Optimization of polymer inclusion membranes (PIMs) preparation for immobilization of Chrome Azurol S for optical sensing of aluminum(III)

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Determination of Al(III) from aqueous samples using Chrome Azurol S (CAS) as reagent immobilized in polymer inclusion membranes (PIMs) was discussed. The PIMs was prepared using poly (vinyl chloride) (PVC), 2-nitrophenyl octyl ether (2-NPOE) and Aliquat 336 as polymer matrix, solvent and ion carriers respectively. Experimental designs for four factors (weight of PVC, Aliquat 336, 2-NPOE, and the concentration of CAS) were used for the optimization of the membrane fabrication. For this purpose, a two level half factorial design, which involves eight experiments, was adopted. The combination of 200 mg of PVC, 50 mg of Aliquat 336, 50 mg of 2-NPOE and 1 × 10⁻³ mol/L CAS was found to be the optimum formulation for the preparation of PIMs. Wide dynamic range of Al(III) determination (0.2-50 ppm), better reproducibility within the same batch, good repeatability and photostability with RSD 1.21% and 0.93%, respectively. The calculated t values indicated that there is no significant difference between the two methods at the 95% confidence level and thus there is no bias in the method. © 2014 Elsevier B.V.

Al(III); Chrome Azurol S; Half factorial design; Optical sensing; Optimization; Polymer inclusion membrane

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