

Effective removal of Pb(II) by low-cost fibrous silica KCC-1 synthesized from silica-rich rice husk ash

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ABSTRACT

Rice husk ash was utilized as a low-cost silica precursor in preparing KCC-1(RHA) for Pb(II) removal. The characterization results revealed the comparable properties of KCC-1(RHA) with the conventional KCC-1. The optimum adsorption conditions were achieved at initial concentration of 322.06 mg/L, adsorbent dosage of 2.4 g/L, and time of 117 min, with Pb(II) removal of 75%. The experimental results followed the pseudo-second-order kinetic model ($R^2 = 0.9950$) and Langmuir isotherm model ($R^2 = 0.9934$). The KCC-1 (RHA) showed good performance during five cycles of adsorption-desorption, thus, affirmed great potential of RHA as silica precursor in synthesizing KCC-1(RHA) for excellent Pb(II) removal.

Keywords: KCC-1 Rice husk ash Pb(II) Adsorption Optimization

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Highlights

- Rice husk ash (RHA) acts as an alternative sodium [silicate](#) for KCC-1.
- KCC-1(RHA) has comparable physicochemical properties with commercial KCC-1.
- KCC-1(RHA) has an excellent performance in the Pb(II) removal.
- Optimum conditions of Pb(II) adsorption onto KCC-1(RHA) were determined using RSM.
- Optimum conditions: $C_o = 322.06$ mg/L, $m = 2.4$ g/L, $t = 117$ min; Pb(II) removal = 75%.