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Combined, sequential procedure for radiochemical analyses of 63Ni, 99Tc, Pu, Th, Am, U and 90Sr in environmental samples

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Environmental samples are sometimes quite unique –the mass of sample collected frequently on remote locations is limited due to need of transportation by hands. The advantage of analyses of as much as possible radionuclides is obvious. The information obtained from ratios between different nuclides are enlarging our knowledge a lot. Moreover, the efforts devoted for dissolution of sample sometimes are large. All this supports concept of developing a single, sequential radiochemical procedure, which applied to a single environmental sample, after single mineralization can give information on many radionuclides. In our laboratory from many years a sequential procedure for radiochemical analyses was developed. Recently sub-procedures for 63Ni and 99Tc were included into existing large sequential procedure for Pu, Th, U, 90Sr radiochemical analyses in environmental (soil, sediment, peat etc.) samples [1]. Soaked with ammonia sample (~10g) is ashed in 400 ℃ sample (about 10 g). Then tracers are added and wet complete digestion is applied using HF, HNO3, HCl and H3BO3. Sample is converted to 1 M HNO3 and then it is neutralized up to pH=6 using ammonia. Precipitation contains all actinides and 90Sr whereas Tc and Ni stay in solution. Actinides are then separated using Dowex-1 and TEVA resins and 90Sr using Sr-Resin. 63Ni is separated using DMG and 99Tc using TEVA.
Procedure was positively tested using reference materials spiked with 95mTc (obtained with AIC-144 cyclotron by us) and NiCl2 as tracers only for radiochemical yield tracing due to lack of RM with certified values for 99Tc and 63Ni) .
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References

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Primary authors: Prof. MIETELSKI, Jerzy-Wojciech (The Henryk Niewodniczanski Institute of Nuclear Physics, Polish Academy of Sciences (IFJ PAN)); Dr KLESZCZ, Krzysztof (The Henryk Niewodniczanski Institute of Nuclear Physics, Polish Academy of Sciences (IFJ PAN))

Co-authors: Dr ŁOKAS, Edyta (The Henryk Niewodniczanski Institute of Nuclear Physics, Polish Academy of Sciences (IFJ PAN)); Ms TOMANKIEWICZ, Ewa (The Henryk Niewodniczanski Institute of Nuclear Physics, Polish Academy of Sciences (IFJ PAN))

Presenter: Prof. MIETELSKI, Jerzy-Wojciech (The Henryk Niewodniczanski Institute of Nuclear Physics, Polish Academy of Sciences (IFJ PAN))

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