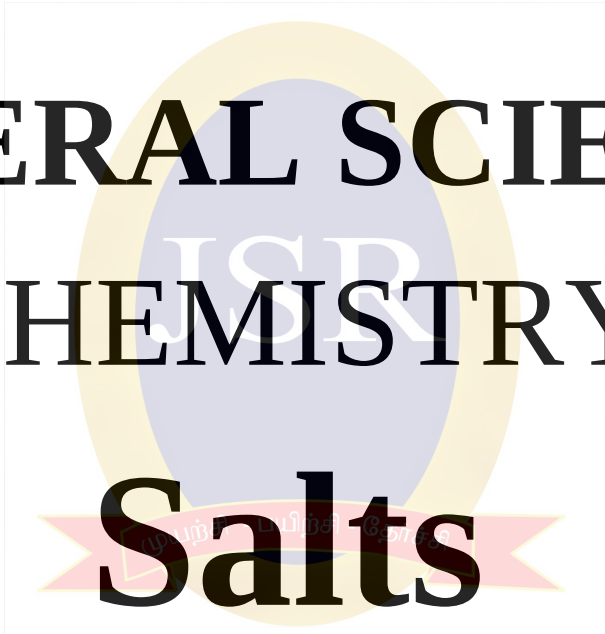


JSR IAS ACADEMY

GENERAL SCIENCE

CHEMISTRY

Salts



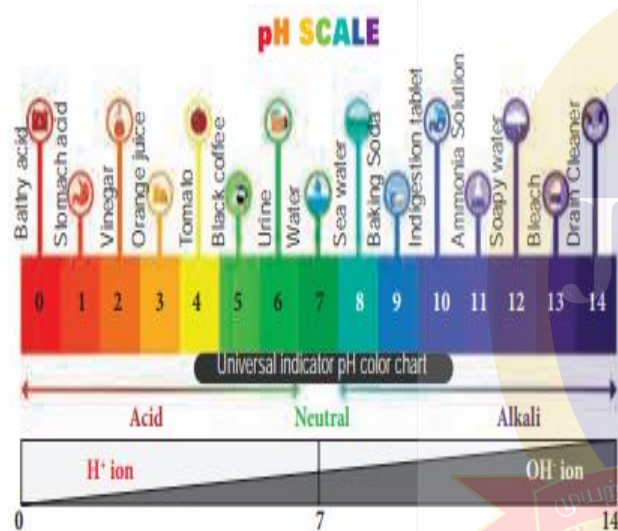
pH Scale

A scale for measuring hydrogen ion concentration in a solution is called pH scale.

The 'p' in pH stands for '**potenz**' in German meaning power.

pH scale is a set of numbers from 0 to 14 which is used to indicate whether a solution is acidic, basic or neutral.

- ✓ Acids have pH less than 7
- ✓ Bases have pH greater than 7
- ✓ A neutral solution has pH equal to 7



The Solution	Approximate pH
Blood	7.3 – 7.5
Saliva	6.5 – 7.5
Gastric Juice	1.0 – 3.0
Soft Drinks	3.0
Sea Water	8.5
House hold Ammonia	12.0
Tomato Juice	4.0 – 4.4

Solution	Approximate pH
Lemon juice	2.2 – 2.4
Tomato juice	4.1
Coffee	4.4 - 5.5
Human saliva	6.5 - 7.5
Household ammonia	12.0

Importance of pH in everyday life**pH in Human Body**

Our body works within the pH range of **7.0 to 7.8**. Living organisms can survive only in narrow range of pH change.

(i) Using pH factor, the general health condition of our body can be examined. At pH level 6.9, the body becomes prone to viral infections like cold, cough and flu.

Cancer cells thrive inside the body at a pH of 5.5.

(ii) The pH of a normal, healthy human skin is 4.5 to 6. Proper skin pH is essential for a healthy complexion.

(iii) pH of stomach fluid is approximately 2.0. This fluid is essential for the digestion of food.

(iv) Human blood pH range is 7.35 to 7.45. Any increase or decrease in this value, leads to diseases. The ideal pH for blood is 7.4.

(v) pH of saliva normally ranges between 6.5 to 7.5.

(vi) White enamel coating of our teeth is calcium phosphate, the hardest substance in our body. It does not dissolve in water. If pH of mouth falls below 5.5, the enamel gets corroded.

