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Separation of Ra, Ba and Pb for determination of Ra-226 by isotope dilution alpha spectrometry and Pb-210 by liquid scintillation spectrometry

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The determination of ^{226}Ra and ^{210}Pb is important for characterization of new and existing reference materials, for use as natural tracers in environmental studies and in environmental assessments when natural radionuclides are present at elevated levels. The ^{226}Ra and ^{210}Pb ratio of characterized reference materials changes with time. Due to possible partial escape of ^{222}Rn from the containers, the calculation of radioactive decay and ingrowth is not reliable after some years, therefore the values have to be re-measured from time to time. In addition soil and sediment matrices usually contain Ba around 100-1000 mg kg⁻¹. This barium content of the samples often disturbs the preparation of the Ra alpha sources and restricts the sample size. The method presented here is based on a simple but efficient separation of Pb and Ra from Ba. After the chemical separation ^{226}Ra is determined by isotope dilution alpha spectrometry (typical resolution of ^{226}Ra alpha sources is 30-60 keV FWHM) and ^{210}Pb by liquid scintillation spectrometry. The method is selective and sensitive and provides reliable determination of ^{226}Ra and ^{210}Pb in 0.5-2 g of soil and sediment samples with limits of detectable activities of 0.00016 Bq/sample and 0.006 Bq/sample respectively.

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