



Laboratory acids

- Hydrochloric acid(monobasic)
- Sulphuric acid(dibasic)
- Nitric acid
- Ethanoic acid
- Monobasic acid is an acid that donates 1 H^+ for every molecule
- Dibasic acid is an acid that donates 2H^+ for every molecule

Three balloons (green, blue, and purple) are positioned vertically on the left side of the slide. Each balloon has a string and several small yellow triangular flags attached to it.

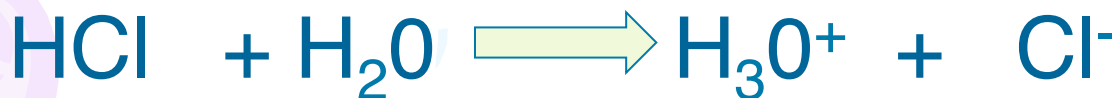
Hydronium ion

Dative bond

Dissociation of acids in water



- What does the equation above mean?
- The acid (HA) donates a proton to the water and the water accepts the proton to become a hydronium ion and an anion.





Arrhenius definition of an acid

- An acid dissociated in water to produce hydrogen ions.
- **What are the shortcomings of this theory? Find out on page 138**



Laboratory bases

- Sodium hydroxide
- Sodium carbonate
- Magnesium hydroxide
- Calcium hydroxide



Dissociation of bases in water

- Arrhenius definition of a base is a substance that dissociates in water to produce OH^- ions.

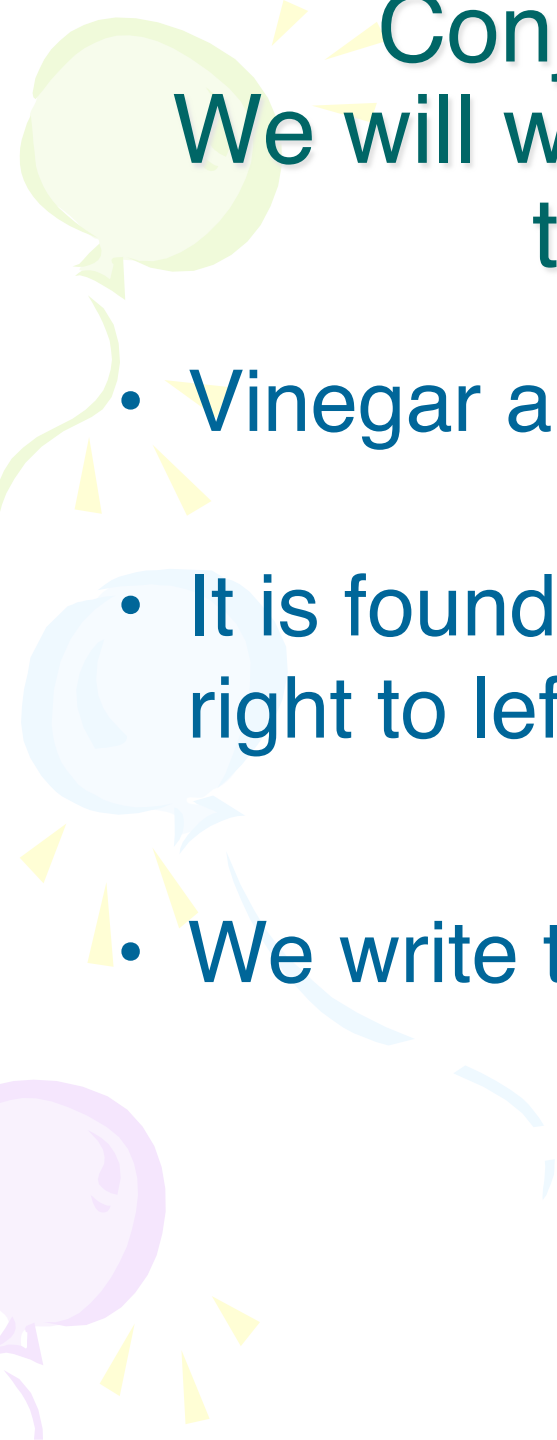
Notes on acids and bases and pH

- Arrhenius acid is a substance that breaks down in water to produce H^+ ions.
- Arrhenius base is a substance that breaks down in water to produce OH^- ions.
- Strong Base is Sodium Hydroxide (used for cleaning drains)
- Weak base is ammonia.
- Strong acid is HCl , H_2SO_4 , HNO_3
- Weak Acid is vinegar(ethanoic acid)



Bronsted Lowry

- Acid is a proton donor.
- A base is a proton acceptor.
- $\text{HCl} + \text{H}_2\text{O} \longrightarrow \text{H}_3\text{O}^+ + \text{Cl}^-$
- $\text{NH}_3 + \text{H}_2\text{O} \longrightarrow \text{NH}_4^+ + \text{OH}^-$
- These two examples demonstrate that water can act as an acid or a base. We call water amphoteric.



Conjugate acid –base pairs

We will write in the conjugate pairs in the equations below

- Vinegar and water react
- It is found that this reaction can go from right to left also.
- We write the equation this way



Definitions

- A base changes to a conjugate acid when it accepts a proton.
- An acid changes to a conjugate base when it donates a proton.
- A conjugate acid-base pair is where the acid and base differ by a proton.



Neutralisation

- pH is the measure of acidity or basicity
- pH measured using universal indicator
- BL acid is proton donor
- BL base is proton acceptor
- Neutralisation is reaction between an acid and a base that makes salt and water.
- Everyday example is rubbing wasp sting with vinegar to neutralise the base
- Putting lime on soil to neutralise acidic soil.

pH

- Concentration of a solution of HCl is 3.65g/l. Calculate the pH?

- Step 1 : $3.65/36.5 = 0.1\text{M}$

- Step 2

$$\text{pH} = -\log_{10}[0.1] = 1$$

$$\text{pH} = -\log_{10}[\text{H}^+]$$



pH

- Calculate the pH of a 0.01M solution of NaOH

$$\text{pH} = -\log_{10}[0.01] = 14 - 2 = 12$$

$$\text{pH} = -\log_{10}[\text{H}^+]$$

pH

- Concentration of a solution of 4.0g/l of sodium hydroxide is Calculate the pH?

- Step 1 : $4/40 = 0.1\text{M}$

- Step 2

$$\text{pH} = -\log_{10}[0.1] = 14-1 = 13$$

$$\text{pH} = -\log_{10}[\text{H}^+]$$