

عنوان مقاله:

Application of Carbon Paste Electrodes Modified with Imprinted Zeolite X as Potentiometric Sensors for Amitriptyline Analysis in Pharmaceuticals

محل انتشار:

مجله تحقیقات شیمی تجزیه و تجزیه زیستی، دوره 10، شماره 3 (سال: 1402)

تعداد صفحات اصل مقاله: 14

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خلاصه مقاله:

Carbon paste electrodes have been developed to improve the performance and selectivity of electrodes for the potentiometric analysis of amitriptyline (AMT). Carbon paste electrodes modified with imprinted zeolites (IZ) were developed as potentiometric sensors for AMT analysis. In this study, zeolite X was synthesized using Na_2O , Al_2O_3 , SiO_2 , and H_2O at a mole ratio of ۴.۵: ۱: ۳: ۳۱۵. The IZ was synthesized by adding AMT to the mixture at an AMT/Si molar ratio of ۰.۰۳۰۶ as a template. Subsequently, AMT was extracted from the zeolite framework to form active and selective AMT recognition sites. The optimum performance was achieved by the electrode composed of activated carbon, paraffin, and IZ at a composition of ۱۲:۷:۱, which was expressed by a Nernst factor of ۲۸.۳۸ mV/decade, measurement range of ۱۰-۵-۱۰-۲ M with a correlation coefficient of ۰.۹۹۹۴, and a low detection limit of ۱.۱۵×۱۰^{-۵} M. The detection limit can accommodate the lower dose of AMT in pharmaceuticals. The modified electrode had precision of ۹۷.۵-۹۹.۹% and accuracy of ۹۱.۲-۱۰۷%, with a response time of ۲۴-۲۱۱ s. Moreover, it was stable for four weeks after more than ۱۰۰ uses. Application of the modified electrode in the determination of AMT in three pharmaceutical samples resulted in a ۹۶-۱۰۲% recovery. The presence of glucose, lactose, mannitol, and ZnSO_4 had no effect on the potentiometric analysis of AMT using the modified electrode. The excellent analytical performance of the modified .carbon paste electrode suggests its potential applications in the analysis of AMT, an affordable medicine

کلمات کلیدی:

Amitriptyline analysis, Potentiometry, Carbon paste electrode, Imprinted zeolite X, Amitriptyline selectivity, Affordable medicine

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