Accurate Determination of Trace Amounts of Lanthanum, Yttrium and all Stable Lanthanides in Biological Materials by Ion Chromatography

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The analytical procedure for the isolation and preconcentration of La, Y and the lanthanides from biological materials and their determination by ion chromatography (IC) with the use of Dionex Ion Pac CS3 + CG3 column (sulfonic acid type), α-hydroxyisobutyric acid (α-HIBA) as an eluent, and PAR or Arsenazo III as color forming reagents, was elaborated. The scheme originally devised for NAA, involving microwave assisted digestion and multistep separation employing ion exchange and extraction chromatography columns was used to selectively recover REE fraction (without scandium) with 100% yield. The REE fraction was analyzed by IC at 25 and 70°C. The run at 70°C enabled resolution of Y and Dy peaks and as a result made possible quantitative determination of La, Y, and all lanthanides. Investigation on the mechanism of band spreading revealed that longitudinal diffusion in the stationary phase considerably contributed to the total plate height. Surprisingly, the plate height ($H$) calculated from Y peak was distinctly lower than $H$ values of the adjacent lanthanides.

The method was validated by analyzing several certified reference materials (CRMs).

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