

عنوان مقاله:

Removal of Nickel(II) by Silica Aerogel-Activated Carbon Nanocomposite from Wastewater

محل انتشار:

مجله علوم دارویی و شیمی، دوره 6، شماره 9 (سال: 1402)

تعداد صفحات اصل مقاله: 14

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خلاصه مقاله:

HMs (HMs) are important pollutants in the environment. The main purpose of this study was to evaluate the efficiency of nickel(II) adsorption process by Silica Airgel-Activated Carbon Nanocomposite (SAACN). Initially, by central composite design method, ۳۰ runs of the experiment based on the range of independent variables including pH ۲-۶, contact time (CT) (۲۰-۱۰۰ min), adsorbent dose (AD) (۰.۱-۰.۵ g/L), temperature (TEM) (۳۰۳-۳۴۳ °K) and nickel(II) concentration (۲.۱ mg/L) was designed for real samples of industrial wastewater. Next, using synthetic samples with different metal concentrations, the kinetic and isotherm models as well as thermodynamic parameters of Ni(II) adsorption process on SAACN were evaluated. Finally, the obtained raw data were analysed by Design of Expert (DOE Ver.۸) software. The results showed that increasing the parameters of pH, AD, CT, and T increase the SAACN performance in Ni(II) adsorption. In addition, certain conditions including AD=۰.۵ g/L, CT=۱۰۰ min, T=۳۴۳ °K, and pH=۶ cause Ni(II) adsorption up to ۹۹.۵% by SAACN. In addition, the adsorption process of Ni(II) by SAACN is more consistent with Langmuir isotherm and pseudo-second-order kinetic models. According to the thermodynamic results, the aforementioned process is spontaneous, endothermic, and irreversible. According to obtained results, SAACN is an efficient and appropriate adsorbent for the removal of metals from industry.

کلمات کلیدی:

Activated carbon, Aqueous solutions, Industrial Wastewater, Nanocomposite, nickel, Silica Aerogel

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