sewage
3. Used in the preparation of bleaching powder
4. Used to neutralize acidic soil

MAGNESIUM HYDROXIDE (Milk of magnesia) - Mg (OH)₂

1. Used as an antacid to neutralise stomach acidity

AMONIUM HYDROXIDE (NH₄OH)

1. Used in the manufacture of fertilisers
2. Used in household cleaning agents

QUESTIONS: HOME ASSIGNMENT

1. What do you understand by base? Give examples of any five bases.
2. What are alkalis? Name and write the formula of any two alkalis.
3. Write the difference between base and alkalis.
4. Write any four properties of base
5. Write one chemical property of base.
6. What is the taste of base?
7. Name the main product of acid-base reaction.
8. Write the uses of the following bases
 - (a) Sodium hydroxide
 - (b) Calcium hydroxide
 - (c) Magnesium hydroxide
 - (d) Ammonium hydroxide

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TOPIC-5:
INDICATORS

INDICATORS

DEFINITION OF INDICATORS:

The substances that change colour in the presence of an acid or base are called Indicators. Thus indicators are those substances that help us to identify a substance whether it is acid or base.

TYPES OF INDICATORS:

It has two types:

- (a) Natural Indicators and
- (b) Artificial or synthetic Indicators

Natural Indicators:

The indicators that are obtained from natural sources are called natural indicators.

Examples: litmus solution, red cabbage juice, China rose (hibiscus) extract, turmeric , beetroot juice, grape juice etc

Making of natural indicators: By boiling red cabbage leaves, beetroot pieces etc in water and filtering it we get juice or solution. It can be used as natural indicator.

INDICATORS

ARTIFICIAL OR SYNTHETIC INDICATORS

The man made indicators are known as artificial or synthetic indicators . These are made in the laboratories. These indicators are prepared from artificial substances

Examples : Phenolphthalein , methyl orange

COLOUR CHANGE IN INDICATORS

Indicators	Acidic solution	Basic solution
Blue litmus	Red	Stay blue
Red litmus	Blue	Stay red
Red cabbage	Pink or red	Green or yellow
Beetroot	Pink or red	Pale yellow
Hibiscus	Dark pink	Green
Turmeric	No change	Dark red

SYNTHETIC INDICATORS

Phenolphthalein	colourless	Bright pink
Methyl orange	Pink or red	Pale yellow

NOTE: Red litmus stay red and blue litmus stay blue in neutral solution

QUESTION: HOME ASSIGNMENT

1. What are indicator? Name the two types of indicators.
2. Define natural indicator and artificial indicator. Give examples of each of them.
3. Write any two differences between natural indicators and artificial indicators.
4. What will be the colour change of the following indicators in acid and base
 - (a) Blue litmus
 - (b) Red litmus
 - (c) Red cabbage
 - (d) Beetroot
 - (e) Hibiscus
 - (f) Turmeric
 - (g) Phenolphthalein
 - (h) Methyl orange
5. Turmeric stains on cloth turn red when they are washed with soap. Give reason.
6. Ant bites are treated with calamine. Give reason.
7. What color changes will be observed when red cabbage juice and methyl orange are each tested first with lemon juice and then with detergent?

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TOPIC-6:

