

Applications of extraction chromatographic resins in radioanalytics and nuclear medicine

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Abstract

An overview over the application of extraction chromatographic resins in environmental analysis, with special regard to the determination of radionuclides, and in the production of radionuclides for use in nuclear medicine is presented

Keywords

Extraction chromatography, actinides, environmental monitoring, radionuclide production, quality control

EXTRACTION CHROMATOGRAPHY

Applications in radioanalytics

Extraction chromatography has become a widely used technique in the field of radioanalytics and increasingly also in non-radiometric environment analysis (e.g. in mass spectrometry). Several applications of extraction chromatographic resins are discussed including examples of actinide determination in large soil samples of up to 100 - 200g [1 - 3], including their use for preconcentration and matrix removal [3], the determination of Sr-89/90 [4] and Pb-210 / Po-210 in environmental samples [5]. Finally some examples of the application of extraction chromatography to mass spectrometric measurements, notably to isotope ratio measurement will shortly be presented [6, 7].

Applications in radionuclide production

Extraction chromatographic resins, especially resins comprised of extractant coated silica, increasingly find application in the preparation of radionuclides for medical use. This is mainly due to their high selectivity, their fast kinetics, their ease of use and the possibility to elute the desired radionuclide in small volumes. It could also be shown that the stability of these kinds of resins against radiolysis is allowing their use under conditions typically encountered in radionuclide production [8]. Furthermore it often is also

possible to recover expensive target materials in high purity using extraction chromatography.

An overview over possibilities and applications of some commercially available extraction chromatographic resins is given. The examples include radionuclides produced by generator systems (e.g. Y-90[9], Ra-223[10]), as well as the separation and purification of generator precursors (e.g. Ac-225/Bi-213[11, 12]) and the separation of radionuclides like Lu-177[13] and In-111[14] from irradiated targets. Further applications include the quality control of the produced radionuclides, especially with respect to radiochemical purity, an example is discussed.

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