# Chemistry
## Chapter-9
## Acid-Base Balance

### ☐ What is neutralization ?

The process of neutralizing a substance neither being an acid nor a base is called neutralization.

### ☐ Acid

- A kind of chemical dissolves in water and decomposes into hydrogen ion or proton,tastes sour
- HCl, H2SO4 are concentrated acid (decomposes 100% in water)
- CH3COOH, H2CO3 are dilute acid (decomposes partially in water)
- 4 out of 1000 molecule of CH3COOH get decomposed
- Stomach contains HCl (Hydrochloric Acid)
- Acid undergoes reaction with reactive metal and create salt and hydrogen gas.

| Food | Acid |
|---|---|
| Milk | Lactic Acid |
| Tamarind | Tartaric Acid |
| Vinegar | Ethanoic Acid |
| Soft Drinks | Carbonic Acid |
| Lemon or Orange | Citric Acid |
| Tea | Tannic Acid |

### ■ Properties of Dilute Acid:

- Tastes sour
- Corrosive in nature, makes metals corroded
- Blue litmus becomes red
- Reaction with reactive metal produces salt and hydrogen gas
- Reaction with metallic carbonates and bicarbonates produces salt, water and CO2
- Reaction with metallic oxide produces salt and water

### ■ Role of water in chemical properties of Acids :

• Acid doesn't contain any hydrogen ion being dehydrated or dry

• Hydrogen ion in aqueous solution shows the acidic property

• Acid being dissolved in water shows acidic property and conduct electricity

### ■ Concentrated Acid:

• Dissolved H+, NO2 and SO3 is greater than the amount of water in HCl, HNO3 and H2SO4

• Hcl(aq) has highly pungent smell

• NO2 + water creates HNO3(aq)

• SO3 + water creates H2SO4(aq)

## ❒ Base and Alkali

• Metallic oxide or hydroxide reacts with acid and creates salt and water

• Alkali is metallic hydroxide, dissolves in water.

### ■ Properties of Dilute Base:

• Red litmus becomes blue

• Slippery

### ■ Dilute Base Reaction with Metallic Salts:

• Reaction between NaOH and Metallic Nitrate produces Metallic Hydroxide and Sodium Nitrate

### ■ Role of Water in Chemical Properties:

• Pure Alkali doesn't contain basic properties until dissolving into water

• Strong alkali has comparatively more OH- ions than the amount of water

## ■ Concept of pH

• Determine the nature of aqueous solution

• pH = - log [H+]

• pH of distilled water is 7

• pH > 7 for bases, pH = 7 for neutral substances and pH < 7 for acids

• pH scale between 0 – 14

### ■ Measuring pH:

• pH paper and Universal indicator have color chart for determining pH

• pH meter directly shows the pH value through digital display

• Litmus paper turns blue to red for pH < 7, red to blue for pH > 7 and remains same for pH = 7

### ■ Importance of pH:

•Best value of pH for soil is 6.0-8.0

•Stomach : 1, Human Skin : 4.8 – 5.5, Urine : 6.0, Blood : 7.43 – 7.45 and Pancreatic Juice : 8.1

• pH for cosmetics is 4.8 – 5.5

### ■ Importance of Neutralization Reaction:

• In digestion, dental care and agriculture

## ❒ Water

### ■ Hardness of water:

• Hardness caused by bicarbonate salts is temporary hardness, removed by filtering

• Hardness caused by chloride or sulfate salts is permanent hardness, removed adding $Na_2CO_3$

### ■ pH Value of Water:

• pH < 4.5 or pH > 9.5 will be a threat

### ❒ What is BOD?

BOD stands for Biological Oxygen Demand. The amount of oxygen needed to decompose organic matter in water in presence of air is called BOD.

### ❒ What is COD?

COD stands for Chemical Oxygen Demand. The amount of oxygen needed to decompose all organic and inorganic matters in water in presence of air is called COD.

• BOD and COD is to measure the pollution level of water.

### ■ Purification of water:

•Chlorination is adding bleaching powder to make water drinkable.

•Boiling water for 15 – 20 minutes can sterilize water.

•Adding alum dust [$K_2SO_4.Al_2(SO_4)_3.24H_2O$] to purify water is sedimentation

•Filtration is to purify water by filtering through different chemicals