Supporting information

Utilization of activated carbon for the adsorption of methylene blue from waste coffee husk

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Table S1: Adsorption kinetic models.

Models	Equation
Pseudo-first order	$q_t = q_e(1 - e^{-(k_1 \times t)})$
Pseudo-second order	$q_t = \frac{k_2 q_e^2 t}{1 + k_2 q_e t}$
Elovich	$q_t = \frac{1}{\beta} ln(\alpha\beta t + 1)$
Bangham	$q_t = k_b t^{\alpha_b}$
Intraparticle diffusion	$q_t = K_I t^{0,5} + C$

In which, q_t (mg g^{-1}) is the amount of adsorbent over time t (min); k_1 (min^{-1}) is the constant rate of Pseudo-first order; k_b is the constant rate of Bangham; K_I (mg g^{-1} min^{-1}) is the constant rate; α (mg g^{-1} min^{-1}) is the initial adsorption rate; β (g mg^{-1}) is the desorption constant; α_b (< 1) represents the adsorption intensity; C is a constant related to the thickness of the liquid film surrounding the adsorbent.

Table S2: Adsorption isotherm models

Models	Equation
Freundlich	$q_e = K_F C_e^{1/n}$
Temkin	$q_e = b_T \, ln \, A \, C_e$
Redlich-Petterson	$q_e = \frac{K_{RP} C_e}{1 + \alpha C_e^{\beta}}$
Sips	$q_e = \frac{Q_m (K_S C_e)^{1/n}}{1 + (K_S C_e)^{1/n}}$

In which, K_F ((mg.g^{-1})(L.mg^{-1})$^{1/n}$) is the Freundlich isotherm constant, C_e (mg.L^{-1}) is the dye concentration at equilibrium, n is a parameter related to the surface heterogeneity; b_T is related to the thermal state of adsorption, A (L.mg^{-1}) is the Temkin constant; K_{RP} (L.g^{-1}) and α (mg^{-1}) are the constants of Redlich-Petterson, β is an exponent between 0 and 1 that represents the heterogeneity of the adsorbent; Q_m (mg.g^{-1}) is the maximum adsorption

capacity of the Sips isotherm, K_s ($L.mg^{-1}$) is the Sips constant and n is the index of heterogeneity; for a homogeneous material n = 1.

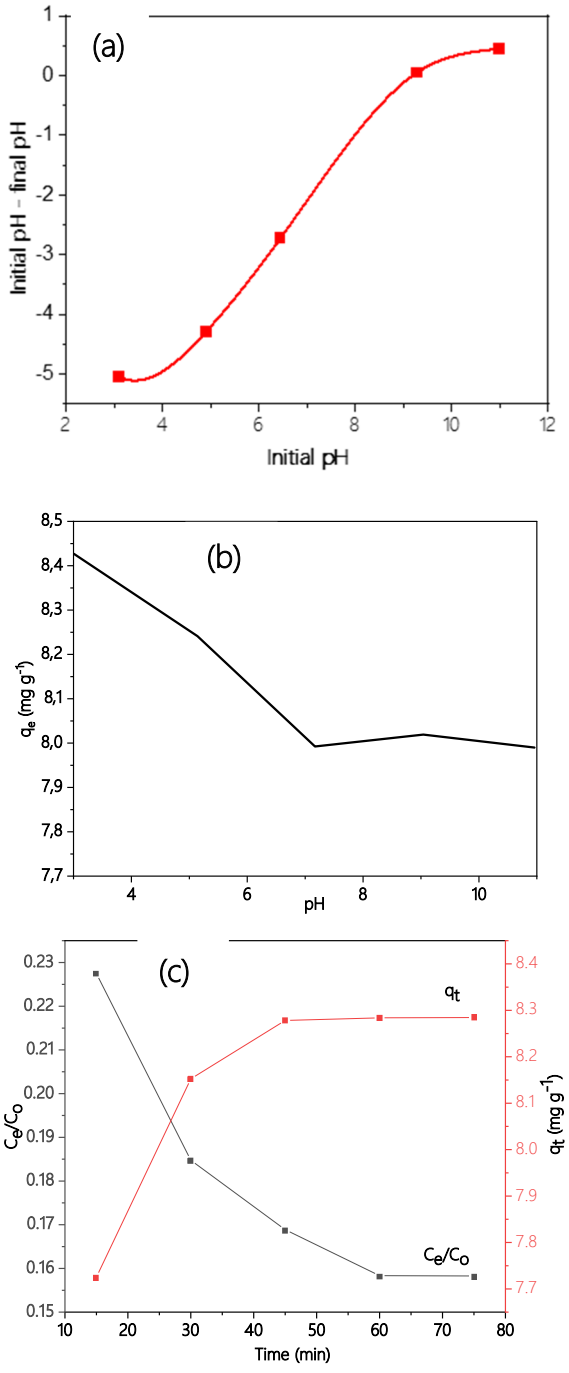

Figure S1: pH_{pzc} of AC (a), effect of pH on MB removal by AC after t = 60 min (b), and effect of contact time on MB adsorption capacity onto AC (c) (C_o = 10 mg L^{-1}, m = 0.05 g, V = 50 mL, T = 298 K).

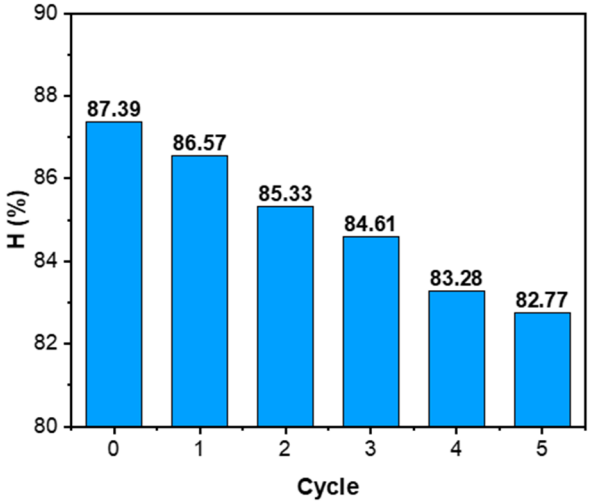

Figure S2: The reusability of AC as adsorbent for the removal of MB dye.