STUDY OF THE KINETICS OF EXTRACTION OF EUROPIUM AND YTTRIUM IN CARBONATE AND NITRATE MEDIA BY THE IR ATR METHOD

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The use of extraction methods for the separation and concentration of rare-earth elements and radionuclides is currently in high demand. Thus, europium is actively used in microelectronics and nuclear power as a neutron absorber, and knowledge about the extraction of yttrium and its separation from strontium is necessary for the development of a ^{90}Y isotope generator for use as a radiopharmaceutical.

The purpose of this work is to study the kinetics of extraction of europium nitrate and yttrium carbonate by various organic extractants (triamylphosphinoxide (TAPO), carbomoyl phosphinoxide (CMPO), 2,3–dihydroxynaphthalene and 8-hydroxyquinoline) [1,2] by infrared spectroscopy with attenuated total reflectance (IR ATR). It is shown that the IR ATR method makes it possible to study the kinetics of the extraction process using small volumes of the studied solutions and gives good convergence of the extraction rate constant with the diffusion cell method (for the Eu^{3+} - TAPO system $7.5*10^{-4}$ $cm^{-1}s^{-1}$ by the IR ATR method and $4.3*10^{-4}$ $cm^{-1}s^{-1}$ by the Lewis cell method). It is also shown that in systems using chelating extractants, the presence of two jumps is observed on kinetic curves, which can be explained by the sequential addition of metal ions to the binding functional groups of extractants (Fig.1).

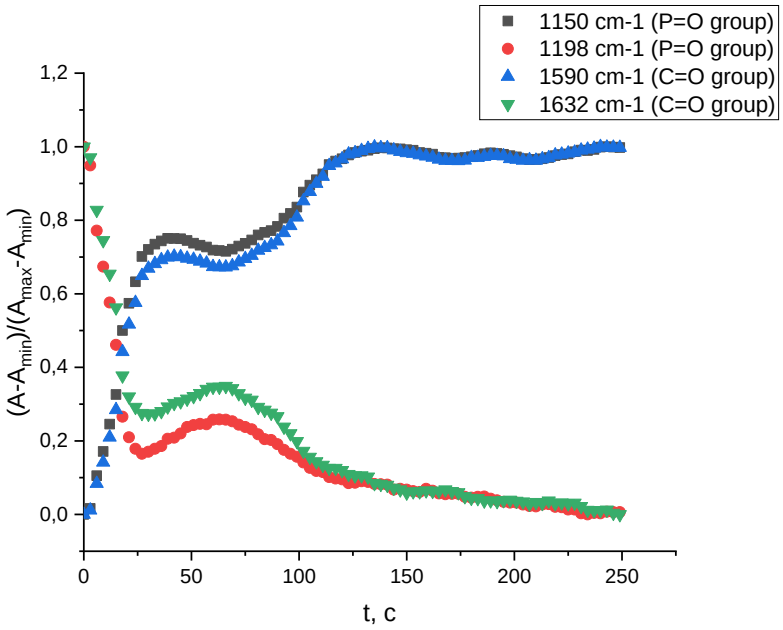

Figure 1. Kinetic curves constructed for a series of IR spectra during extraction of Eu^{3+} with CMPO solution in 1,2-Dichloroethane

References

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