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Thematic course: Solid state nanoreactor. Part IX.

Equilibrium constants of the sorption of pyridinecarboxylic acids by polystyrene type sulfocationite

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Abstract

The processes of sorption of pyridine-3-carboxylic (nicotinic) and pyridine-4-carboxylic (isonicotinic) acids by sulfonic acid cation exchangers of the polystyrene type (CU-2-4 and CU-2-8) from aqueous solutions with different pH values were studied. Analysis of the FTIR spectra of isonicotinic acid, isonicotinic acid sulfate, and CU-2-8 sulfonic cation exchanger filled with isonicotinic acid showed that pyridinecarboxylic acid is in the protonated form in the polymer phase. Experimental data of the equilibrium distribution of acids in the aqueous solution-cation exchange system have been obtained. The values of the equilibrium constants for ion exchange and ligand sorption processes involving various forms of pyridinecarboxylic acid, sulfonic cation exchanger, and protons were calculated. The equilibrium constants for the ion exchange of sulfocationite protons by pyridinecarboxylic acid cations from solution are in the range 3.3-4.4. The selectivity of sulfonic cation exchangers to cations increases in the sequences proton < nicotinic acid cation < isonicotinic acid cation. The values of the equilibrium constant for ligand sorption of molecules are 195-220 dm^3/mol for isonicotinic acid and reach 320-330 dm^3/mol for nicotinic acid, i.e. the sorption activity of the H-form of the cation exchanger is higher in relation to nicotinic acid molecules. A change in the amount of a crosslinking agent (from 4% to 8% divinylbenzene) in a polystyrene type sulfonic cation exchanger does not significantly affect its sorption activity towards pyridinecarboxylic acids.

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