Preparation of Magnetic Activated Carbon from Cassava Peel for Removal of Tetracycline Antibiotic in Aquatic Environment

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Abstract

The widespread use of antibiotics has become a serious problem because of their adverse effects on the environment and humans health. Adsorption technique using low-cost adsorbent from agricultural waste could be a promising technique for removal of antibiotics from an aquatic environment. This study prepared magnetic active carbon from cassava peel for removal of tetracycline antibiotics. The FeCl3·6H2O and FeSO4·7H2O are used as magnetic sources to obtain magnetic properties that are separated with a simple magnetic field. Physical characterization of the activated carbon obtained was performed by Scanning Electron Microscope (SEM) and X-ray diffraction (XRD). The effects of dose adsorbent, pH, and contact time on adsorption of tetracycline have been investigated. Characterization using SEM showed the difference between active carbon and magnetic active carbon. Morphology of activated carbon showed large pores, while magnetic active carbon revealed iron oxide particles that cover and surround on the pores of the activated carbon. The result from XRD characterization showed a similarity of diffraction peak of iron oxide and magnetic activated carbon with a specific peak. The results of adsorption optimization were observed at adsorbate concentration of 1 mg/L, 20 mg adsorbent mass with pH 6 conditions, and contact time for 10 minutes. The study shows that magnetic activated carbon from cassava peel has a future perspective of low-cost adsorbents which effectively removes antibiotics from an aquatic environment.