

Kenaf cellulose-based poly(amidoxime) ligand for adsorption of rare earth ions

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ABSTRACT

A well-known adsorbent, poly(amidoxime) ligand, was prepared from polyacrylonitrile (PAN) grafted kenaf cellulose, and subsequent characterization was performed by Fourier transform infrared spectroscopy (FTIR), field emission scanning electron microscope (FESEM) and inductively coupled plasma mass spectrometry (ICP-MS). The adsorption capacities of the prepared ligand for rare earth metals are found to be excellent, with adsorptions of La³⁺, Ce³⁺, Pr³⁺, Gd³⁺ and Nd³⁺ experimentally determined to be 262, 255, 244, 241 and 233 mg·g⁻¹, respectively, at pH 6. The experimental values of the adsorption of rare earth metals are well matched with the pseudo-second-order rate equation. The reusability of the adsorbent is examined for seven cycles of sorption/desorption, demonstrating that the proposed adsorbent could be reused for over seven cycles without any significant loss in the original removal capability of the ligand.

KEYWORDS:

Adsorption; Poly(amidoxime); Rare earths; Separation; Kenaf cellulose