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Research article

Direct Blue 71 removal by tamarind shell-supported *Phanerochaete chrysosporium*: synergistic biosorption and biodegradation in batch and fixed-bed systems

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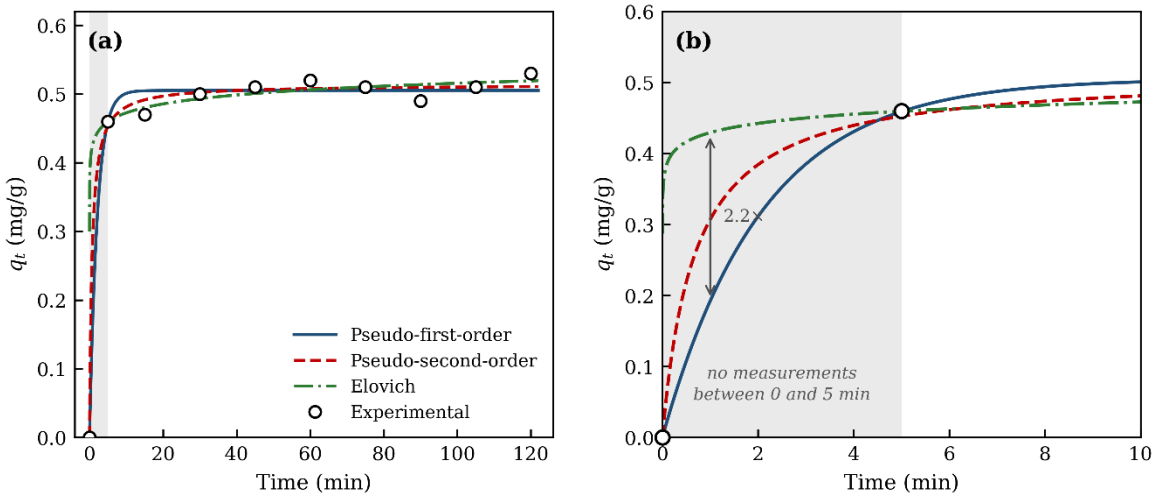


Figure S1. DB71 biosorption kinetics onto tamarind shell (TS) fitted to the pseudo-first-order, pseudo-second-order, and Elovich nonlinear models ($[DB71]_0$ = 10 mg/L; biosorbent dose = 10 g/L; pH 7; temperature = 25 °C). (a) Full experimental range. (b) Expansion of the interval 0–10 min; the shaded region indicates that no measurements were made between 0 and 5 min, so the model curves there are extrapolations.

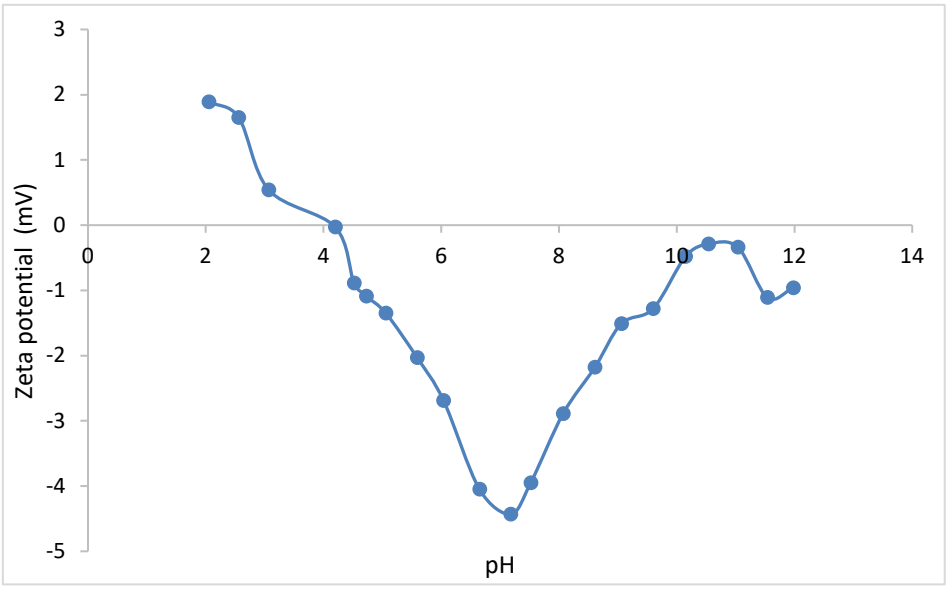


Figure S2. Zeta potential of tamarind shell (TS) as a function of pH.

