Adsorption properties of Fe-attapulgite nanocomposite removal tannin from aqueous solution

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\textbf{abstract}

Iron-modified attapulgite (Fe-ATP) was successfully prepared via a facile hydrothermal method. Their structure and properties were studied by Fourier-transform infrared spectrometer, scanning electron microscopy, X-ray diffraction. The chemical element compositions and chemical bonds of Fe-ATP were detected by X-ray photoelectron spectroscopy. The adsorption kinetics and isotherm model, the effects of adsorbent dosage, the initial pH value of the tannin solution, and contact time and temperature on the adsorption capacity of the tannin (TA) were explored. The results show that the iron modified attapulgite presented excellent adsorption. The adsorption performance of 30\% Fe-ATP was the best and the adsorption capacity reaches 34.86 mg\cdot g\textsuperscript{-1}. When the pH value was 3, the adsorption capacity reaches the highest 40.9 mg\cdot g\textsuperscript{-1}. The above results showed that this could be attributed to the increase of surface area caused by the introduction of iron hydroxide, and electrostatic interaction may play a key role in the adsorption process. It can be concluded that Fe-ATP was suitable as an adsorbent material to remove TA from aqueous solution.

\textbf{Keywords:} Attapulgite; Modified attapulgite; Tannin; Adsorption properties