Methods and objects of chemical analysis, 2015, Vol. 10, No. 2, 53-60

Silica Adsorbed Indicator System «La(III)-Alizarincomplexone» for Fluoride Determination in Saliva

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Recieved: June 15, 2015; Accepted: July 22, 2015

The organo-mineral strongly acidic anionite has been obtained by adsorption of cetyltrimethylammonium bromide on the surface of silica. Capacity of the silica relatively modifier that corresponds to the chemisorption was found to be 0.2 mmol·g^{-1}. Optimal condition for the adsorption of the mixed-ligand complex of La(III) with Alizarincomplexone and F^- on the surface of the modified silica gel has been established. Analytical response turned to be maximum value under the conditions when the concentration of the complex of La(III) with Alizarincomplexone was 0.06 mM, and the ratio of volume of the solution to mass of the silica was 333 ml·g^{-1}. The value of the analytical response was not changed within the pH range of 4.0–4.7. The optimal time for the phase contact was found to be 5 min. The solid-phase spectrophotometric method for the determination of fluoride has been proposed. The method is based on the light absorbtion at 630 nm of the mixed-ligand complex of La(III) with Alizarincomplexone and F^- immobilized onto the surface of silica modified with cetyltrimethylammonium bromide. The detection limit and the range of linearity were found to be 0.02 mg·L^{-1} and 0.04–0.4 mg·L^{-1}, respectively. The characteristics of the analytical performance of the method proposed have been determined. The effect of foreign components from saliva on the determination of fluoride has been studied. The influence of hydrophosphates has been masked with Barium chloride. The proposed method has been successfully applied to analyses of saliva.

Keywords: fluoride, Alizarincomplexone, Lanthanum(III), solid-phase spectrophotometry, mixed-ligand complex, quaternary ammonium salt