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Abstract

In this work an electrochemical procedure for Cr(VI) flow based determination in tap water is presented. An AdCSV method was developed using a screen printed electrode modified with magnetic poly(1-allyl-3-methylimidazolium) chloride and the procedure does not require the addition of complexing agents in the solution unlike the methodologies reported so far for Cr(VI) determination. The flow based system is described and the control variables were studied in detail and optimized using a Taguchi parameters design. Under optimal conditions, the electrochemical sensor offered an excellent response to Cr(VI) and the limit of detection estimated from 3σ was 0.5 μg L^{-1} (n=3) allowing the analysis of tap water samples. The effect of interfering ions was also investigated below the maximum permissible limits for tap water according to Mexican standards. The presence of the magnetic particles on the sorbent allowed its easy modification on the electrode surface between each determination when removing the magnetic field placed in the wall-jet cell. Finally, the precision of the method was tested with tap water samples using standard addition method for Cr(VI) quantification and the accuracy was evaluated comparing the results with the dyphenylcarbazide method and by analyzing a certified water sample. The method shows good repeatability and reproducibility (%RSD less than 5%) making it feasible for Cr(VI) flow based determination and no significant difference is observed in the results obtained by both methods.

Keywords

Cr(VI), AdCSV, flow based determination, magnetic particles, poly(ionic liquid)