Effect of surface modification of activated carbon on its adsorption capacity for bromate

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Received 21 November 2011; Accepted 9 September 2012

\begin{abstract}
This study deals with bromate adsorption by using modified activated carbons (ACs), attempting to reveal the effect of different modification methods on bromate adsorption by performing kinetic and isotherm tests. Four carbon modification methods including thermal modification, HNO\textsubscript{3} modification, H\textsubscript{2}O\textsubscript{2} modification, and NaOH modification are applied. These modification methods change the porous structures and redistribute the surface functional groups of AC. The kinetic data have been analyzed using pseudo-second-order and intra-particle diffusion models, and the intra-particle diffusion model is found to be the best applicable model to describe the adsorption process. The isothermal test shows that the thermal and alkaline modified ACs, with lower acidic functional groups, present higher adsorption capacities, and there is a remarkable linear relationship between the maximum adsorption capacity and the proportion of the acidic groups. The presence of natural organic matters (NOM) lowers the capacities of these ACs in bromate adsorption, but the HNO\textsubscript{3} modified AC was not as sensitive as other modified samples. The presence of other anions (NO\textsubscript{3}^{-}, SO\textsubscript{4}^{2-}, Cl\textsuperscript{-}) can reduce the bromate uptake and the selectivity order for the AC is NO\textsubscript{3}^{-} > SO\textsubscript{4}^{2-} > Cl\textsuperscript{-}.

Keywords: Bromate; Activated carbon; Adsorption; Modification
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