

Solid-contact potentiometric sensors based on macrocyclic ligands for the determination of carbonate ions

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Keywords: solid-contact potentiometric sensor, ion-selective electrode, polyaniline, thiacalixarene.

Abstract

In this work, a new type of solid-contact potentiometric sensors has been proposed for the determination of carbonate ions. The sensors consist of screen-printed electrodes consecutively covered with electropolymerized polyaniline and polymeric membrane containing asymmetric tetrasubstituted thiacalix[4]arenes with p-nitrophenylacetamide groups at the lower rim as ionophores. The polyaniline was deposited by dynamic electrolysis with multiple cycling the potential. Polymeric membrane was formed by drop casting from solution in THF. The sensors developed make it possible to determine 0.05 M – 8.0 μM carbonate ions with sensitivity of 27-31 mV/pC. The response time was equal to 10 s and daily potential drift of 5 mV. The estimation of potentiometric selectivity by separate solutions method showed the possibility to apply sensors for direct determination of total carbonate content in natural waters and other samples with a similar ionic content.