Indicators and it's selection in acid-base titration:

Indicators are the substances which are used to detect the end point during the titration by the sharp change of it's colour.

The selection of a suitable indicator for particular acid-base titration depends upon the nature of acid and base used in the titration. There are four types of acid-base titrations and the correct selection of indicator on the basis of nature of titration curve are explained as follows:-

1. Titration between strong acid – strong base (HCl and NaOH):

In a titration of strong acid (HCl) and strong base (NaOH), the steep rise of curve occurs at p^H from 3 to 11. Any indicator capable of changing it's colour between 3 to 11 is suitable indicator. In this titration methyl orange (p^H range 3.1–4.4) and phenolphthalein (p^H range 8.2–10) can be used as indicators.

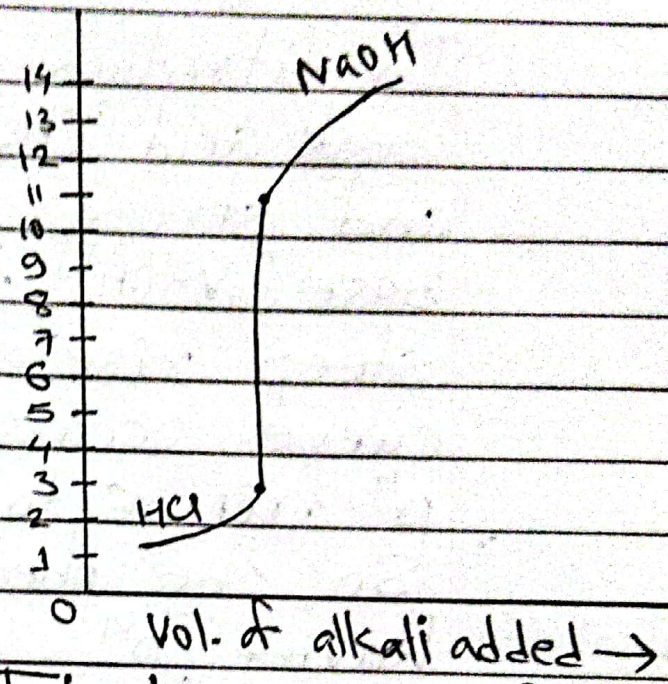

Fig: Titration curve for strong acid vs strong base

2. Titration between weak acid and strong base (CH_3COOH and NaOH):

In titration of weak acid (CH_3COOH) and strong base (NaOH), the steep rise of curve occurs at p^H from 6 to 11. So, the phenolphthalein having p^H range (8.2–10) can be used as indicator.

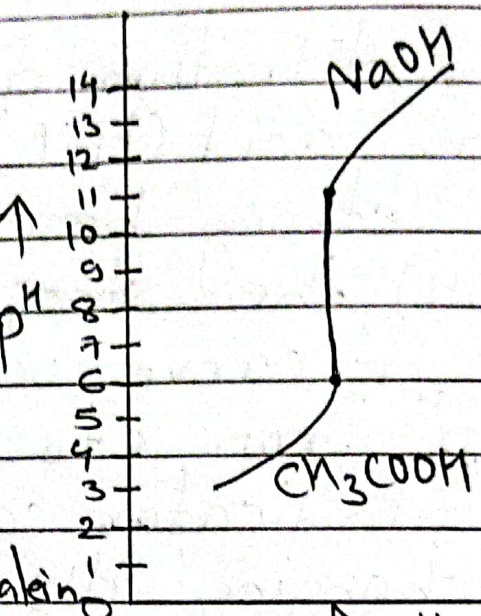

Fig: Titration curve for weak acid vs strong base

3. Titration between strong acid and weak base (HCl and NH_4OH):

In titration of strong acid (HCl) and weak base (NH_4OH), the steep rise of curve occurs at p^H from 3 to 8. So, the methyl orange having p^H range (3.1 – 4.4) can be used as indicator.

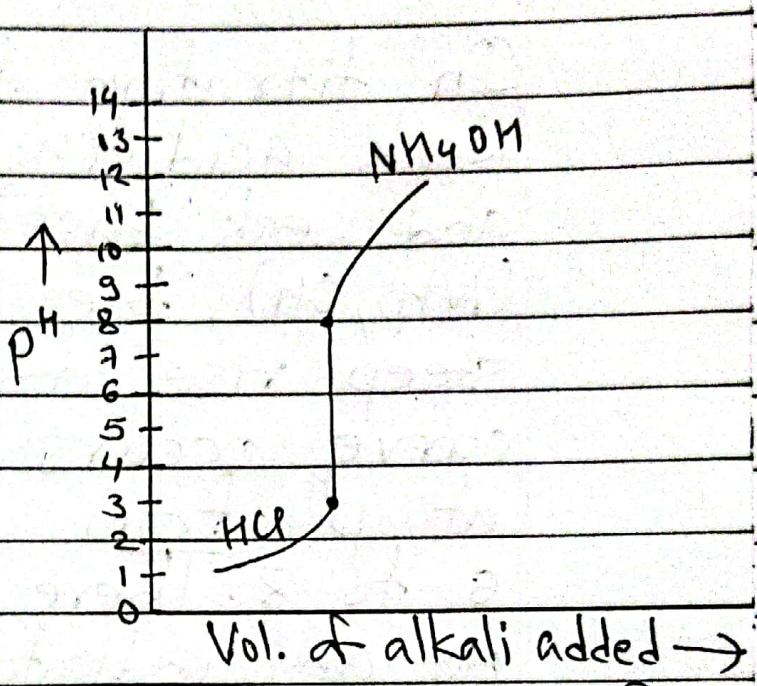

Fig: Titration curve for strong acid vs weak base

4. Titration between weak acid and weak base (CH_3COOH and NH_4OH):

In titration of weak acid (CH_3COOH) and weak base (NH_4OH), the steep rise of curve occurs at p^H from 6 to 8. There are no any indicators suitable in such narrow range of p^H.

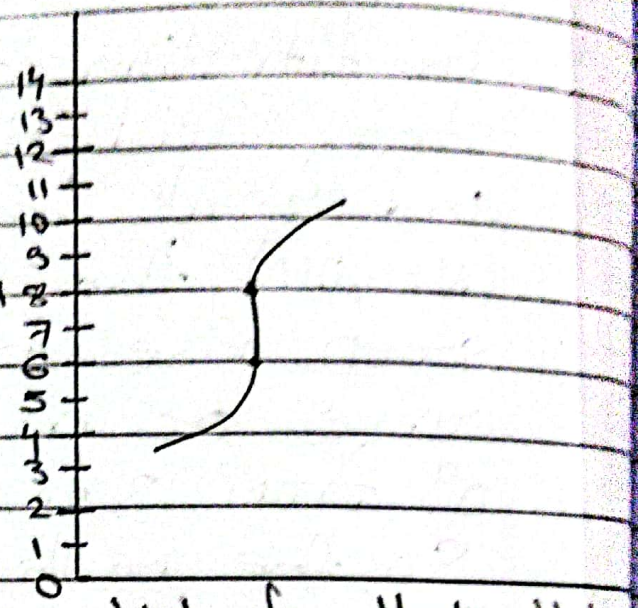

Fig: Titration curve for weak acid and weak base