

عنوان مقاله:

Determination of Pb²⁺ ions in environmental samples using graphite electrode modified with liquid membrane based on molecularly imprinted polymer

محل انتشار:

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خلاصه مقاله:

Molecular imprinting is a useful technique for the preparation of functional materials with molecular recognition properties. The molecular imprinting technique is a powerful method for preparing artificial recognition sites with predetermined selectivity for a wide range of target molecules. Molecular imprinted polymers (MIPs) are being extensively used as synthetic polymer-based receptors or as artificial antibodies, because of their ability to mimic natural systems. However, when compared to natural recognition products, they offer several advantages such as robustness, specificity, reusability and cost-effectiveness. They also exhibit resistance to extreme conditions, like high temperature, acidic and basic environments, and therefore lend themselves to engineering possibilities compared with biological counterparts. Lead is one of the most toxic chemicals that pose a wide range of dangers to human's health. In addition to renal disease, cardiovascular effects and reproductive toxicity may cause irreversible neurologic damage. As described elsewhere, continuous exposure with lead may cause adverse and poisonous effects to the brain, blood, kidneys, nervous and reproductive system along with other diseases. Therefore, it is desired to develop the simple, selective, sensitive, efficient and eco-friendly methods for the determination of trace levels of Pb²⁺ ions in environmental and biological samples. In recent years, various instrumental techniques including; spectrophotometric methods, atomic absorption and emission spectroscopy and mass spectrometry have been applied to the determination of Pb²⁺. However, most of these techniques are either time consuming, involving multiple sample manipulations, or too expensive for most analytical laboratories. A membrane electrode based on molecularly imprinted polymer were designed and prepared. The best response characteristics were obtained using the composition: 5% molecularly imprinted polymer as ionophore, 63% dibutyl phthalate as plasticizer and 30% polyvinyl chloride. The sensor exhibits a Nernstian response for lead ions over a wide concentration range of 1.0×10^{-2} to 1.0×10^{-6} M with a slope of 29.3 ± 0.1 mV/decade of activity. It has a fast response time of about 20 s and can be used for at least five weeks without any divergence in potential. The electrode can be used in the pH range 4.0–8.0. The proposed sensor shows fairly good discriminating ability towards lead ions in comparison with some alkali, alkaline ... earth, transition and heavy metal ions. At the end of the electrode performance by using analytical measure

کلمات کلیدی:

Ion-selective electrode, Membrane PVC, Lead (II), Molecularly imprinted polymer, Polyvinyl chloride

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