

Acid-base indicators

Acid-base indicators are weak organic acids or bases that determine the equivalence point on a titration curve.

Use

Acid-base indicators are used in practice in acid-base titration. The property that the dissociated and non-dissociated form has different coloring is used. Different indicators are used in the titration of different substances. For example, methyl orange and methyl red are suitable for the titration of weak bases, phenolphthalein for the titration of weak acids.

Natural indicators are, for example, tea or red cabbage, which change color after the addition of an acidic substance.

Mathematical relations

- The equation expressing the color change
 - $\text{HInd (acid form, color A)} \rightarrow \text{H} + \text{Ind (basic form, color B)}$

The color of the solution depends on the concentration ratio of the ionized and non-ionized form

- **Functional area of the indicator**
 - $[\text{H}] = \text{indicator constant} \times [\text{HInd}] / [\text{Ind}]$
 - $\text{indicator constant} = [\text{H}] \times [\text{Ind}] / [\text{HInd}]$

The functional area of the indicator is a color transition, i.e. the area where an observable change occurs. During the titration, we choose the indicator so that its functional area corresponds to the pH around the equivalence point on the titration curve. An acid-base indicator is usable if the color change is within 2 pH units.

The most frequently used acid-base indicators

Overview of the most frequently used acid-base indicators			
	Name	Functional areas of indicators	Color
Azo dyes	methyl orange	3,1-4,5	red - yellow
	methyl red	4,4-6,3	red - yellow
Phthaleins	phenolphthalein	8,2-10	colorless - red
	thymolphthalein	9,3-10,5	colorless - blue
Sulfophthaleins	phenol red	6,8-8,4	yellow - red
Mixed indicators	TASHIRO (methyl red + methylene blue)		

Mixed indicators are mixtures of indicators and inert dyes.

Links

Related articles

Acid-base reactions

References

- BLATSKA, Veronika. *Acid-base titrations* [online]. ©2004. [feeling. 2011-06-26]. <<http://edu.uhk.cz/titrace/ucebnice.html>>.

External links

- <https://www.primat.cz/upce-fcht/predmety/analyticka-chemie-i-q8070/prednaska-c-9-m20545>