

ACIDS, BASES AND SALTS - Form 4 Chemistry notes

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Acids

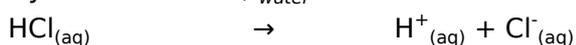
- Are substances whose molecules yield hydrogen ions in water; or
- Are substances, which contain replaceable hydrogen, which can be wholly or partially replaced by a metal.
$$\text{HCl(aq)} \rightarrow \text{H}^+_{(\text{aq})} + \text{Cl}^-_{(\text{aq})}$$
- OR: - Acids are proton donors i.e. a substance which provides protons or hydrogen ions.

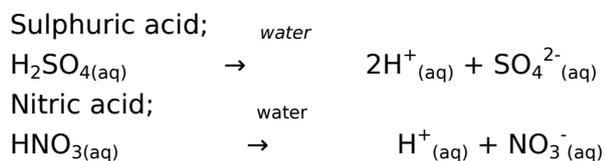
Strength of Acids

- Acids can be categorized as either strong or weak acids;
 - a. **Strong acids**
 - Are those which dissociate or ionize completely to a large extent in water, to yield many hydrogen ions.
 - They yield to the solution as many protons as they possibly can.

Examples

Hydrochloric acid; *water*

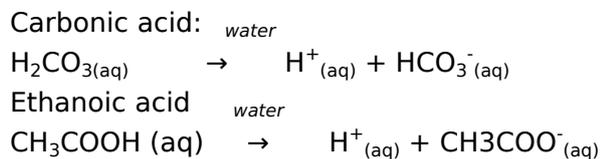




b. Weak acids

- Are acids, which undergo partial dissociation to yield fewer hydrogen ions.
- They do not ionize in water completely or to a large extent i.e. some of their molecules remained unionized in solution.

Examples:



• Note: - concentrated acids and dilute acids

Concentrated Acids

- Is an acid with a high number of acid molecules per given volume.

Dilute Acids

- Are acids with a low number of acid molecules per given volume.
- Thus there are concentrated strong acids or dilute strong acids; as well as concentrated weak acids and dilute weak acids.

Comparing the Strength of Acids

i. Using rate of evolution of hydrogen

Apparatus:

- Boiling tubes; 1M HCl/ H₂SO₄/HNO₃ ; Methanoic acid/ tartaric acid; magnesium ribbon.

Procedure:

- One boiling tube is half filled with 1M HCl; while another is half filled with 1M Ethanoic acid.
- 2 pieces of magnesium ribbons are cleaned to remove a layer of oxide on the surface.
- One of the two pieces is put in each tube of the acid.

Observations:

- Hydrochloric acid evolves hydrogen much more quickly than Ethanoic acid yet they were of equal concentration.

Conclusion

- Hydrochloric acid is a strong acid;
- Ethanoic acid is a weak acid

Note:

- The same experiment can be repeated with marble chips (CaCO₃) in acids of same concentration.
- The marble chips dissolve more quickly in HCl, which is a strong acid.

ii. Using electrical conductivity

Procedure:

- 50cm³ of 2M-hydrochloric acid solution is placed into a beaker and set up apparatus as shown below.
- The switch is closed and the brightness of the bulb noted.