SEQUENTIAL DETERMINATION OF ACTINIDES IN A VARIETY OF MATRICES

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A large number of analytical procedures for the actinides have been published, each catering for a specific need. Due to the bioassay programme in our laboratory, a need arose for a method to determine natural (Th and U) and anthropogenic actinides (Np, Pu and Am/Cm) together in a variety of samples. The method would have to be suitable for routine application: simple, inexpensive, rapid and robust. In some cases, the amount of material available is not sufficient for the determination of separate groups of actinides, and a sequential separation and measurement of the analytes would therefore be required. The types of matrices vary from aqueous samples to radiological surveillance (urine and faeces) to environmental studies (soil, sediment and fish), but the separation procedure should be able to service all of these. The working range of the method would have to cater for lower levels of the transuranium actinides in particular sample types containing higher levels of the natural actinides (U and Th).

The first analytical problem to be discussed, is how to get the different sample types into the same loading solution required by a single separation approach. This entails sample dissolution or decomposition in some cases, and pre-concentration or pre-separation in others. A separation scheme is presented for the clean separation of all the actinides in a form suitable for alpha spectrometry.

The development of a single column separation of the analytes of interest will be looked at, as well as observations made during the development of the separation scheme, such as concentration effects. Results for test samples and certified reference materials will be presented.