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Rapid separation and determination of ^{107}Pd and ^{79}Se from intermediate level radioactive waste from NPP A1

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Palladium ^{107}Pd and Selenium ^{79}Se are amongst nineteen limited radionuclides monitored in wastes disposed at national repositories in Slovak Republic. Both of these radionuclides are pure beta emitters with energies $E_{\beta, \text{max}}$ 150.7 keV; 33 keV respectively. Such low energies of beta spectra make them very difficult to measure. The best possible method of determination is liquid scintillation counting. Even LSC methods are to be much more sophisticated than simple photomultiplier tube measurements; triple-to-double coincidence ratio liquid scintillation counting is one of the best methods to determine these difficult to measure radionuclides. Radiochemical separations of these radionuclides are not even in these days exactly described. Procedures are either very complex or other parts of procedures are dealing only with selenium and palladium as a toxic element and heavy metal therefore the emphasis is on determining with instrumental methods: ICP MS, ICP AES and ICP OES. These methods cannot be used in case of intermediate level RAW. Intermediate level, historic RAW from NPP A1 are presently disposed. Since at A1 NPP occurred INES 4 accident in year 1977, cladding of many fuel assemblies was violated, even one fuel assembly was melted down, whole spent fuel storage, reactor vessel and other storages for fuel assemblies were severely contaminated with fission, activated and transuranic elements with specific activities up to 1011 Bq/kg. This paper is describing development of selenium 79 separation in steps consisting precipitation of selenium into its metallic form and achievement of desired radionuclide purity with ion chromatography. Determination of palladium is studied in few simple precipitation steps with DMG and co-precipitation of other pollutants. Both limited radionuclides are determined with liquid scintillation counting with TDCR.

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