TENDER HEART HIGH SCHOOL, SEC-33B, CHD.

CLASS- IX
CHAPTER- 3

SUBJECT- CHEMISTRY
TEACHER- ANAMIKA

Preparation of Acid

(1) By synthesis:-

Hydrogen + Non-metal ⟶ Acid

$H_2 + Cl_2 \longrightarrow 2HCl$

(2) By action of water on non-metallic or acidic oxide:-

Acidic oxide + Water ⟶ Acid

$SO_3 + H_2O \longrightarrow H_2SO_4$

$CO_2 + H_2O \longrightarrow H_2CO_3$

Note:- Only oxy acids can be prepared by this method.

(3) By oxidation of Non-metal:-

Non-metal + Acid ⟶ Acid + Water + Oxide

$S + 6HNO_3 \longrightarrow H_2SO_4 + 2H_2O + 6NO_2$

(4) By displacement:-

Salt + Less Volatile acid $\xrightarrow{\Delta}$ Salt + Acid (More Volatile)

$NaCl + H_2SO_4 \xrightarrow{\Delta} NaHSO_4 + HCl$

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Properties of Acid:-

Physical properties

1) Taste:- Mineral acids like H_2SO_4 and HNO_3 are highly corrosive in nature. Acids have sour taste.

2) Physical state:- Some acids are solid and some are liquid at room temp.

For eg. H_3BO_3, $(COOH)_2$, H_3PO_4 → Solid
CH_3COOH, HCl, HNO_3 → liquid
H_2SO_4 → Non volatile acid

3) Effect on skin:- All mineral acid have corrosive action on the skin. & cause painful burns and blister. Conc. H_2SO_4 Chars the skin black, conc. HCl gives amber colour to the skin. Carbonic acid & organic acid are not corrosive

4) They change colour of Indicator:-

Indicator	Colour change in acidic medium
Litmus	Blue to red
Methyl orange	Orange to pink
Phenolphthalein	Remain colourless

Chemical properties:-

(1) Reaction with active metal:-

Active Metal + Acid ⟶ Salt + Hydrogen

$Mg + 2HCl \longrightarrow MgCl_2 + H_2\uparrow$

(2) Reaction with base - Neutralisation

Basic oxide/ hydroxide + Acid ⟶ Salt + Water

$CuO + H_2SO_4 \longrightarrow CuSO_4 + H_2O$

Action of dilute acid on salt

3) Decomposition of hydrogen carbonates and carbonates

Carbonates/ bicarbonate + Acid ⟶ Salt + Water + CO_2

$CaCO_3 + 2HCl \longrightarrow CaCl_2 + H_2O + CO_2\uparrow$

NOTE:- If salt produced in insoluble, then the reaction does not proceed. So, we do not expect lead carbonate to react with HCl or H_2SO_4.

4) Decomposition of Sulphites & bisulphites:-

Sulphite/ bisulphite + Acid ⟶ Salt + H_2O + SO_2

$CaSO_3 + 2HCl \longrightarrow CaCl_2 + H_2O + SO_2\uparrow$

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5) Decomposition of sulphides:-

Metal sulphide + Acid ⟶ Salt + Hydrogen sulphide

$ZnS + 2HCl \longrightarrow ZnCl_2 + H_2S$

Bases:- A bases is either metallic oxide or metallic hydroxide which react with hydronium ion of acid to form salt and water only.

For example:- CuO, $Mg(OH)_2$

Basic oxide:- A basic oxide is a metallic oxide which contain the ion O^{2-} and react with an acid to form salt and water only.

Basic hydroxide:- It is metallic hydroxide which contain $^{\ominus}OH$ & will react with an acid to give salt and water only.

Basic hydroxide + Acid ⟶ Salt + H_2O

$NaOH + HCl \longrightarrow NaCl + H_2O$

~~Alt~~ Alkalis:- An alkali is a basic hydroxide which when dissolve in water produces $^{\ominus}OH$

$NaOH \rightleftharpoons Na^+ + {}^{\ominus}OH$

All alkalis are bases but all bases are not alkalis.

Classification of Bases:-

On the basis of strength

1) A strong alkali:- dissociate completely.

2) A weak alkali:- It undergoes only partial dissociation.

On the basis of their acidity:-

1. Monoacidic basic:- which produce $^{\ominus}OH$ ions.

2. Dibasic base:- two $^{\ominus}OH$ ion.

$$Ca(OH)_{2(aq.)} \rightleftharpoons Ca^{2+} + 2\,^{\ominus}OH$$

3. Tribasic acidic base:- give three $^{\ominus}OH$ ion.

$$Al(OH)_3 \rightleftharpoons Al^{3+} + 3\,^{\ominus}OH$$

Preparation of base

1. From Metal:-

Metal + oxygen $\longrightarrow$ Base

$$2Mg + O_2 \longrightarrow 2MgO$$

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2) By action of Water on reactive metal:-

Reactive Metal + Water ⟶ Bases/ Alkali + H_2

$Ca + 2H_2O \longrightarrow Ca(OH)_2 + H_2$

3) By double decomposition:-

Salt Solution + Base ⟶ Basic hydroxide + Normal Salt

$FeCl_3 + 3NaOH \longrightarrow Fe(OH)_3 \downarrow + 3NaCl$

4) By action of oxygen on metal sulphide:-

Metallic Sulphide + Oxygen $\xrightarrow{\Delta}$ Metallic oxide + SO_2

$2ZnS + 3O_2 \xrightarrow{\Delta} 2ZnO + 2SO_2$

5) By action of Salt:-

Metal Carbonate $\xrightarrow{\Delta}$ Basic oxide + CO_2

$CaCO_3 \xrightarrow{\Delta} CaO + CO_2\uparrow$

Properties of base/ alkali

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Physical prop.

1. They have sharp & bitter taste

2.

Indicators	Colour change
Litmus	Red to blue
Methyl orange	Orange to yellow
Phenolphathein	Colourless to pink

Chemical prop:-

1. Strong alkali + CO_2 ⟶ Carbonate + H_2O

$2NaOH + CO_2 \longrightarrow Na_2CO_3 + H_2O$

2. Base/Alkali + Acid ⟶ Salt + H_2O

$Ca(OH)_2 + 2HCl \longrightarrow CaCl_2 + 2H_2O$

3. Metallic salt + Base/Alkali ⟶ Salt + Insoluble hydroxide

$CuSO_4 + 2NH_4OH \longrightarrow (NH_4)_2SO_4 + Cu(OH)_2\downarrow$