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Solvent extraction kinetics of Sm(III), Eu(III) and Gd(III) with 2-ethylhexyl phosphoric acid-2-ethylhexyl ester☆

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Abstract: Solvent extraction kinetics of Sm (III), Eu (III) and Gd (III) from hydrochloric acid have been focused on using 2-ethylhexyl phosphoric acid-2-ethylhexyl ester (P507) with Anordning for Kontinuerlig Undersokning av Fordelningsfaktore vid Vatske Extraction (AKUFVE). Compared with the conventional set-up, some advantages emerge obviously, for example, fast phase separation, easy operation and convenience of kinetic data acquisition. First of all, the extraction mechanism was discussed based on the dimeric model of P507. Secondly, the effects of stirring speed was investigated and 420 r·min^{-1} was determined of the following experiments. The effects of pH, concentration of rare earth elements (REEs) and P507 on the extraction rate were analyzed. The results indicated that the extraction mechanism changed with the increasing concentration of P507. Then, the experiments with different temperature were carried out. It turned out that the values of apparent activation energy (E_a) for Sm(III), Eu(III) and Gd(III) extracted by P507 were 26.80 kJ/mol, 13.40 kJ ·mol^{-1} and 11.10 kJ ·mol^{-1} respectively, the resistance of the entire process was limited by diffusion or both of diffusion and

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