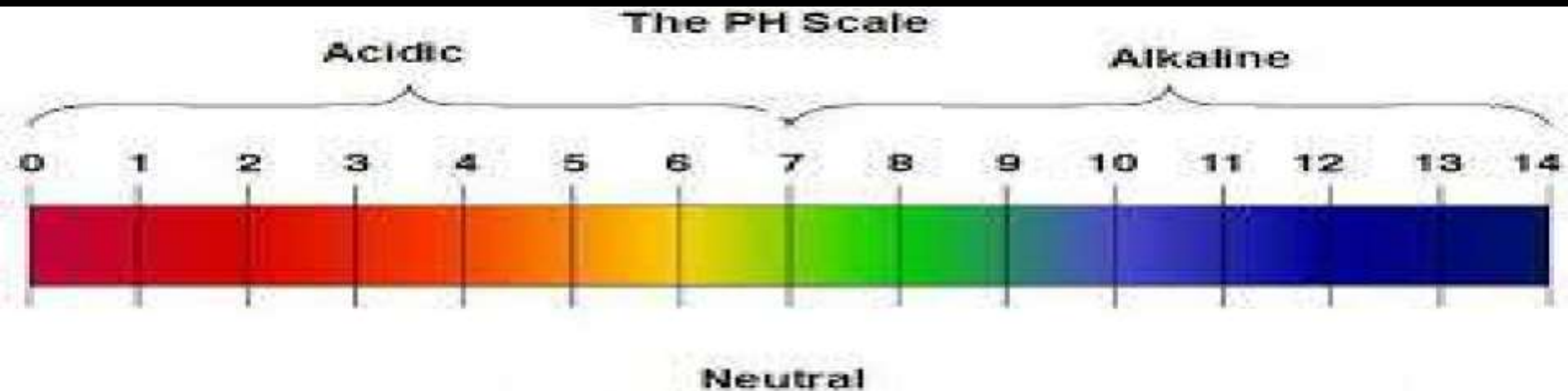


Acid base titration



Acid base titration

- An acid-base titration is a procedure used in quantitative chemical analysis to **determine the concentration of either acid or a base.**
- The equivalence of an acid-base titration is the point at which there are **equal amounts** (in moles) of H_3O^+ and OH^- in titration flask.





- **End point of titration** – the point in a titration at which the **indicator changes colour**.
- The indicator should change colour sharply at the equivalence point.
- At the end point of the titration,
 - all the acid has been **neutralised** by the alkali
 - the solution in the conical flask contain **salt and water only**.

Acid base indicators

- Acid base indicators are **weak organic acids** that dissociate slightly in aqueous solutions to form ions.
- The indicators can change colour because their ions have colours that are different from undissociated molecule.

Types of acid-base reactions

Types of acid- base reactions	Example
Strong acid with strong base	HCl and NaOH
Strong acid with weak base	HCl and NH ₃
Weak acid with strong base	CH ₃ COOH and NaOH
Weak acid with weak base	CH ₃ COOH and NH ₃