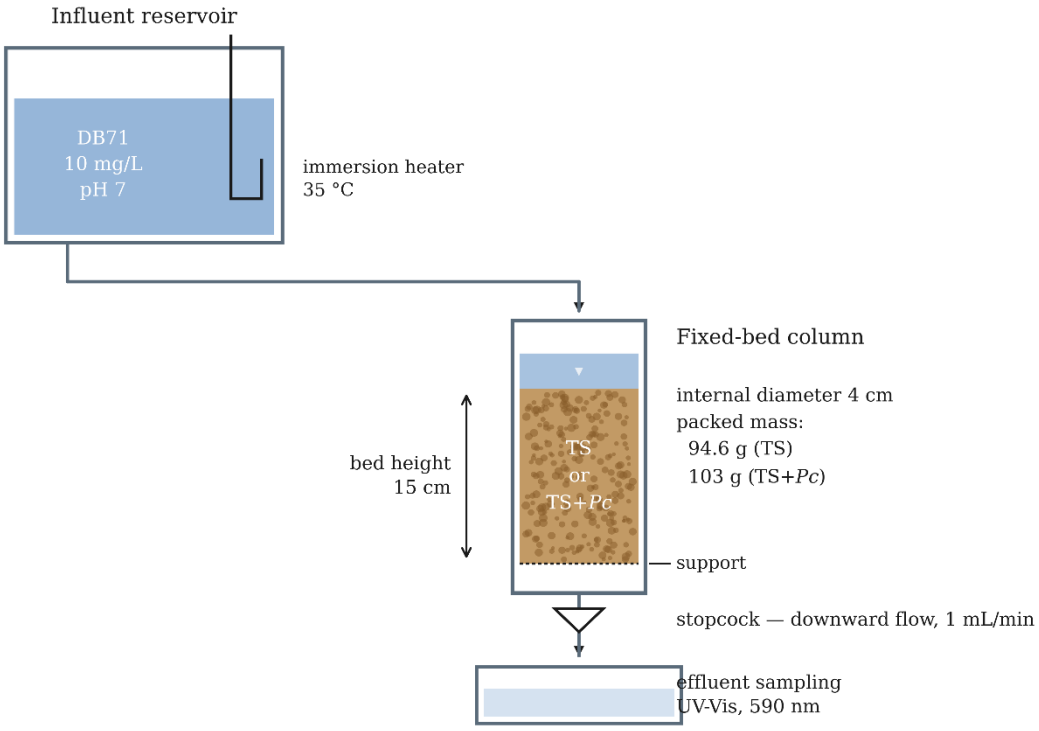


Figure S3. Schematic representation of the fixed-bed column system used for the continuous removal of DB71.

Table S1. Thermodynamic parameters for DB71 biosorption onto tamarind shell (TS) at 25, 35, and 40 °C: standard Gibbs free energy (ΔG°), standard enthalpy (ΔH°), and standard entropy (ΔS°), determined from the Van't Hoff equation (biosorbent dose = 20 g/L; pH 3).

T (°C)	K° (dimensionless)	ΔG° (kJ/mol)	ΔH° * (kJ/mol)	ΔS° * (J/mol K)	R^2 (van 't Hoff)
25	6.74×10^5	−33.27	14.49	160.7	0.43
35	1.04×10^6	−35.50			—
40	8.35×10^5	−35.50			—

* ΔH° and ΔS° were obtained from a three-point Van't Hoff regression and are not constrained by these data; see Section 3.8.

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