NOVEL APPROACHES FOR ^{90}Sr QUANTIFICATION IN THE AQUEOUS PHASE USING EXTRACTIVE SCINTILLATING RESINS

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Simple and rapid procedures were developed and characterized for simultaneous separation and determination of ^{90}Sr in aqueous samples under both laboratory and field conditions. Two different approaches were applied to prepare highly selective structures for strontium extraction. The first approach incorporated crown ether 4′,4″(5″)-*di*-*tert*-butyldicyclohexano-*18*-*crown*-*6* (DTB-DCH18C6) into porous copolymer of vinyl toluene with chloromethyl styrene 20% crosslinked with divinylbenzene beads fabricated via suspension polymerization. To increase surface hydrophilicity and enhance Sr extraction efficiency, the resin beads were subsequently treated with 1,4-diazabicyclo[2.2.2]octane (Dabco) reagent. The final modified material showed high selectivity for Sr ions in 5M HNO_3 (uptake >92%). The same column was reused three times without degradation in uptake. The developed structure will be combined and tested with the scintillating fluor monomer (vNPO) which was developed recently in our group [1] to be used as extractive scintillating sensor under laboratory conditions. The second approach involves the incorporation of SuperLig®620 solid phase extraction particles into porous scintillating polyvinyltoluene beads. The porous scintillating polyvinyltoluene beads were formulated with our vNPO fluor monomer. This second approach aims to prepare an extractive scintillating sensor to be used in-situ or for on-line environmental radiation monitoring without the need to acidify the sample. The new extractive scintillating resin proved to be highly selective for Sr ions under environmental conditions, was chemically stable with an uptake of >99% and retained the ability to scintillate with an efficiency of 52-55%.

[1] A. F. Seliman, V. N. Bliznyuk, S. M. Husson and T. A. DeVol "Development of polymerizable 2-(1-naphthyl)-5-phenyloxazole scintillators for ionizing radiation detection "J. Mater. Chem. C, 3 (2015) 7053-7061