عنوان مقاله:

In-situ preconcentration, and electrochemical sensing of Zinc(II) and Copper(II) based on ionic liquid mediated hollow fiber-modified pencil graphite electrode using response surface methodology

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نویسندگان:

Ghobad Mansouri - *Department of Chemistry, Payame Noor University, PO BOX ۱۹۳۹۵-۴۶۹۷ Tehran, Iran*

Mohammd Bagher Gholivand - *Faculty of Chemistry, Razi University, Kermanshah ۶۷۱۴۹۶۷۳۴, Iran*

Zarrin Eshaghi - *Department of Chemistry, Payame Noor University, PO BOX ۱۹۳۹۵-۴۶۹۷ Tehran, Iran*

خلاصه مقاله:

A single-use electrochemical sensor using ionic liquid mediated hollow fiber-graphite working electrode was fabricated for the first time. The screening tool was developed by coupling this electrode with differential pulse voltammetry (DPV) for in-situ pre-concentration and determination of Zn(II) and Cu(II). In our plot, porous polypropylene hollow fiber membrane divided into pieces of 2 cm, then fiber s lumen and pores was satiated with homogeneous mixture of reduced graphene oxide (rGO) and three types used ionic liquids:(1-ethyl-3-methylimidazolium tetrafuoroborate), (1-butyl-3-methylimidazoliumhexafluorophosphate) and (1-butyl-2,3-dimethylimidazolium hexafluorophosphate) individually. Thereafter, a pencil graphite rod was placed inside the fiber. Fabricated sensors used for single-step simultaneous purification and determination of Zn(II) and Cu(II) ions from water samples. The response surface method (RSM) was used as the basis of the design and analysis of the experiments. Parameters that were most important in separation part of study such as: molar mass of ionic liquids, amount of nanoparticle and sonication time have been investigated. Analysis of variance (ANOVA) and RSM contour plots were presented for effect of all factors (input parameters) on the maximum current of differential pulse voltammetry (DPV) peaks (output responses). The results disclosed that the metal removal was impressed by the molar mass of ionic liquids, amount of nanoparticle and sonication time respectively. The efficiency specifications of this procedure were evaluated by calculating precision and response linearity. Under the optimal experimental conditions linear concentration ranges of 0.9–550µgL-1 and 0.7–500 µgL-1 were obtained for Zn(II) and Cu(II) ions respectively. The reported limit of detection for Zn(II) and Cu(II) were 0.27 and 0.21µgL-1 with relative standard deviations (RSD) 3.2%, and 4.4%, respectively. In addition, this .sensor was successfully applied to real water samples

کلمات کلیدی:

Zn(II), Cu(II), hollow fiber - pencil graphite electrode, differential pulse voltammetry, surface response method, ionic liquid