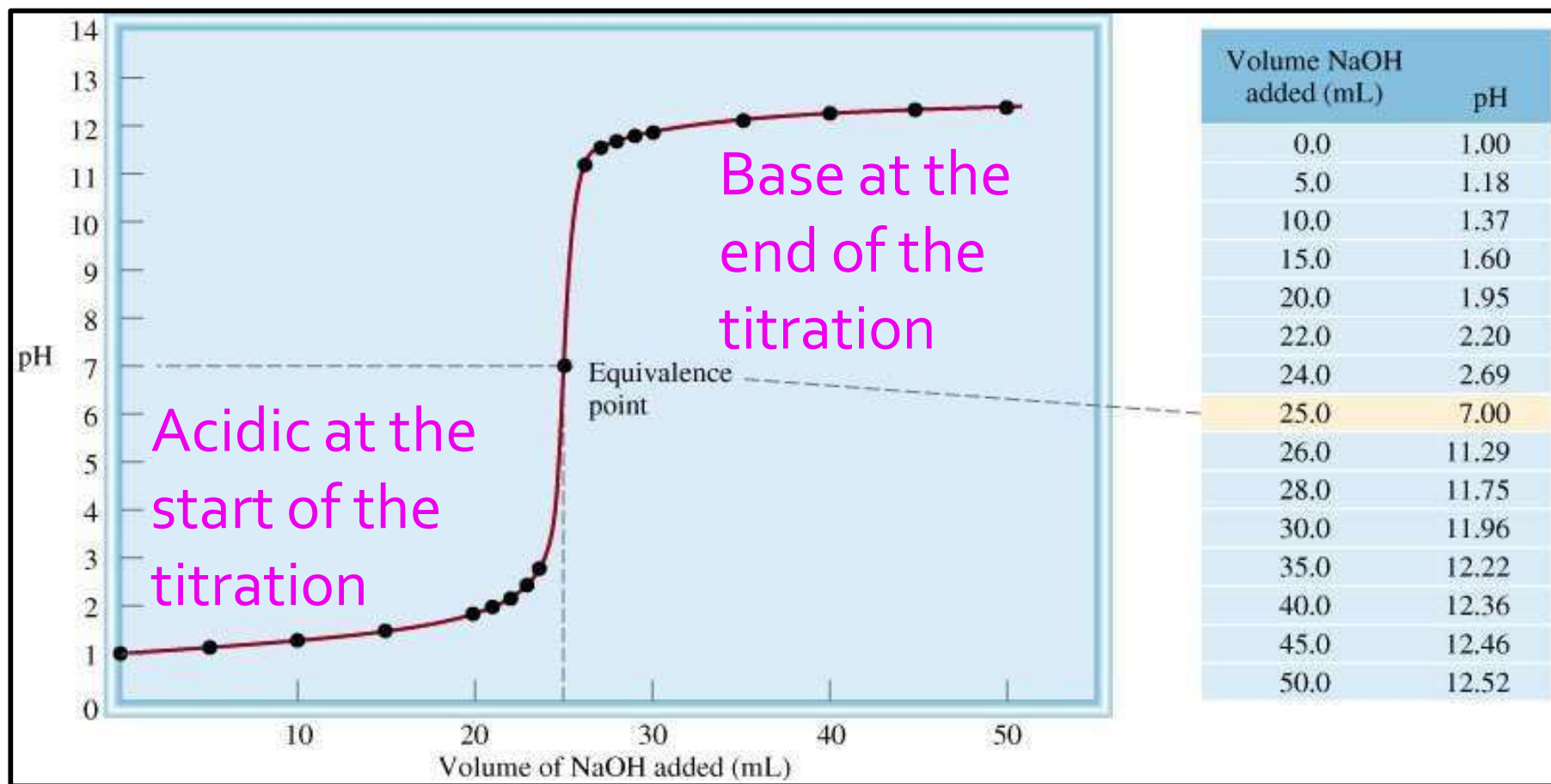
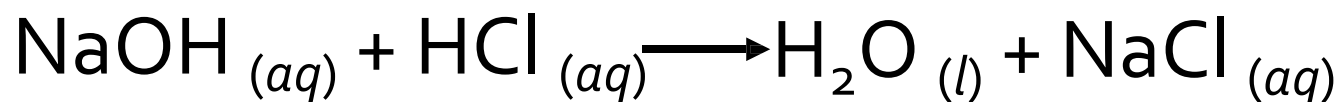
The pH range and the change in colour for some indicators

Indicator	pK_{HIn}	pH range	Colour change	
			Acid	Alkali
Methyl orange	3.7	3.2-4.2	Red	Yellow
Bromotymol blue	7.1	6.0-7.6	Yellow	Blue
Phenolphthalein	9.3	8.2-10.0	Colorless	Pink

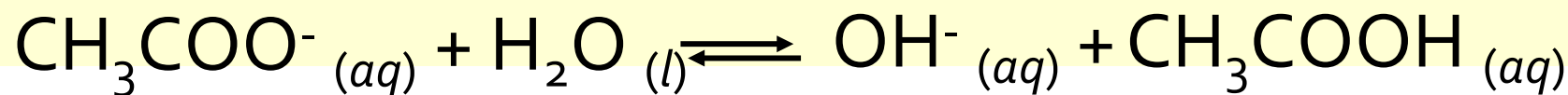
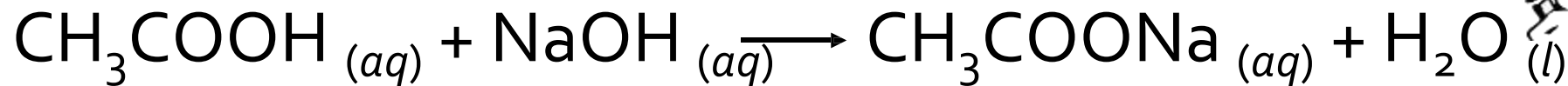
pH of acid base reaction at its equivalent point

