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Determination of Effective Capacities of Ion-Exchangeable Materials by Measuring the Equilibrium Conductivity

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The effective ion-exchange capacities of ion-exchange materials were determined by measuring the change in the equilibrium conductivity of a column packed with analyte. The developed instrumental method can provide effective ion-exchange capacities for both cation and anion exchangers with simple operations. The cation-exchange capacity of a weak-acid cation-exchange resin (TSKgel SuperIC-Cation column) depended on the conditioning pH and the molar concentration of the conditioning agent. Plots of effective cation-exchange capacities over the conditioning pH exhibited three inflection points, suggesting the presence of two carboxy groups and one phenolic OH group in the resin, probably due to the inherent base polymer. This method was applied to several commercial analytical columns for ion chromatography, and could provide scientifically useful results for characterizing the resin properties.

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