

# Treatment of water containing methylene by biosorption using Brazilian berry seeds (*Eugenia uniflora*)

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## Abstract

Brazilian berry seeds (*Eugenia uniflora*) were used as an eco-friendly and low-cost biosorbent for the treatment of textile effluents containing methylene blue. Characterization techniques indicated that Brazilian berry seeds are constituted of irregular particles, mainly composed of lignin and holocellulose groups, distributed in an amorphous structure. Methylene blue biosorption was favorable at pH of 8, using a biosorbent dosage of 0.8 g L<sup>-1</sup>. The equilibrium was reached in the first 20 min for lower M methylene blue concentrations and 120 min for higher methylene blue concentrations. Furthermore, the general and pseudo-second-order models were suitable for describing the kinetic data. Langmuir was the most adequate model for describing the isotherm curves, predicting a biosorption capacity of 189.6 mg g<sup>-1</sup> at 328 K. Biosorption was spontaneous ( $-9.54 \leq \Delta G^0 \leq -8.06$  kJ mol<sup>-1</sup>) and endothermic, with standard enthalpy change of 6.11 kJ mol<sup>-1</sup>. Brazilian berry seeds were successfully used to remove the color of two different simulated textile effluents, achieving 92.2% and 73.5% of removal. Last, the fixed-bed experiment showed that a column packed with Brazilian berry seeds can operate during 840 min, attaining biosorption capacity of 88.7 mg g<sup>-1</sup>. The data here presented indicates that textile effluents containing methylene blue can be easily and successfully treated by an eco-friendly and low-cost biosorbent like Brazilian berry seeds.

## Keywords:

Biosorption, Dye, Eco-friendly, Effluent, Fixed-bed, Methylene blue