USING SR RESIN WITH MIXED HCL/HNO_3 MATRICES

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Most current radioanalytical protocols have been developed for the analysis of air, water, soil and bioassay samples. While these protocols build the foundation of operational environmental monitoring, they are not necessarily suitable for the analysis of samples that will be encountered in the aftermath of a nuclear incident. In such a situation, it will be important to determine the amount of ^{90}Sr and other isotopes of interest present in the affected area to ensure the appropriate response. Due to the likelihood of such an event occurring in an urban or metropolitan area, it is crucial to have procedures that can be used to rapidly and accurately separate and determine radioactive materials from matrices found in these environments. Of particular interest for emergency response and nuclear forensics are methods that can be applied to the analysis of concrete, steel, and glass.

Chromatographic resins have been used for radioanalytical separations for several years now, and are the most common material used to isolate radiostrontium in a rapid fashion. The only published methods for strontium selective resin (Sr Resin), use exclusively nitric acid separation matrices. Unfortunately, steel is often dissolved in hydrochloric acid, or some mixture of HCl and HNO_3, which requires conversion to a purely nitric acid system for further analysis based on the currently available methods. Previous work has shown no significant reduction in strontium retention in 3 M HNO_3 with up to 0.5 M HCl in the system.[1] This work takes a more in-depth look at the mixed nitric/hydrochloric acid system, and indicates that while there is a significant drop at lower ionic strengths, even solutions containing more HCl than HNO_3 can be effective extraction matrices at high ionic strength.

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[1] Horwitz, EP; Chiarizia, R; Dietz, ML (1992), Solvent Extraction & Ion Exchange, 10:2, 313-336