



Equilibrium, kinetic, and thermodynamic studies on the biosorption of Bordeaux S dye by sericin powder derived from cocoons of the silkworm *Bombyx mori*

Vitor R. Silva^{a,*}, Fabiane Hamerski^a, Thiago A. Weschenfelder^a, Marcelo Ribani^b, Marcelino L. Gimenes^c, Agnes P. Scheer^a

^aChemical Engineering Department, Federal University of Paraná, Francisco H. Santos St., Curitiba, Paraná, Brazil, Tel. +55 41 3361 3584; emails: vrenan@ufpr.br (V.R. Silva), fabianehamerski@gmail.com (F. Hamerski), thiago.weschenfelder@gmail.com (T.A. Weschenfelder), agnesps@gmail.com (A.P. Scheer)

^bTechnology Institute of Paraná, João Américo St., 330 Curitiba, Paraná, Brazil, email: ribani@tecpar.br

^cChemical Engineering Department, State University of Maringá, Colombo Av., 5790 Maringá, Paraná, Brazil, email: marcelino@deq.uem.br

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ABSTRACT

The biosorption of Bordeaux S dye onto sericin powder derived from silkworm cocoons was studied in a batch adsorption system to determine the kinetic mechanism, the equilibrium, and thermodynamic parameters. The Langmuir, Freundlich, and Temkin isotherm models were used for the equilibrium modeling. In order to describe the kinetics, the fits of pseudo-first-order, pseudo-second-order, Weber–Morris, Crank, and external liquid film diffusion models were evaluated. The adsorption occurs favorably at pH below 3.2. The kinetic and equilibrium studies showed fast adsorption and interaction were limited to the monolayer surface, with pseudo-second-order and Langmuir models providing the best fits. Thermodynamic studies indicated that the system is spontaneous and exothermic and that physical interactions govern the adsorption process. The results revealed that sericin powder has the potential to be used as a biosorbent for the treatment of wastewater containing the dye Bordeaux S.

Keywords: Sericin powder; Degumming process; Bordeaux S; Batch adsorption

*Corresponding author.