SUBJECT - CHEMISTRY
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TOPIC - Adsorption indicators:

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Adsorption indicators:

There are certain organic dye stuffs like fluorescein eosin etc which are used as adsorption indicators in precipitation reactions. They were first introduced by K. Fajan in 1924. They are so named because these indicators are adsorbed by the precipitate at the end-point They are either acid dyes, such as those of fluorescein Series s.e fluorescein, eosin etc which are used as the Sodium Salts or basic dyes Such as those of rhodamine Series e.g rhodamine 6G etc which are used as the halogen Salts. with positively Charged precipitating ion anionic dye can be used and with negatively charged precipitating ion, Cationic dye can be used. The indicator action arises due to the Secondary adsorption of the Coloured ion on the Surface of the primary absorbed layer (precipitating ion) on the Colloided precipitates. Since the Success of these indicator depends upon the collodial nature of the precipitates and a large Surface area of the adsorbent, neutral Salts specially those giving higher valent ions should be avoided and Solution should be delute. As AgCl Salts are Sensitive to light hence the titration Should be Carried out with as little exposure in light as possible Since fluorescein is very weak acid, it can be used in neutral or faintly alkaline Solution.

Dichloro fluorescein however is a stronger acid and so can be used at pH 4 to 7

Fluorescein (Na^+Fl^-) is used as a adsorption indicator in the titration of NaCl solution with $AgNO_3$ solution. The fluorescein molecule is greenish yellow but its anion in aqueous solution is pink

$$Na^+Fl^- \rightleftharpoons Na^+ + Fl^-$$

(greenish yellow) (pink)

In this titration, a white colloidal ppt of AgCl is formed -

$$NaCl + AgNO_3 = \downarrow AgCl + NaNO_3$$

Befor the end point, the colloidal AgCl particles adsorb Cl^- ions which are present in excess and become negatively charged $AgCl/Cl^-$ Being negatively charged $AgCl/Cl^-$ cannot adsorb fluorescein anion (Fl^-) due to electrostatic repulsion and hence the surface of ppt remains white. But after the end point, Ag^+ ions are in excess and AgCl sol particles absorb Ag^+ ions and thus become positively charged $AgCl/Ag^+$. Fluorescein anion has greater affinity than the NO_3^- anion, hence the former is adsorbed on $AgCl/Ag^+$ as secondary layer and turns rose red (pink). Hence the end point is marked by the colour change at the surface of the precipitate from white to sharp pink -