(Note that this is not everything, only those that are tested)

Chapter 8 : Acids & Bases

WA2

No.

Date . .

Acids are substances that dissociate in water to form H^+ ions.

Ethanoic acid = CH_3COOH

Hydrochloric acid = HCl

Nitric acid = HNO_3

Sulfuric acid = H_2SO_4

Properties:

1. Acids have a sour taste
2. Acids produce mobile ions when dissolved in water to conduct electricity
3. Aqueous acids turn blue litmus paper red

Acid + (reactive) Metal ⟶ Salt + Hydrogen

↳ Does not work with metals like copper, silver and lead

Acid + Base/Alkali ⟶ Salt + Water

↳ Called neutralisation

Acid + Carbonate ⟶ Salt + Water + Carbon dioxide

↗ HCl (sulfuric acid) ↗ HNO_3 (nitric acid) ↗ H_2SO_4 (sulfuric acid)

Strong acids dissociate completely in water to form a high concentration of hydrogen ions.

↳ For example, hydrochloric acid is a strong acid.

$HCl(aq) \longrightarrow H^+(aq) + Cl^-(aq)$

↗ H_3PO_4 (Phosphoric acid) ↗ CH_3COOH (Ethanoic acid)

Weak acids dissociate partially in water to form low concentration of hydrogen ions.

↳ For example, ethanoic acid is a weak acid.

$CH_3COOH(aq) \rightleftharpoons CH_3COO^-(aq) + H^+(aq)$

Ionic equation for every Acid + Base/Alkali reaction:

$OH^-(aq) + H^+(aq) \longrightarrow H_2O(l)$

Basicity of an acid is the maximum number of H^+ ions that can be produced by 1 molecule of acid during dissociation.

↳ Honestly just look at the chemical formula for the number of hydrogen for 1 molecule of the compound.

$HCl(aq) \longrightarrow H^+(aq) + Cl^-(aq)$

↳ HCl is a **monobasic** acid.

↳ Produces one H^+ ion from each acid molecule when dissociated in water

$H_2SO_4(aq) \longrightarrow 2H^+(aq) + SO_4^{2-}(aq)$

↳ H_2SO_4 is a **dibasic** acid.

↳ Produces two H^+ ions from each acid molecule when dissociated in water

$H_3PO_4(aq) \longrightarrow 3H^+(aq) + PO_4^{3-}(aq)$

↳ H_3PO_4 is a **tribasic** acid

↳ Produces three H^+ ions from each acid molecule when dissociated in water.

Bases are any metal oxide (Not tested for WA2) or hydroxide.

Sodium oxide = Na_2O

Zinc oxide = ZnO

Copper (II) oxide = CuO

} Not tested for WA2

Magnesium hydroxide = $Mg(OH)_2$

Aluminium hydroxide = $Al(OH)_3$

Bases are mostly insoluble in water

↳ Exceptions:

- Bases containing group 1 metals
- Bases containing ammonium ion (NH_4^+)

When (soluble) bases dissolve in water, it forms a metal hydroxide called an alkali.

An alkali is a substance which releases hydroxide ions (OH^-) when it is dissolved in water.

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Properties:

1. Soapy feeling
2. Turning red litmus paper blue
3. Able to conduct electricity
4. Corrosive
5. Reacts with acids to form water

   Acid + Base/Alkali ⟶ Salt + Water
6. Reacts with ammonium salts to form ammonia, salt and water

   Base/Alkali + Ammonium salt ⟶ Salt + Ammonia + Water

The strength of an alkali refers to the extent of ionisation of the alkali when dissociated in water.

Strong alkalis ionise completely in water to produce a high concentration of hydroxide ions.

↳ Examples include:

- Sodium hydroxide = $NaOH$
- Potassium hydroxide = KOH

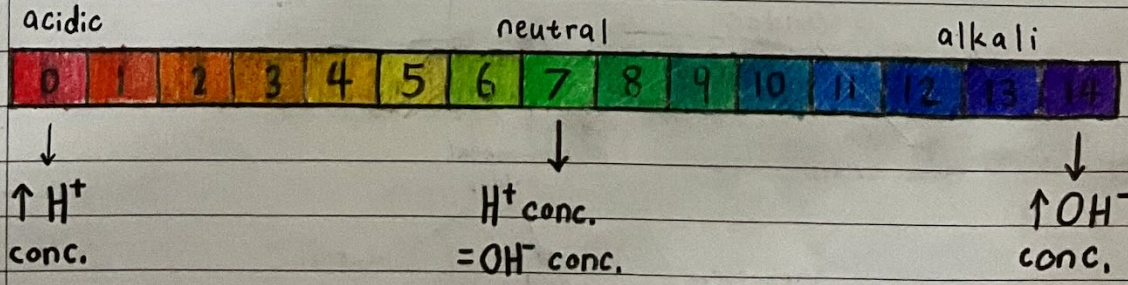
Weak alkalis ionise partially to produce a low concentration of hydroxide ions.

↳ Examples include:

- Ammonia = NH_3

$NH_3(g) + H_2O(l) \rightleftharpoons NH_4^+(aq) + OH^-(aq)$

A pH scale is a measure of how acidic or alkaline an aqeous solution is.



An indicator changes colours when added to an acid or alkali.

↳ It is a mixture of substances which shows different colours in different pH.

Tips for titration practical :

1. Look out for the **results table**!!
   - ↳ Okay this is quite important so listen closely
   - ↳ There's normally only one way to do this table :

	1	2	3	
Final burette reading/cm^3				→ higher
Initial burette reading/cm^3				→ lower
Volume of ____ used/cm^3				
Best titration results				

   - ↳ Follow this format & you'll be ok!
2. Do not leave the filter funnel **ON THE BURETTE**
   - ↳ Yes, you're in a rush, but they check this too
   - ↳ Immediately after pouring the solution into the burette, take it off!
   - ↳ Leaving it on will only make the results and yours worse-
3. **Label** the liquids!!
   - ↳ I can never stress this enough, as this is whats standing between whether you finish the paper.
   - ↳ The chemicals you will use are definitely going to be transparent & colourless, so pour them into beakers (label the beakers) before pouring them in anything.
4. Remember **units**!!!
   - ↳ $1 dm^3 = 1000 cm^3$
5. **Same assumption** all round
   - ↳ If they ask for assumptions ofc
   - ↳ Assume that all of ____ fully reacted with ____