

عنوان مقاله:

Investigation and Comparison of Fluoride Adsorption Behavior on a Hybrid Material Containing Zirconium Dioxide Coated on γ -Alumina (60 and 90) and Their Initial Precursor in Aqueous Solution

محل انتشار:

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خلاصه مقاله:

In the present research work, zirconium oxide coated on activated alumina (Al_2O_3 -90, Al_2O_3 -60) were synthesized and used along with their pristine materials to investigate and compare the adsorption behavior of fluoride on them. These material was characterized by BET and X-ray diffraction analyzer. The obtained results confirmed that the immobilization of ZrO_2 particles on the external surface pore of Al_2O_3 -60 and Al_2O_3 -90 has been performed successfully. The results of adsorption behavior study show that among these adsorbents, the synthesized hybrid material Al_2O_3 -60- ZrO_2 has high affinity toward the adsorption of fluoride ions from aqueous solution under ambient condition (36.62 mg.g⁻¹). Adsorption data in all of adsorbents were fitted with Langmuir model and the calculated E value shows that the chemical sorption process is a dominant mechanism in adsorption process. In the first 80 minutes of contact time, the maximum adsorption of fluoride was found to be for these synthesized hybrids Al_2O_3 -60- ZrO_2 , Al_2O_3 -90- ZrO_2 . The adsorption rate of fluoride ions on these hybrid materials in spite of their initial material was almost independent on pH value in the range 3 to 8. The negative values of ΔG° indicates that the adsorption process of fluoride ions onto these adsorbents is exergonic and will proceed spontaneously. In addition, overall, the obtained results show that the prepared hybrid materials as adsorbents are promising and potential candidate for the adsorption and removal of trace amount of fluoride from nuclear and chemical wastewater.

کلمات کلیدی:

Fluoride ions, adsorbent, ZrO_2 , Al_2O_3 -60- ZrO_2 , Al_2O_3 -90- ZrO_2

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