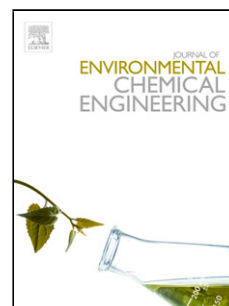


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Cerium oxide nanoparticles application for rapid adsorptive removal of tetracycline in water

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Abstract

This study investigates the potential of CeO₂ nanoparticle as an adsorbent to remove tetracycline (TC) in water. CeO₂ nanoparticle was synthesized using precipitation method in water/alcohol mixed solvents. As-synthesized sample was characterized using x-ray diffractometer, scanning electron microscope, and Fourier transform infrared spectroscopy. The adsorption isotherm experiment was conducted in liquid phase by varying the contact time and the temperature at initial TC concentration of 25 – 125 mg/L. The result showed that CeO₂ has a cubic structure with crystallite size of 10.86 nm and is composed by aggregate particles. The equilibrium adsorption is reached after a contact time of 60 min that yield the removal efficiency of 80-97% and adsorption capacity of 58.03 mg/g. The adsorption kinetic analysis indicated that the adsorption process could be described by a pseudo second order model. The thermodynamic parameters confirmed that TC adsorption onto CeO₂ nanoparticle was exothermic and spontaneous. The high removal efficiency and short time adsorption equilibrium suggest that CeO₂ nanoparticle can be used as an antibiotic adsorbent for water treatment.

Keywords: CeO₂, adsorption, tetracycline, water treatment

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