Chemistry Notes:

Strong and Weak Acids and Their Reactions

What Are Acids?

- Acids produce protons (H+ ions) in water.
- An H+ ion is only a proton.
- When acids dissolve in water, they ionize and release H+ ions.
- Example: HCl in water becomes H+ and Cl–.
- Acids show acidic behavior only when they are in water.
- Hydrogen chloride gas is not an acid until it dissolves in water.

Strong and Weak Acids

Strong Acids

- Examples: Hydrochloric acid, Sulfuric acid, Nitric acid.
- They ionize completely in water.
- All the acid molecules break apart to release H+ ions.

Weak Acids

- Examples: Ethanoic acid, Citric acid, Carbonic acid
- They do not fully ionize in water
- Only a small number of molecules release H+ ions.

Reversible Ionization of Weak Acids

- Weak acids ionize through a reversible reaction.
- The reaction goes both ways: molecules that stay together and molecules that break apart.
- Because only a few particles ionize, the balance stays mostly on the left side.

pH and Hydrogen Ion Concentration

- pH tells how much H+ is present in a solution.
- If pH goes down by 1, the H+ ions become 10 times more.
- If pH goes down by 2, the H+ ions become 100 times more.

Comparing Strong and Weak Acids

- If a strong acid and a weak acid have the same concentration, the strong acid will always have a lower pH.
- Strong acids ionize completely.
- Weak acids do not ionize completely.

Acid Strength vs Acid Concentration

Acid Strength

- Tells what part of the acid molecules ionize in water
- Shows how many molecules break apart

Acid Concentration

- Tells how much acid is dissolved in a certain volume of water
- A strong acid can be dilute
- A weak acid can be concentrated
- Increasing concentration lowers the pH for both strong and weak acids.