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PURE SODALITE SYNTHESIS, CHARACTERIZATION AND APPLICATION FOR HEAVY METAL IONS REMOVAL FROM AQUEOUS SOLUTIONS

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Abstract

Pure sodalites were successfully synthesized from kaolinite taking the advantages of alkaline fusion technique. The synthesized sodalites were then characterized via XRD, SEM/EDX, and FTIR methods. The efficiency of these sodalites for treatment of Cu^{2+}, Zn^{2+} and Ni^{2+} ions in aqueous solutions was also scrutinized through batch adsorption experiments. Subsequently, the concentrations of Cu^{2+}, Zn^{2+}, and Ni^{2+} ions in final leachates were detected by ICP-OES analysis. Furthermore, the results proved that adsorption data fitted very well to Freundlich isotherm model assuming that the metal ions removal can be applied to multilayer adsorption. Moreover, the kinetics of the adsorption followed the pseudo-second-order model suggesting that the rate of adsorption process may be controlled by the chemical sorption. In brief, the synthesized sodalites excellent performance for heavy metal ions removal from aqueous solutions can shed light on their remarkable potential in purification applications. Additionally, considering high cost of the natural sodalite, synthesis of sodalites with homogeneous porous structure that can be used as great adsorbents would be profitable for environmental purposes.

Key words: adsorption, heavy metal ion, pure zeolitic phase, sodalite, synthesis

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