Supplementary (Table S2)

Table S2. Nonlinear equations of kinetic models.

Kinetic model name	Description	Equations	Reference
Pseudo First Order	Assumes that the bonding between sorbate and sorbent is caused by hydrogen bonds and Van der Waals forces meaning that the reaction is more likely to be physisorption.	$Q_t = Q_e(1 - e^{(-K_1 t})$	Wong, Szeto et al. 2004
Pseudo Second Order	Assumes that the electrons are covalently exchanged or shared between sorbate and sorbent meaning that the reaction is more likely to be chemisorption.	$Q_t = \frac{Q_e^2 K_2 t}{(1 + Q_e K_2 t)}$	Ho and McKay 1998; Ho and Mckay 1999
Elovich	This model is commonly used to describe the kinetics of adsorption of gas substances which is held by chemical bonds onto heterogeneous solids. This model has been used in the recent years to describe the transfer of contaminants from the aqueous solution phase to the solid phase.	$Q_t = \frac{1}{\beta} Ln(\alpha\beta_t)$	Wu *et al.* 2013
Avrami	This model describes the kinetics of crystallization, such as the solid transformation from one phase to another at constant temperature. This model can also take into consideration other changes of phase in materials, such as chemical reaction rates.	$Q_t = Q_e(1 - e^{(-K_{av} t^{n_{av}}})$	Farag, Elshfai et al. 2018
Intraparticle model	Assumes that the adsorbate can transport from the aqueous solution phase to the solid phase of GT-nZVI through an intraparticle diffusion process. This model takes into consideration the mass transfer resistance inside the adsorbent particles, but neglects film diffusion.	$Q_t = K_{id} t^{0.5} + C_i$	Lin et al. 2011; Wu *et al.* 2013

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