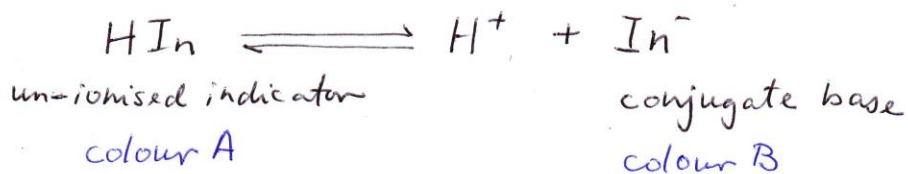


Acid-base indicators (A2)

An acid-base indicator is a dye or mixture of dyes which changes colour over a specific pH range.

Many indicators can be considered as weak acids in which the acid (HIn) and its conjugate base (In^-) have different colours.



Adding an acid to this indicator solution shifts the position of equilibrium to the left. There are now more molecules of colour A.

Adding an alkali shifts the position of equilibrium to the right. There are now more ions of colour B.

The colour of the indicator depends on the relative concentration of HIn and In^- . During titration, the colour of the solution depends on the concentration of H^+ ions present.

Indicators usually change colour over a pH range of between 1 and 2 pH units.

In the middle of the range there is a recognisable end-point where the indicator has a colour in between the two extremes of colour.

Example

Indicator bromothymol blue is yellow in acidic solution and blue in alkaline solution.

The colour change take place between pH 6.0 and pH 7.6.

The end-point, which is a greyish green colour, occurs when the pH is 7.0.

Choice of indicator

- must have an easily observed colour change
- must change quickly in the required pH range over the addition of a drop of reagent.

Some of the chemical indicators used to monitor pH

Name	lower pH colour	pH range	End-point	higher pH colour
methyl violet	yellow	0.0-1.6	0.8	blue
methyl yellow	red	2.9-4.0	3.5	yellow
methyl orange	red	3.2-4.4	3.7	yellow
bromophenol blue	yellow	2.8-4.6	4.0	blue
bromocresol green	yellow	3.8-5.4	4.7	blue
methyl red	red	4.2-6.3	5.1	yellow
bromothymol blue	yellow	6.0-7.6	7.0	blue
phenolphthalein	colourless	8.2-10.0	9.3	pink
alizarin yellow	yellow	10.1-13.00	12.5	orange