

Table 1 Adsorption kinetic models and corresponded parameters.

Kinetic models	Model	Main parameters
Pseudo-first order	$q_t = q_e(1 - e^{-K_1 t})$	K_1 means adsorption rate constant (1/min).
Pseudo-second order	$\frac{t}{q_t} = \frac{1}{q_e^2 K_2} + \frac{t}{q_e}$	K_2 is adsorption rate constant (1/min).
Intraparticle diffusion	$q_t = K_3 \sqrt{t} + C$	K_3 means rate constant (mg/g min ^{1/2}). C is a constant.