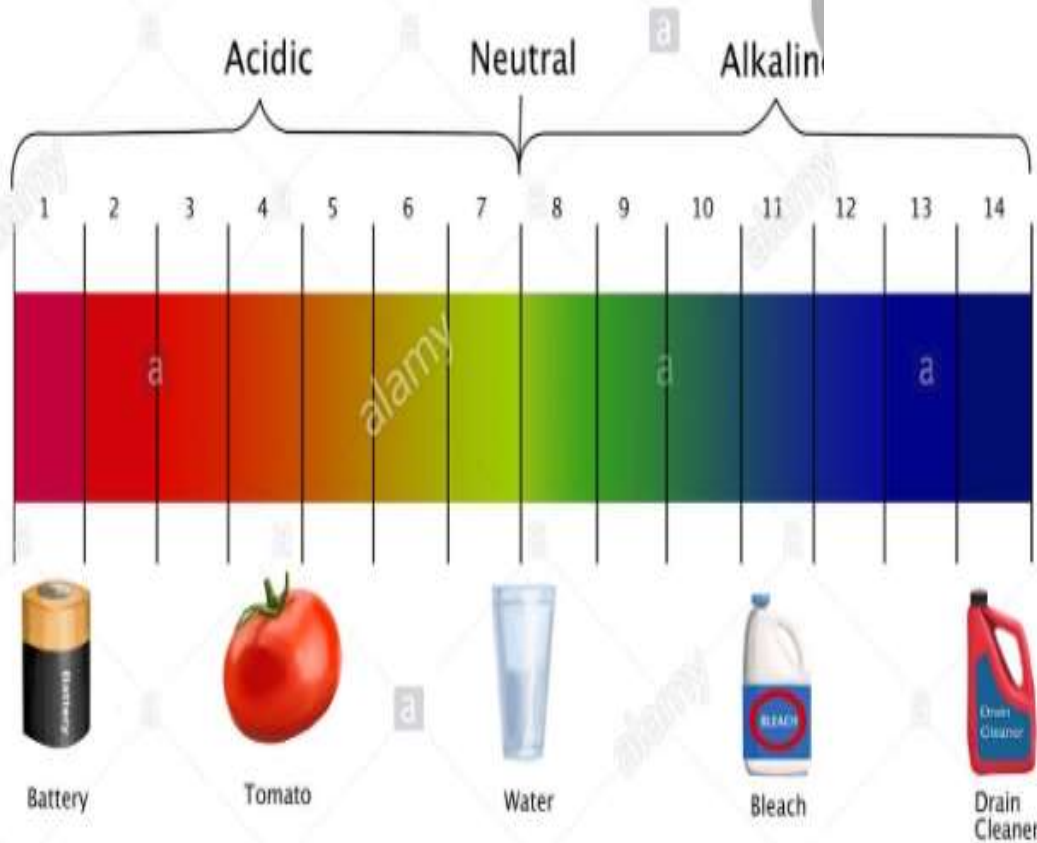
**pH SCALE & UNIVERSAL
INDICATOR**

pH SCALE

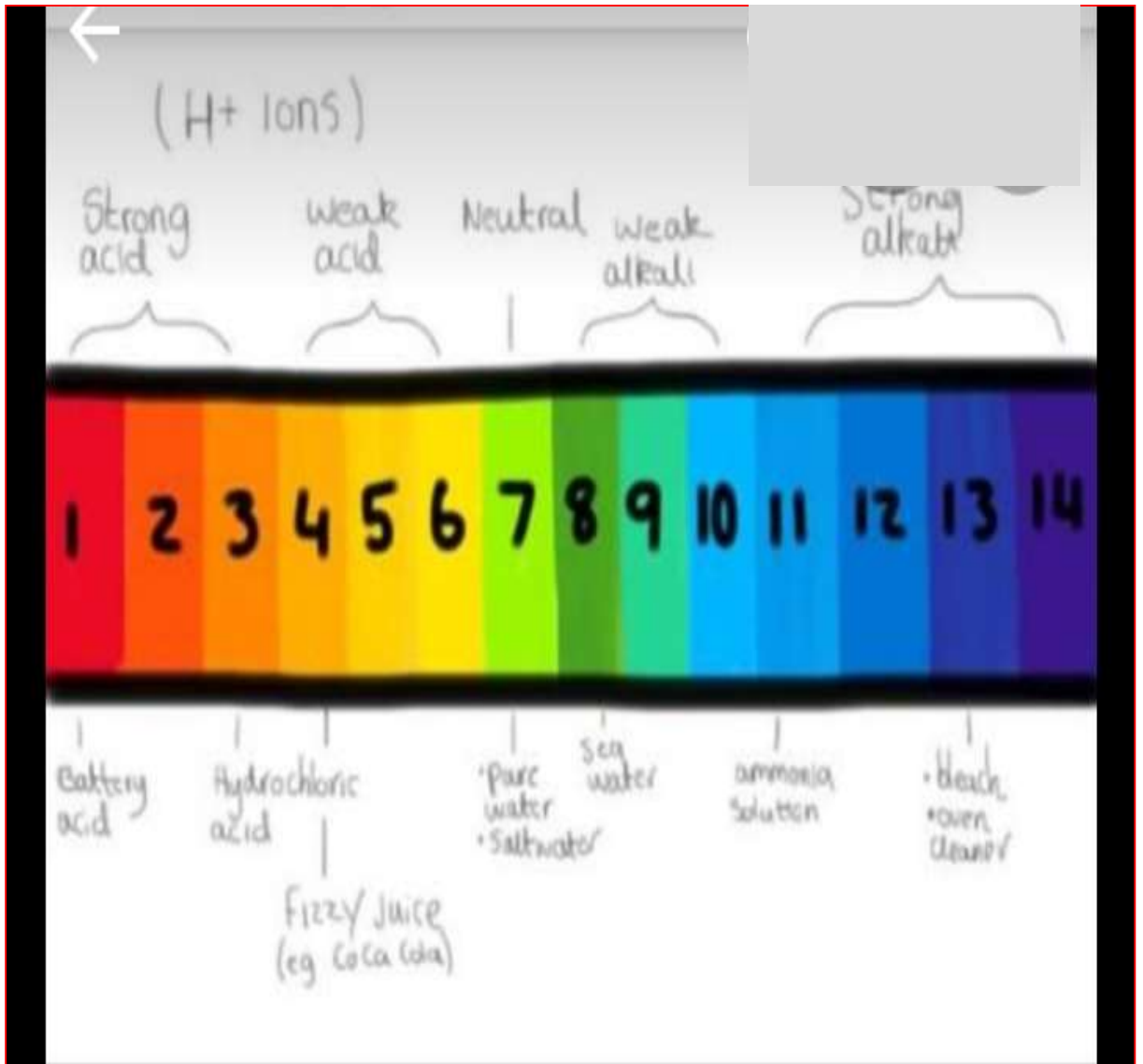
1. The indicators that we use help us to tell whether a solution is acidic or basic (alkaline) solution but it cannot tell us how strong or weak it is.
2. pH Scale is a scale that measures exactly how acidic or alkaline a solution is.
3. In pH Scale there is calibration of numbers against colour that ranges from 0 - 14 :
(0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14)
4. (a) For neutral substance pH value is 7
(b) For acid pH is less than 7
(c) For Base pH is greater than 7
5. pH means potential Hydrogen. pH is really a measure of the relative amount of free hydrogen ions and hydroxyl ions in the water.
6. **Note:** More pH value means less number of hydrogen ions in the solution (It is basic). And less pH value means more number of hydrogen ions in the solution (Acidic)

