

# A Selective, Efficient, Facile, and Reusable Natural Clay/Metal Organic Framework as a Promising Adsorbent for the Removal of Drug Residue and Heavy Metal Ions

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Figure S1. Calibration curve for Safinamide detection using UV-VIS spectrophotometer.

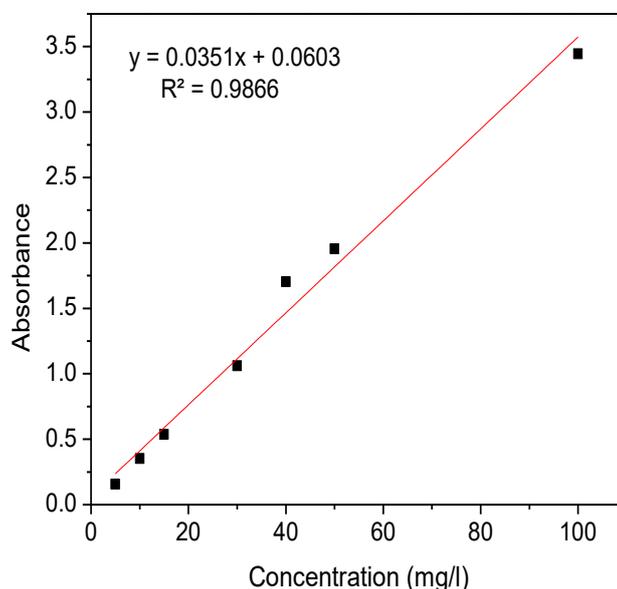


Table S1. Isotherm models investigated in this study.

<b>Langmuir isotherm model</b>	$q_e = q_{\max} \frac{K_L C_e}{1 + K_L C_e}$ <p>where <math>C_e</math> (mg/L) is the equilibrium aqueous-phase concentration of adsorbate, <math>q_e</math> (mg/g) is the quantity of adsorbed substances, <math>q_{\max}</math> (mg/g) is the maximum adsorption capacity, and <math>K_L</math> (L/mg) is the Langmuir constant related to the adsorption rate.</p>	(1)
<b>Freundlich isotherm model</b>	$q_e = K_f C_e^{1/n}$	(2)

	where $K_f$ is the Freundlich constant that provides data concerning the adsorption capacity of adsorbed particles onto an adsorbent surface, and $n$ is the Freundlich constant. $1/n$ provides information regarding surface heterogeneity and adsorption intensity.
<b>Langmuir–Freundlich isotherm</b>	$qe = \frac{q_{MLF}(K_{LF}C_e)^{MLF}}{1+(K_{LF}C_e)^{MLF}},$ where $q_{MLF}$ is the Langmuir–Freundlich maximum adsorption capacity (mg/g), $K_{LF}$ is the constant of a heterogeneous solid at equilibrium, and $MLF$ represents the heterogeneity parameter. (3)
<b>Sips isotherm model</b>	$qe = \frac{q_{max}K_s C_e^{1/n}}{1+K_s C_e^{1/n}},$ where $q_{max}$ is the adsorption capacity (mg/g), $K_s$ is the Sips constant attached to adsorption energy, and $1/n$ is the sips isotherm exponent. (4)
<b>Toth isotherm model</b>	$qe = \frac{K_e C_e}{(1+K_L C_e^n)^{1/n}},$ where $K_L$ and $n$ are Toth isotherm constants (mg/g). (5)
<b>Temkin isotherm model</b>	$q = \left(\frac{RT}{b_t}\right) \ln A_t + \left(\frac{RT}{b_t}\right) \ln C_e,$ where $A_t$ is the equilibrium binding constant (L/mg), $b_t$ is the Temkin heat of the adsorption constant, $R$ represents the gas constant, and $T$ represents the temperature of the system. (6)
<b>Redlich–Peterson isotherm model</b>	$qe = \frac{K_R C_e^{1/n}}{1+a_R C_e^\beta},$ where $\beta$ is an exponent, and $K_R$ (L/g) and $a_R$ (L/mg) are Redlich–Peterson isotherm constants. (7)
<b>Kahn isotherm model</b>	$qe = \frac{Q_m b_K C_e}{(1+b_K C_e)^{a_K}},$ where $a_K$ is the Kahn isotherm model exponent, $b_K$ is the Khan isotherm model constant, and $Q_m$ is the Khan isotherm maximum adsorption capacity (mg/g). (8)
<b>Fritz–Schlunder isotherm model</b>	$qe = \frac{q_{mFSS} K_1 C_e^{m_1}}{1+K_2 C_e^{m_2}},$ where $q_{mFSS}$ is the Fritz–Schlunder maximum adsorption capacity (mg/g), and $K_1, K_2, m_1,$ and $m_2$ are Fritz–Schlunder parameters. (9)

**Table S2.** Adsorption kinetics equations investigated for non-linear regression of kinetic data.

Model	Description
<b>Pseudo first-order [94]</b>	$q_t = q_e(1 - e^{-K_1 t}),$ where $q_t$ is the adsorption capacity (mg g <sup>-1</sup> ) at time $t$ (min), $q_e$ is the adsorption capacity (mg g <sup>-1</sup> ) at equilibrium, and $k_1$ is the pseudo first-order rate constant (min <sup>-1</sup> ). (S10)
<b>Pseudo second-order [95]</b>	$q_t = \frac{q_e^2 K_2 t}{1+q_e K_2 t},$ where $k_2$ is the pseudo second-order rate constant (min <sup>-1</sup> ). (S11)
<b>Intraparticle diffusion [96]</b>	$q_t = K_{ip} \sqrt{t} + C_{ip},$ where $k_{ip}$ is the measure of the diffusion coefficient (mg g <sup>-1</sup> min <sup>-1/2</sup> ), and $C_{ip}$ is the interparticle diffusion constant (mg g <sup>-1</sup> ). (S12)
<b>Mixed 1- and 2-order model [97,98]</b>	$q_t = q_e \frac{1 - \exp(-kt)}{1 - f_2 \exp(-kt)},$ where $f_2$ is the mixed 1,2 order coefficient, and $k$ is the adsorption rate constant (mg g <sup>-1</sup> min <sup>-1</sup> ). (S13)
<b>Avrami model [99]</b>	$q_t = q_e(1 - \exp(-K_{av} t)^{n_{av}}),$ where $k_{av}$ is the Avrami rate constant (min <sup>-1</sup> ), and $n_{av}$ is the Avrami component. (S14)