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ACID- BASE TITRATION INDICATORS AND TYPES OF INDICATORS

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INDICATORS

- **A large number of substances, called neutralisation or acid-base indicators, change colour according to the hydrogen-ion concentration of the solution at the end point of the titration.**
- **Types of indicators**
 1. **Internal indicator**
 2. **External indicator**
 3. **Self indicator**
 4. **Mixed indicator**
 5. **Universal indicator**



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INTERNAL INDICATOR

These are those indicators which takes part in the reaction(titration) and after completion of titration it changes the color of the solution indicating the sharp end point. An example of internal indicator is Diphenyl Amine, which is used in the titration of Mohr,s salt and Potassium Permanganate.



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EXTERNAL INDICATORS

Indicator which never takes part in the original chemical reaction but after completion of reaction it also changes the color of solution to indicate the endpoint.

e.g- potassium ferrocyanide



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SELF INDICATOR

- **Self indicator is actually a chemical substance which can mark the end point of a titration or any other reaction along with self-participation in the reaction.**
- **For example, acidified Potassium dichromate and potassium permanganate**



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MIXED INDICATOR

For some purposes it is desirable to have a sharp colour change over a narrow and selected range of pH; this is not easily seen with an ordinary acid-base indicator, since the colour change extends over two units of pH. The required result may, however, be achieved by the use of a suitable mixture of indicators; these are generally selected so that their pK_a values are close together and the overlapping colours are complementary at an intermediate pH value.



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e.g. A mixture of equal parts of neutral red and methylene blue gives a sharp colour change from violet-blue to green from acid to alkaline solution at pH 7. This indicator may be employed to titrate acetic acid with ammonia solution or vice versa.

UNIVERSAL INDICATOR

By mixing suitable indicators together changes in colour may be obtained over a considerable portion of the pH range. Such mixtures are usually called 'universal indicators'. They are not suitable for quantitative titrations, but may be employed for the determination of the approximate pH of a solution by the colorimetric method.



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E.G- 0.1g of phenolphthalein, 0.2g of methyl red, 0.3 g of methyl yellow, 0.4g of bromo thymol blue, and 0.5 g of thymol blue in 500mL of absolute ethanol, and adding sodium hydroxide solution until the colour is yellow. The colour changes are: pH 2, red; pH 4, orange; pH 6, yellow; pH 8, green; pH 10, blue.



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