INDICATORS USED IN ACID-BASE TITRATIONS

The various indicators used in acid-base titrations change colour at different pH levels. However, they all change colour within a given pH range and not at a specific pH.

For accurate results, the correct indicator must be selected. A graph must be drawn to show the change in pH as the titration proceeds, and the graph must have a steep section that represents a sudden change in pH. That is, the pH must change dramatically with the addition of one drop of solution from the burette. And the indicator must change colour over the pH range that corresponds to the steep part of the graph.

EXAMPLE 1
A student performs a titration, adding hydrochloric acid to a standard solution of sodium hydroxide. Sketch a graph to show the change in pH as the titration proceeds.

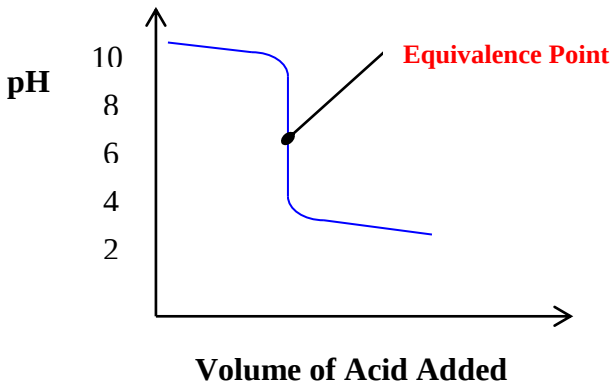
Solution

1. Sodium hydroxide is a strong base, and the pH in the conical flask is initially greater than 7.

2. Hydrochloric acid is a strong acid. Titrating a strong base with a strong acid results in an equivalence point at about pH=7. As the titration proceeds, the pH initially falls slowly, but then falls rapidly at the equivalence point.

3. As an excess of hydrochloric acid is added, the pH falls further.

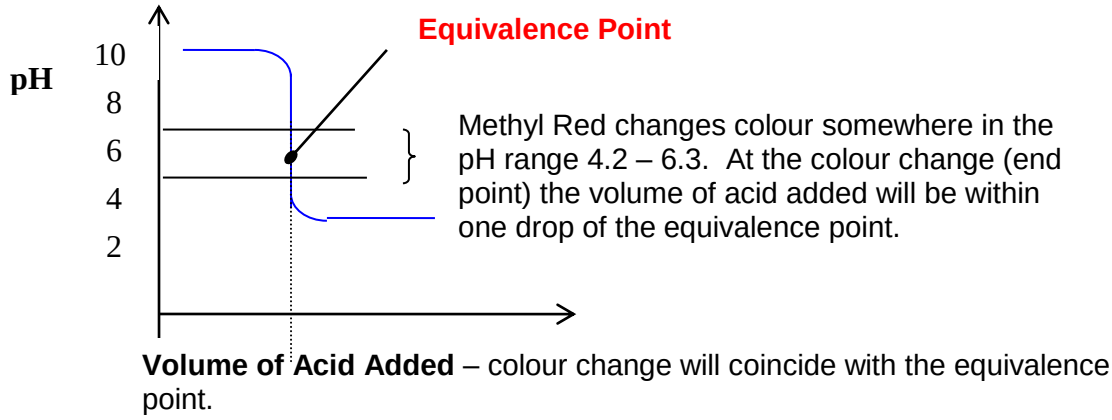
4. Sketch the graph to represent this information



EXAMPLE 2
Different indicators change colour over different pH ranges. A student performs an acid-base titration and has access to the following indicators:

Indicator	pH Range For Colour Change	Colour Acid Form	Base Form
Methyl Violet	0.3 – 3.0	Yellow	Violet
Methyl Red	4.2 – 6.3	Red	Yellow
Phenolphthalein	8.2 – 10.0	Colourless	Pink

The following graph represents the change in pH as the titration proceeds. Which is the best choice of indicator?



Solution

The steep part of the graph is in the pH range of about 3 – 10. Methyl red is the indicator that changes colour within this range.