COMMON ACIDS	pH	COMMON BASES	pH
HCl (4%)	0	Blood plasma	7.4
Stomach acid	1	Egg white	8
Lemon juice	2	Sea water	8
Vinegar	3	Baking soda	9
Oranges	3.5	Antacids	10
Soda, grapes	4	Ammonia water	11
Sour milk	4.5	Lime water	12
Fresh milk	5	Drain cleaner	13
Human saliva	6-8	Caustic soda 4% (NaOH)	14
Pure water	7	Milk of magnesia	10
Tomato juice	4.2	Coffee	5.6

Toothpastes which are generally basic and used for cleaning the teeth can neutralize the excess acid and prevent tooth decay

pH in our digestive system

It is very interesting to note that our stomach produces hydrochloric acid. It helps in the digestion of food without harming the stomach. During indigestion the stomach produces too much acid and this causes pain and irritation.

pH of stomach fluid is approximately 2.0.

pH of soil

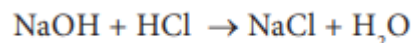
In agriculture, the pH of soil is very important.

Citrus fruits require slightly alkaline soil, while rice requires acidic soil and sugarcane requires neutral soil.

pH of rain water

The pH of rain water is approximately 7 which means that it is neutral and also represents its high purity.

If the atmospheric air is polluted with oxide gases of sulphur and nitrogen, they get dissolved in rainwater and make its pH less than 7. Thus, if the pH of rain



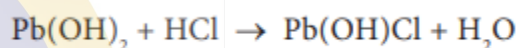
(ii) Acid Salts

It is derived from the partial replacement of hydrogen ions of an acid by a metal. When a calculated amount of a base is added to a polybasic acid, acid salt is obtained.



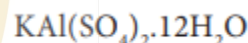
(iii) Basic Salts

Basic salts are formed by the partial replacement of hydroxide ions of a diacidic or triacidic base with an acid radical.



(iv) Double Salts

Potash alum is a mixture of potassium sulphate and aluminium sulphate.



Water of Crystallisation

Many salts are found as crystals with water molecules they contain. These water molecules are known as water of crystallisation.

Salts that contain water of crystallisation are called **hydrated salts**.

The number of molecules of water hydrated to a salt is indicated after the dot in its chemical formula.

For example, copper sulphate crystal have five molecules of water for each molecule of copper sulphate. It is written as $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ and named as copper sulphate pentahydrate.

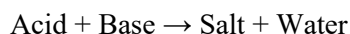
This water of crystallisation makes the copper sulphate **blue**. When it is heated, it loses its water molecules and becomes **white**



SALTS

Salts are the products of the reaction between acids and bases.

Salts produce positive ions and negative ions when dissolved in water.



Types of Salts

(i) Normal Salts

A normal salt is obtained by complete neutralization of an acid by a base.

Identification of Salts**(i) Physical examination of the salt.**

The physical examination of the unknown salt involves the study of colour, smell and density. This test is not much reliable.

(ii) Dry heating Test.

This test is performed by heating a small amount of salt in a dry test tube. After all the water get evaporated, the dissolved salts are sedimented in the container.

(iii) Flame Test.

Certain salts on reacting with concentrated hydrochloric acid (HCl) form their chlorides. The paste of the mixture with con.HCl is introduced into the flame with the help of platinum wire.

Colour of the flame	Inference
Brick red	Ca^{2+}
Golden Yellow	Na^{2+}
Pink Violet	K^{+}
Green Fleshes	Zn^{2+}

(iv) When HCl is added with a carbonate salt, it gives off CO_2 gas with brisk effervescence.

Uses of Salts**Common Salt (NaCl)**

It is used in our daily food and used as a preservative.
Washing Soda (Sodium Carbonate-)

- It is used in softening hard water.
- It is used in glass, soap and paper industries.

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Baking Soda (Sodium bicarbonate - NaHCO_3)

- It is used in making of baking powder which is a mixture of baking soda and tartaric acid.
- It is used in soda-acid fire extinguishers.
- Baking powder is used to make cakes and bread, soft and spongy.
- It neutralizes excess acid in the stomach and provides relief.

Bleaching powder (Calcium Oxychloride - CaOCl_2)

- It is used as disinfectant.
- It is used in textile industry for bleaching cotton and linen.

Plaster of Paris (Calcium Sulphate Hemihydrate - $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$)

- It is used for plastering bones
- It is used for making casts for statues.