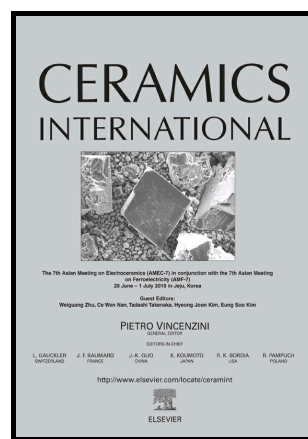


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Magnesium ferrite nanoparticles as a magnetic sorbent for the removal of Mn^{2+} , Co^{2+} , Ni^{2+} and Cu^{2+} from aqueous solution

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Ni²⁺ and Cu²⁺ from aqueous solution

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Abstract

The aim of this research was to prepare magnesium ferrite (MgFe₂O₄) magnetic nanoparticles and to investigate their sorption characteristics towards Mn²⁺, Co²⁺, Ni²⁺, Cu²⁺ ions in aqueous solution. MgFe₂O₄ was synthesized by glycine-nitrate combustion method and was characterized by low crystallinity with crystallite size of 8.2 nm, particle aggregates of 13–25 nm, BET surface area of 14 m²/g and pore size of 8.0 nm. Sorption properties of MgFe₂O₄ towards Mn²⁺, Co²⁺, Ni²⁺, Cu²⁺ ions were studied using one-component model solutions and found to be dependent on metal ions concentration, contact time, pH and conditions of regeneration experiment. The highest sorption capacity of MgFe₂O₄ was detected towards Co²⁺ (2.30 mmol g⁻¹) and Mn²⁺ (1.56 mmol g⁻¹) and the lowest towards Ni²⁺ (0.89 mmol g⁻¹) and Cu²⁺ (0.46 mmol g⁻¹). It was observed that sorption equilibrium occurs very quickly within 20–60 min. The pH_{ZPC} of sorbent was calculated to be 6.58. At studied pH interval (3.0–7.0) the sorption capacity of MgFe₂O₄ was not significantly affected.

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