Biosorption of methyl violet from aqueous solution using Algerian biomass

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ABSTRACT

The present study focuses on the biosorption of methyl violet (MV) from aqueous solution using an Algerian biomass, Ammodaucus leucotrichus. The biosorption of MV on A. leucotrichus was investigated as function of pH (3–10), stirring speed (100–400 rpm), biosorbent dosage (0.5–3 g L\(^{-1}\)), and initial MV concentrations (10–50 mg L\(^{-1}\)). All experiments were carried out in a batch reactor at room temperature. FTIR analysis of our biosorbent material showed the presence of main functional groups, amino, carboxyl, hydroxyl, and carbonyl groups, which are efficient biosorbents responsible for the removal of MV. The effects of biosorption were examined and the percentage of MV removal increased from ~68 to 93%. Pseudo-first-order, Elovich equation, and pseudo-second-order models were used to interpret and explain the experimental data. The sorption kinetics of MV onto A. leucotrichus biomass was explained by the pseudo-second-order kinetic equation. Freundlich, Langmuir, Dubinin–Radushkevich, and Temkin models were applied to describe the sorption isotherm. The obtained results indicated that the MV sorption follows the Freundlich models. Under the optimum conditions, the maximum biosorption capacity \(q_{\text{max}}\) was 500 mg g\(^{-1}\).

Keywords: Ammodaucus leucotrichus; Biosorption; Methyl violet; Isotherm; Kinetic models

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