

Definitions of Acids and Bases

- Arrhenius Acid:** substance that when dissolved in water produces protons (H^+)
- A. **Strong Acid:** dissolves and dissociates 100% to produce protons (H^+)
1. seven strong acids: HCl, HBr, HI, HNO_3 , H_2SO_4 , $HClO_4$, & $HClO_3$
 2. solutions of strong acids have a high concentration of H^+ .
 3. the molecular form of the strong acid does not exist in solution.
- B. **Weak Acid:** dissolves but less than 100% dissociates to produce protons (H^+)
1. any acid that is not one of the seven strong is a weak acid (e.g. H_3PO_4 , HNO_2 , H_2SO_3 , HClO, $HClO_2$, HF, H_2S , $HC_2H_3O_2$ etc.)
 2. solutions of weak acids have a low concentration of H^+ .
 3. the molecular form of the weak acid does exist in solution.
- Arrhenius Base:** substance that when dissolved in water produces hydroxides (OH^-)
- A. **Strong Base:** dissolves and dissociates 100% to produce hydroxides (OH^-)
1. strong bases: Group IA metal hydroxides (LiOH, NaOH, KOH etc.) and heavier Group IIA metal hydroxides ($Ca(OH)_2$, $Sr(OH)_2$ and $Ba(OH)_2$)
 2. solutions of strong bases have a high concentration of OH^- .
 3. the molecular form of the strong base does not exist in solution.
- B. **Weak Base:** dissolves but less than 100% produces hydroxides (OH^-)
1. weak bases: ammonia (NH_3) and its derivatives (NH_2OH , $(CH_3)_2NH$ etc.)
 2. solutions of weak bases have a low concentration of OH^- .
 3. the molecular form of the weak base does exist in solution.

Electrolytes

When a substance is dissolved in water, the resulting solution can be classified according to its electrical conductivity.

1. **Strong electrolyte:** a solution of a strong electrolyte conducts a strong electrical current
 1. high concentration of mobile ions present in solution
 2. substance dissolves and dissociates 100% into ions
 3. strong electrolytes: strong acids, strong bases and soluble ionic compounds
2. **Weak electrolyte:** a solution of a weak electrolyte conducts a weak electrical current
 1. low concentration of mobile ions present in solution
 2. substance dissolves and dissociates less than 100% into ions (some dissociates into ions and the rest dissolves as neutral molecules)
 3. weak electrolytes: weak acids and weak bases
3. **Non-electrolyte:** a solution of a non-electrolyte conducts no electrical current
 1. no mobile ions present in solution
 2. substance dissolves as neutral molecules (none dissociates into ions)
 3. non-electrolytes: organic compounds that are not classified as weak acids or bases eg. C_2H_5OH (ethanol) and $C_{12}H_{22}O_{11}$ (sugar) etc.