

Immobilization of pyridinecarboxylic acids in a polymer nanocontainer based on the AB-17-8 strongly basic anion exchanger

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Abstract

The possibility of the immobilization of pyridinecarboxylic (nicotinic, isonicotinic, dipicolinic, and cinchomeronic) acids in the phase of AB-17-8 strongly basic anion exchanger and subsequent their release from the nanocontainer into the solution has been researched. The immobilization of pyridinecarboxylic acids in the AB-17-8 polymer nanocontainer was performed by ion exchange sorption. In the ¹³C NMR spectra of solid-state samples of the AB-17-8 anionite in the OH, in dipicolinic and cinchomeronic acids are observed the resonance absorption bands of ¹³C in the ranges of chem. shifts of 40-70, 120-150 and 190-210 ppm, corresponding to the carbon of the elementary unit of the anion exchanger. In the NMR spectrum of the anion exchanger containing the immobilized dipicolinic and cinchomeronic acids, an additional resonance line (170 ppm) appears that corresponds to the carbon of two carboxyl groups of pyridinecarboxylic acids. This is absent in the anionite spectrum in the OH form. From the analysis of NMR spectra it follows that pyridinecarboxylic acids were encapsulated in a nanocontainer based on the AB-17-8 anionite. The dynamic ion-exchange capacities of strongly basic anionite during the sorption (immobilization) of pyridinecarboxylic acids in a polymer nanocontainer coincides with the ion-exchange capacities of the anionite after desorption (release) of these acids from the polymer nanocontainer. The ion-exchange capacity of a polymer nanocontainer based on the anionite for nicotinic acid is 2.8 meq/g, and for isonicotinic acid is 2.7 meq/g. This corresponds to the content of ionogenic groups in the polymer. The ion exchange capacities of the anionite for dipicolinic acid and cinchomeronic acid are 2.0 meq/g and 2.1 meq/g, respectively. It is shown that the kinetics of the processes of the immobilization of pyridinecarboxylic acids in a polymer nanocontainer based on the AB-17-8 strongly basic anion exchanger and their release is determined by the diffusion of the organic components in the polymeric phase.

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