

CHEMISTRY STUDY MATERIALS FOR CLASS 10

(NCERT Based notes of Chapter -02)

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ACIDS, BASES AND SALTS

ACIDS

Acid is a substance which furnishes H^+ ions or H_3O^+ ions when dissolved in water. Acids have one or more replaceable hydrogen atoms. The word acid is derived from the Latin name 'acidus' which means sour taste. Substances with 'sour taste' are acids. Lemon juice, vinegar and grape juice have sour taste, so they are acidic. They change blue litmus to red. They are colourless with phenolphthalein and pink with methyl orange. There are many substances which contain acid and hence taste sour, such as curd, tamarind, lemon, etc.

CLASSIFICATION OF ACIDS

1. **Based on their sources:** Acids are classified into two types namely organic acids and inorganic acids.

Organic acids:- Acids present in plants and animals (living beings) are **organic acids** eg. $HCOOH$, CH_3COOH (Weak acids)

Inorganic acids:- Acids from rocks and minerals are **inorganic acids** or mineral acids eg. HCl , HNO_3 , H_2SO_4 (Strong acids)

2. **Based on their basicity**

Monobasic acid: - It is an acid which gives one hydrogen ion per molecule of the acid in solution eg. HCl , HNO_3 .

Dibasic acid:- It is an acid which gives two hydrogen ions per molecule of the acid in solution e.g., H_2SO_4 , H_2CO_3 .

Tribasic acid:- It is an acid which gives three hydrogen ions per molecule of the acid in solution. e.g., H_3PO_4 ,

3. Based on ionisation

Acids are classified into two types based on ionisation.

Strong acids:- These are acids which ionise completely in water eg. HCl

Weak acids:- These are acids which ionise partially in water eg. CH_3COOH

4. **Based on concentration:-** Depending on the percentage or amount of acid dissolved in water acids are classified into concentrated acid and dilute acid.

Concentrated acid:- It is an acid having a relatively high percentage of acid in its aqueous solution.

Dilute acid:- It is an acid having a relatively low percentage of acid in aqueous solution.

INTEXT QUESTIONS PAGE NO. 18

Question 1: You have been provided with three test tubes. One of them contains distilled water and the other two contain an acidic solution and a basic solution, respectively. If you are given only red litmus paper, how will you identify the contents of each test tube?

Answer : If the colour of red litmus paper gets changed to blue, then it is a base and if there is no colour change, then it is either acidic or neutral. Thus, basic solution can be easily identified.

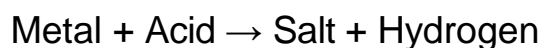
Let us mark the three test tubes as A, B, and C. A drop of the solution in A is put on the red litmus paper. Same is repeated with solution B and C. If either of them changes colour to blue, then it is basic. Therefore, out of three, one is eliminated. Out of the remaining two, anyone can be acidic or neutral.

Now a drop of basic solution is mixed with a drop of each of the remaining two solutions separately and then the nature of the drops of the mixtures is checked. If the colour of red litmus turns blue, then the second solution is neutral and if there is no change in colour, then the second solution is acidic. This is because acidic and basic solutions neutralize each other. Hence, we can distinguish between the three types of solutions.

CHEMICAL PROPERTIES OF ACIDS

REACTION OF ACIDS WITH METAL:

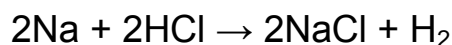
Acids give hydrogen gas along with respective salt when they react with a metal.



Example:

- Hydrogen gas and zinc chloride are formed when hydrochloric acid reacts with zinc metal. $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$

- Hydrogen gas and sodium chloride are formed when hydrochloric acid reacts with sodium metal.



- Hydrogen gas and iron chloride are formed when hydrochloric acid reacts with iron. $\text{Fe} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2$

- Hydrogen gas and zinc sulphate are formed when zinc metal reacts with sulphuric acid $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$

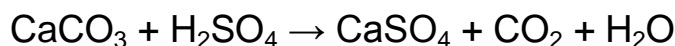
REACTION OF ACIDS WITH METAL CARBONATE:

Acids give carbon dioxide gas and respective salts along with water when they react with metal carbonates.

Metal carbonate + Acid → Salt + Carbon dioxide + Water

Examples:

- Sulphuric acid gives calcium sulphate, carbon dioxide gas, calcium sulphate and water when it reacts with calcium carbonate.



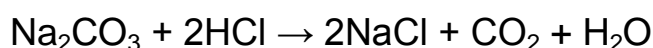
- Sulphuric acid gives sodium sulphate, carbon dioxide gas and water when it reacts with sodium carbonate.



- Hydrochloric acid gives carbon dioxide gas, calcium chloride and water when it reacts with calcium carbonate.



- Hydrochloric acid gives carbon dioxide gas, sodium chloride along with water when reacts with sodium carbonate.



- Hydrochloric acid gives carbon dioxide, magnesium chloride and water when it reacts with magnesium carbonate.



- Nitric acid gives sodium nitrate, water and carbon dioxide gas when it reacts with sodium carbonate.