Ion-selective potentiometric determination of Pb(II) ions using PVC-based carboxymethyl cellulose Sn(IV) phosphate composite membrane electrode

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\textbf{ABSTRACT}

Pb(II) ion-selective electrode membranes were fabricated by using solution casting method using carboxymethyl cellulose Sn(IV) phosphate composite cation-exchange material. The membrane electrode showed response towards Pb(II) ions in the concentration range from $1 \times 10^{-1}$ to $1 \times 10^{-6}$ M with a Nernstian slope of 28.057 mV per decade change in Pb\textsuperscript{2+} ion concentration and can be used for five months without observing any deviation. The membrane electrode exhibited fast response time of 10 s studied for $1 \times 10^{-2}$ and $1 \times 10^{-3}$ M of Pb\textsuperscript{2+} ion concentrations. The membrane electrode was operated successfully at $1 \times 10^{-2}$ M, $1 \times 10^{-3}$ M and $1 \times 10^{-4}$ M concentrations of lead ion over the pH range 2–4. The proposed electrode was found selective for Pb(II) in the presence of alkali and alkaline earth metal ions. It was also employed as an indicator electrode in the potentiometric titration of Pb(II) using ethylenediamine tetraacetic acid, disodium salt (EDTA). The sharp end-point corresponds to the stoichiometry of Pb(II)–EDTA complex.

\textit{Keywords:} Composite cation exchanger; Potentiometric determination of Pb(II); Carboxymethyl cellulose Sn(IV) phosphate; Membrane electrode; Selectivity