Acid	Base	pH at equivalence point	Indicators
Strong	Strong	= 7 (neutral)	Methyl orange Phenolphthalein
Strong	Weak	< 7 (acidic)	Methyl orange
Weak	Strong	> 7 (basic)	Phenolphthalein
Weak	Weak	pH depend on K_a and K_b of acid & base conc.	-

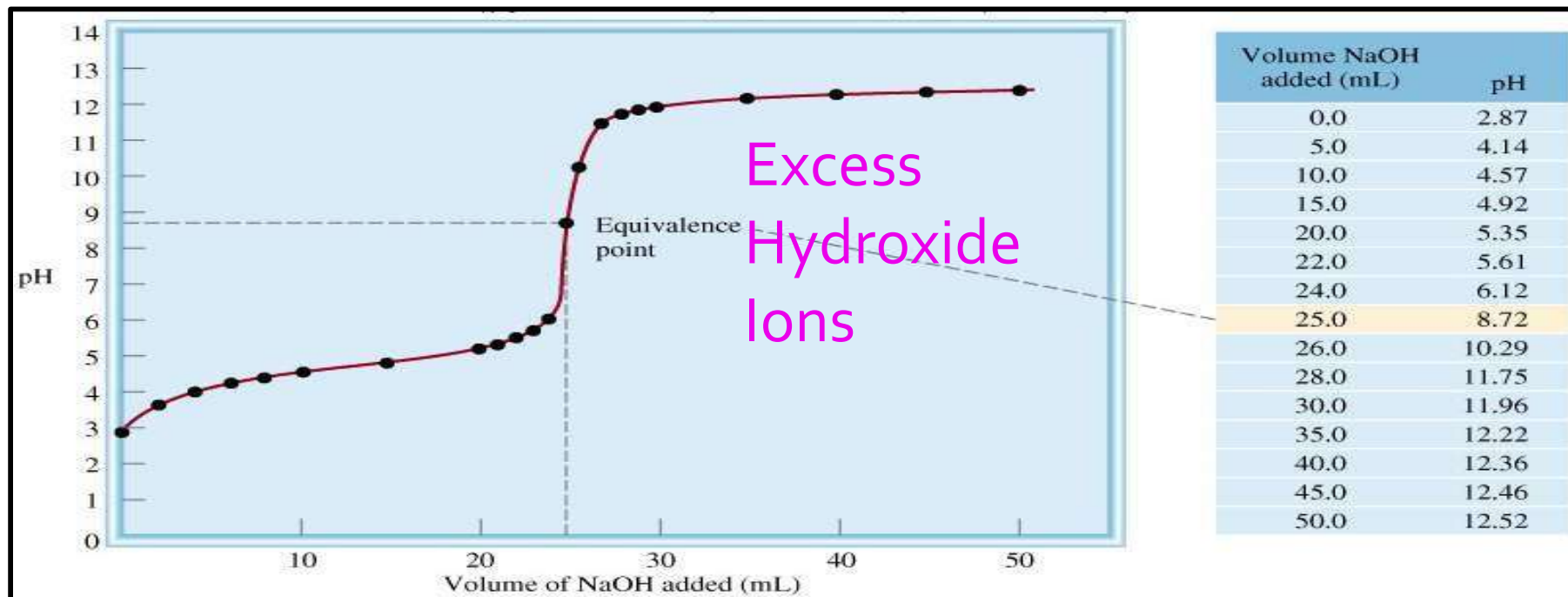
Titration of Strong Acid with Strong Base



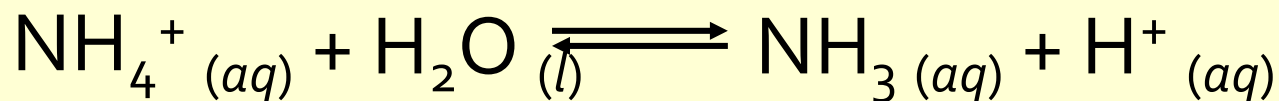
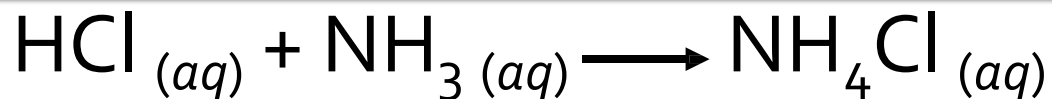
Titration of Weak Acid with Strong Base



At equivalence point ($\text{pH} > 7$):



Titration of Weak Base with Strong Acid



At equivalence point ($\text{pH} < 7$):

