Trace Uranium Analysis by Isotope Dilution Alpha and Mass Spectrometry and Comparison with Other Techniques

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In the present work a single isotope diluent ^{233}U has been employed in the accurate determination of uranium by isotope dilution mass spectrometry (MSID) and alpha spectrometry (ASID). The results obtained on geological samples showed a total precision and accuracy of the order of 0,5% to 1% in MSID and 1% to 2% for ASID respectively for uranium concentrations in the range of 2 to 4000 ppm.

A new technique of MSID with the addition of two tracers (^{233}U and ^{235}U) was also developed, which offers a great advantage of providing two independent values for the concentration of uranium in single dilution by which it is possible to evaluate the chemical procedures adopted. The precision obtained for the two values in same dilution is of the order of 0,5% for all the samples.

The accuracy of the each isotope dilution technique is discussed based on the determination of the uranium in the same samples applying other techniques like X-ray fluorescence and instrumental neutron activation.

The techniques can easily be adopted to environmental samples with a little modification in the chemical procedure.