



Alkali solid-state conversion of kaolin and zeolite to effective adsorbents for removal of lead from aqueous solution

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ABSTRACT

The adsorption of lead [Pb(II)] ions onto adsorbents prepared by alkali solid-state conversion of kaolin and natural zeolite mixture was investigated. The adsorption isotherms were obtained and the Langmuir parameters were calculated in order to make a comparison between the adsorption capacities of synthesized adsorbents and those of their constituents. The synthesized adsorbents exhibit much higher adsorption capacity than kaolin and zeolite. Therefore, the low-cost adsorbent based on kaolin and Jordanian zeolite has important features since it has an extraordinary adsorption capacity towards Pb(II) ions (157 mg Pb(II)/g at pH 6.0 and 0.1 M ionic strength). Furthermore, the results implied the advantage of using zeolite as filler in kaolin-based geopolymers and the advantage of using kaolin as a binder for zeolite in their use as industrial adsorbents in water purification. The adsorption capacity of the synthesized adsorbents, unexpectedly, increases with pH decrease and ionic strength increase. The XRD pattern of the synthesized adsorbent prepared from Jordanian kaolin (JK) and zeolite indicates that it is amorphous.

Keywords: Adsorption; Lead; Kaolin; Jordanian zeolitic tuff; Alkali solid-state conversion

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