

Characterization of adsorbents from Ukrainian kaolinite clay for the sorption of nickel: insight and practical application for water treatment in conditions of economic constraints

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ABSTRACT

Heavy metals are often present in mining waters. In this research, comparative studies of Ni²⁺ adsorption were made on natural red and white kaolins from the Murzyntski quarry in Ukraine. Red kaolin showed a higher adsorption capacity of Ni²⁺ and was more effective than white kaolin at pH 3.5 and pH 7.5, total dissolved solids (TDS) 0.01, 1.5, and 2.5 g/L. This was since red and white kaolins had different percentages of minerals in their composition, that is, kaolinite, quartz, and hematite, as well as different pH_{pzc} values. The adsorption capacity of saline water was tested for potential environmental applications of such materials in the purification of mining waters. To ensure the ecological and economic effect of applying the kaolins studied, it was proposed to introduce them into the Svistunova accumulation lake located about 150–200 km from the kaolin quarry.

Keywords: Ecological effect; Mining water; Adsorption; Nickel; Kaolin; Environmental applications

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