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After leach tests, the surface of the solid forms was analyzed by scanning electron microscope (SEM, Hitachi S4100L) and electron probe microanalysis (EPMA, Hitachi X-650S); the surface morphology was examined and the concentration profiles of Cs, Sr, Al and Si in the solid were determined by EDS analysis. As for Cs solid forms, the XRD patterns for the specimens treated with different leachants at 90°C for 1 month remained unchanged. The surface alteration of Sr solid forms was observed for the specimens treated with NaOH and NaCl at 90°C for 1 month; the precipitated phase of Analcime ( $\text{NaAlSi}_2\text{O}_6$ ) was detected on the surface by XRD and EDS analysis.

The selective separation and immobilization of heat-generating nuclides were accomplished by using K-H zeolites. This process is also effective for the advanced disposal system of HLW and environmental remediation. Further, these findings suggest that the Cs and Sr solid forms are expected to have a potential possibility for radiation and heat sources.

#### References:

1. H. Mimura, T. Hirabayashi, M. Ozawa, Leachability and Thermal Properties of Ceramic Solid Forms Immobilizing Cesium and/or Strontium, Proc. of International Conference Nuclear Energy for New Europe 2003 (2003).

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### DETERMINATION OF PALLADIUM (II) AND SILVER (I) BY ATOMIC ABSORPTION SPECTROMETRY AFTER PRECONCENTRATION ON PROPYLTHIOETHYLEAMINE MODIFIED SILICA

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The palladium and silver ions are very important elements for utilization and particularly from secondary sources since Ukraine has no deposits. One of the possible sources is wastewater from non-ferrous metals industry. The low contents of these elements and high mineralization of its sources make their determination essentially problematic and particularly by routine non-selective methods such as photometry. Direct AAA of these elements in wastewater is also impossible unless pre-concentration is used. Most often the complexing sorbents are used for the pre-concentration of their trace amount: synthetic ion-exchangers, oxidized coals, and, in the last years, modified silica, exceeding other sorbents by their favorable kinetic characteristics. The sorption of palladium and silver ions from water solution by silica with covalently bonded propylthioethylamine has been studied as a function of pH, metal concentrations and time of stirring. The effect of the nature and concentration of eluent for desorption of metal ions has been also investigated.

Quantitative and selective recovery (>95%) was observed for palladium in the range pH 1-3 and for silver at pH 1-2. Other studied metal (3-d metals) ions remain in solution at this pH range. A working pH range for palladium selective pre-concentration is pH=2.0. For silver this range is pH=1.0.

The adsorption capacity of silica gel modified by propylthioethylamine for palladium and for silver was found to be 0,11 mmol g<sup>-1</sup> and 0,06 mmol g<sup>-1</sup> respectively.

The equilibrium time of 15 min and 30 min was found to be sufficient to saturate >95 % of the matrix with palladium and silver respectively.

The 10% thiourea in 0.1M HCl was selected as optimal for the elution of adsorbed metal ions by silica modified. 2 ml of eluent is sufficient for complete desorption of metal ions.

On the basis of the research results, the procedure involving palladium and silver ions pre-concentration and subsequent atomic absorption has been proposed. This procedure was tested in the analysis of model water solution. The data bear out the sufficient accuracy and reproducibility of the proposed procedure.