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Synergy of sequential injection analysis and molecular recognition technology for low-level Sr-90 activity determination

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The routine monitoring, as a part of radiation protection from radioactive materials released into the environment, is established in many countries worldwide. A radionuclide of particular interest is Sr-90, which is, due to its long half-life, one of the most hazardous radionuclide. As it is pure beta emitter, its isolation prior determination is necessary. In recent years, materials based on solid phase extraction are used as a replacement for purification steps of conventional methods, which are mostly time consuming and labor intensive. The introduction of such materials provide partial automatization and miniaturization of separation procedures. The products based on molecular recognition technology, AnaLigSr-01 and SuperLig 620, provided by IBC Technologies, more known as materials encased in Empore™ Strontium RAD Disks, are promising materials, since it is possible in short time to separate Sr2+ from many interfering cations, which are present in much higher concentrations, such as Na+, K+, Mg2+, Ca2+ etc. The drawback of these materials is that they, besides Sr2+, sorb Pb2+ and Ba2+. These cations may interfere during measurements on available instrumentation. Therefore, within this research an extensive study is done to effectively separate strontium from these elements. The goal is to develop rapid and easy to handle method for precise determination of strontium, with detection limits below 50 mBq/L. The final results show, that by changing pH or molarity of complexing agents, pure fractions of Pb2+, Sr2+ or Ba2+ can be obtained.

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