Acids, Bases & Salts

Acid :

An acid is a substance which

(i) is sour in taste

(ii) turns blue litmus paper into red

(iii) contains replaceable hydrogen

(iv) gives hydrogen ion (H+) in aqueous solution (Arrhenius heorem

(v) can donote a proton (Bronsted & Lowry concept)

(vi) can accept electron (Lewis theorem)

Uses of acid :

1. As food :

(a) Citric acid — Lemons or oranges Citrus fruits)

(b) Lactic acid — sour milk

(c) Butyric acid — Rancid bu er

(d) Tarteric acid — rapes

(e) Acetic acid — Vin ar

(f) Maleic a id A ples

(g) Carbo ic aci — Soda water aerated drinks

(h) Stearic aci — Fats

(i) Oxalic and — Tomato, wood sorrel.

2. Hydrochloric acid (HCl) is used in digestion

3. Nitric acid (HNO3) is used in the purification of gold & silver.

4. Conc. H_2SO_4 and HNO_3 is used to wash iron for its galvanization.

5. Oxalic acid is used to remove rust spot.

6. Boric acid is a constituent of eye wash.

7. Formic acid is present in red ants.

8. Uric acid is present in urine of mammals

Basicity of an acid : The number of removable hydrogen ions from an acid is called basicity of that acid.

Mono basic acid (one removable H^+ ion) — HCl, HNO_3

Dibasic acid (two removable H^+ ion) — H_2SO_4, H_2CO_3, $3PO_3$,

Tribasic acid (three removable H^+ ion) — H_3PO_4

Acidic strength (i) HF < HCl < HBr < HI

(ii) $CH_3COOH < H_2SO_4 < HNO_3 < HCl$

Uses of HCl :

(i) HCl present in gastric j ic s are r sponsible for the digestion.

(ii) Used as bathroom l aner

(iii) As a pickling ag nt before galvanization.

(iv) In th tann g of lea

(v) In the dyin and textile industry.

(vi) In the manufacture of gelatine from bones.

Uses of HNO_3

(i) In the manufacture of fertilizers like ammonium nitrate.

(ii) In the manufacture of explosives like TNT (Trinitro toluene), TNB (Trinitro benzene), Picric acid (Trinitro phenol) etc.

(iii) Nitro Glycerine (Dynamite)

(iv) Found in rain water (first shower)

(v) It forms nitrates in the soil.

(vi) In the manufacture of rayon.

(vii) In the manufacture of dyes & drugs.

Uses Of Sulphuric acid (H_2SO_4)

(i) In lead storage battery.

(ii) In the manufacture of HCl.

(iii) In the manufacture of Alum.

(iv) In the manufacture of fertilizers, drugs, de ents explosives. Use of Boric acids : As an antiseptic.

Uses of Phosphoric acid :

(i) Its calcium salt makes our bones.

(ii) It forms phosphatic fe ilizers.

(iii) PO_4^{-3} is involved i prov ding energy for chemical reactions in our body.

Uses of Ascorbic cid : Sou ce of Vitamin C

Uses of Citric acid : Fl ring agent & food preservative.

Uses of Ace acid : Flavouring agent & food preservative.

Uses of T taric acid : (i) Souring agent for pickles (ii) A component of baking powder (sodi m bicarbonate + tartaric acid)

Bases :

A. Base is a substance which

(i) bitter in taste

(ii) turns red litmus paper into blue

(iii) gives hydroxyl ions (OH–) in aqueous solution.

(iv) can accept proton (Bronsted & lowry concept)

(v) can donate electrons (Lewis theory)

1. Oxides & hydroxides of metals are bases

2. Water soluble bases are called alkali e.g. NaOH, KOH, etc.

3. All alkalies are bases but all bases are not alkalies because all ses are not soluble in water.

Acidity of a base : The number of removable hydroxyl (OH–) ions f om a base is called acidity of a base.

Acidity of NaOH = 1

Acidity of KOH = 1

Acidity of Ca(OH)2 = 2

The pH scale : pH of a solution i he negative logarithm of the concentration of hydrogen ions in mole pe lit e.

pH = – log[H+]

If pH < 7 then soluti n is acidi

If pH > 7 hen olution is sic

If pH = 7 then olution is neutral

Salt : Whe an acid reacts with a base, salt and water are formed.

Acid + Base → alt + Water

HCl + NaOH → NaCl + H2O

Uses of some important salts :

1. Sodium Chloride : As a flavouring agent in food. In saline water for a patient of dehydration (0.9% NaCl), In the manufacture of HCl etc.

2. Sodium iodate : Iodised salt to prevent Goitre disease.

3. Sodium Carbonate : As washing soda, manufacturing of glass etc.

4. Sodium Benzoate : As a food preservative for pickles.

5. Potassium nitrate : As a fertilizer giving both K & N to the solid I g n powder (C + S + KNO3), In match sticks etc.

6. Calcium Chloride : Dehydrating agent used for removing moist e from gases.

7. Calcium carbonate (lime stone) : In the construc ion f building, In the cement industry., In the extraction of metals etc.

8. Calcium sulphate : (i) Plaster of Paris (2 Ca O4 · H O) – For moulds & statues, in the cement industry in the form f Gypsum (CaSO4 · 2H2O).

9. Calcium Phosphate : As a fertilize (Sup rphosp ate of lime)

10. Bleaching powder : (i) As a disinf ctant (ii) As a bleaching agent (removing colours)

11. Alum (Potassium alum ium sulp ate) : (i) In the purification of water, (ii) In the dyeing industry (ii) As an iseptic after shave.