pH SCALE

The PH Scale



pH SCALE



UNIVERSAL INDICATOR

1. A universal indicator is a pH indicator made of solution of several compounds that exhibits several smooth colour changes over a wide range of pH values to indicate the acidity or alkalinity of solution. It is a mixture of a different indicators. we can have Universal indicator in the form of paper and solution also.
 2. Strong Acid turns the Universal Indicator paper into dark red
 3. Strong Base turns the Universal Indicator paper into dark blue or purple
 4. Neutral substance (like distilled water) turns the Universal Indicator paper into green
- * The colour changed of the universal indicator paper is compared with standard colour paper or pH scale. This helps us to measure the acidity or alkalinity of given acid or base.

UNIVERSAL INDICATOR



A roll of universal indicator paper



Colors of universal indicator

Digital PH Meter



REFERENCE

Accuracy up to ± 0.1 pH

QUESTION: HOME ASSIGNMENT

1. What do you understand by pH scale?
2. What is the pH value of acid, base and neutral substances?
3. What is called universal indicator?
4. Write the differences between universal indicator and other indicator.
5. What is the meaning of pH?
6. How is pH value of a solution related to the concentration of hydrogen ions?
7. pH value of one solution is 2 and another solution is 13, Identify which solution is base and which one is acid.
8. What is the range of pH value for the following
 - (a) strong acid
 - (b) weak acid
 - (c) strong base
 - (d) weak base
 - (e) neutral substance
9. Name any ten substances and write their pH value.

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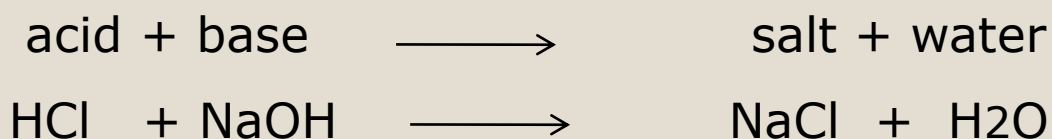
TOPIC-7:

NEUTRALISATION REACTION

NEUTRALISATION

NEUTRALISATION REACTION: DEFINITION

When an acid and base reacts with each other, they neutralise each other's chemical effects. This reaction is called a neutralisation reaction. In this reaction products are salt and water. Heat is also produced during the process.



NEUTRALISATION REACTION IN DAILY LIFE:

- 1. Tooth decay:** Bacteria feed on the food that is stuck between our teeth. This bacteria produce an acid that destroys the enamel of our teeth. It is called tooth decay. To prevent this from happening we use toothpaste, which is mildly basic.
- 2. Acidity in Stomach:** Stomach secretes hydrochloric acid that help in digestion of food. Some times too much acid is produced that causes acidity and stomach ache. Then we take antacid - $\text{Mg}(\text{OH})_2$ which is a base,

NEUTRALISATION

3. **Ants bite**: when ants bite we feel irritation as it injects **venom** which contain acid. It is treated with calamine lotion. The lotion contains Zinc Oxide which is a mild base. Thus neutralisation reaction takes place and the problem is solved.

4. **Acid Rain**: It causes soil acidic. Rain water reacts with Sulphur dioxide, nitrogen dioxide present in air and acid is formed and get mixed in soil. Axccessive use of fertilisers also causes the soil to become acidic. Farmers treat acid soil with bases like quicklime(calcium oxide) or slake lime (calcium hydroxide)

5. **Factory waste**: it contains acid. It is generally released into rivers and water bodies. They will kill the fish and other organisms that live in the water. Hence before release ,they are neutralised by base like slake lime.

QUESTION: HOME ASSIGNMENT

1. What do you understand by neutralisation reaction? Give one example of neutralisation reaction.
2. Why is acid–base reaction called neutralisation reaction?
3. Give any five examples of neutralisation reaction in our daily life.
4. What is acid rain? Write any two harms of acid rain.
5. We use Zinc oxide when ant bites us. Give reason.
6. Factory wastes are treated with slake lime before releasing to water bodies. Give reason.
7. What is the root cause of tooth decay? How

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TOPIC-8:
SALTS AND ITS USES

SALTS AND ITS USES

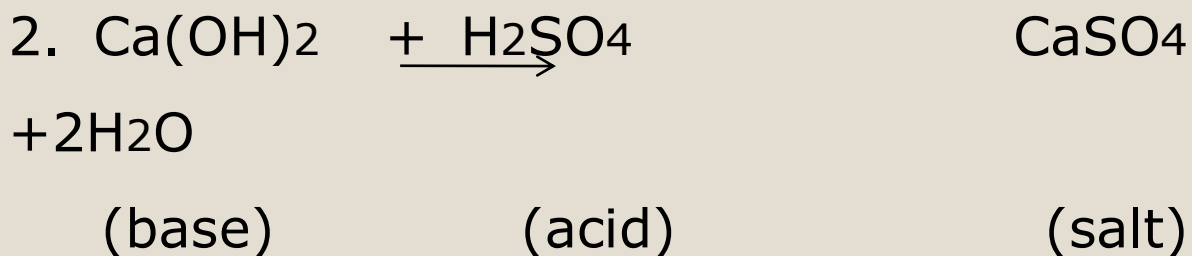
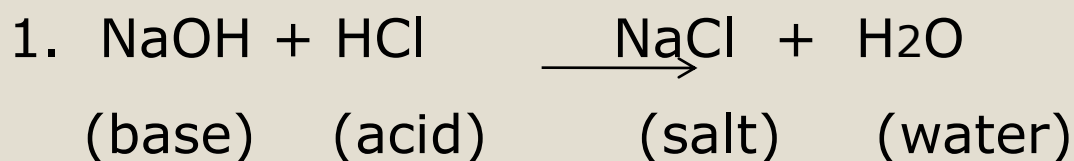
SALTS – DEFINITION:

Salt is an ionic compound that contains a cation (base) and an anion (acid). Salts are compounds that are formed when acids and base react. Salts are also formed when acid reacts with metals.

Naming of a salt: Name of the metal is given first and it is followed by name of the non-metallic group.

Examples of Salts: sodium chloride (NaCl), Calcium sulphate (CaSO₄), Magnesium sulphate (MgSO₄) etc

Formation of salts: By Acid – Base reaction:



USES OF SALTS

1. NaCl is used in making of food to make it tasty. It is also used as preservative in pickles.
2. Washing soda (sodium carbonate) is used to make laundry soaps and detergent.
3. Baking powder (it contains sodium bicarbonate) is used to make cake softy and spongy
4. Magnesium sulphate (known as Epsom Salt) is used in gardening and agriculture. It is also used in medicine and to make cosmetics
5. Calcium Sulphate is used to make plaster of Paris, which is used to make casts to set broken bones.
6. Many salts such as ammonium sulphate, calcium phosphate, sodium nitrate and potassium nitrate are used to make fertilisers. Potassium nitrate is also used to make explosives.

CRYSTALLISATION

CRYSTAL: It is defined as the solid form of a substance having a fixed geometrical structure. Examples of crystal: table salts, diamond , sugar etc.

CRYSTALLISATION:

The process by which solid crystals are formed from solution is called cryatallisation.

Note: By crytallisation impurities can be removed.

TO PREPARE CRYSTALS OF CuSO_4 FROM A SOLUTION:

Requirements: water, dilute sulphuric acid, copper sulphate powder, beaker, filter, stirrer, stand , Bunsen burner

Method : water (half filled beaker) + dilute HCl + Heat till boiling+ Adding CuSO_4 and stirring + continue till saturation occur + filter soon and allow to reman the solution undisturbed for 2 hrs, then crystall of CuSO_4 is ready

QUESTION: HOME ASSIGNMENT

1. What do you mean by salts? Give examples of any four salts.
2. What is the chemical name of table salt?
3. How is salt formed?
4. Name the products of acid – base reaction.
5. What happen when metal reacts with acid?
6. Write any four uses of salts.
7. What is crystal and crystallisation?
8. How will you make crystal of copper sulphate?
9. Which salt is used to make plaster of Paris?
10. Name the salt that is used to make medicine and cosmetics.