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Letter to the Editor

Comments on "Adsorptive removal of cadmium(II) ions from liquid phase using acid modified carbon-based adsorbents"

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Dear Editor,

Recently, Ihsanullah et al. [1] published the paper entitled "Adsorptive removal of cadmium(II) ions from liquid phase using acid modified carbon-based adsorbents". In the "2.7. Kinetic modelling" section of the original paper, the authors had mentioned that "The adsorption of Cd(II) was analysed using the following pseudo-first-order, second-order and pseudo-second-order rate equations:" by using Eqs. (5) to (7).

Pseudo-first order

$$\log(q_e - q_t)/q_e = -K_L t/2.303 \tag{5}$$

Second order

$$1/(q_e - q_t) = 1/q_e + kt \tag{6}$$

Pseudo-second order

$$t/q_t = 1/2K_s q_e^2 + t/q_e \tag{7}$$

In fact, Eqs. (6) and (7) are the same when constant $2K_S = k$ [2]. Details are shown as follows:

$$\begin{aligned}
\frac{1}{q_e - q_t} &= \frac{1}{q_e} + kt \\
\frac{1}{q_e - q_t} &= \frac{1 + kq_e t}{q_e} \\
q_e - q_t &= \frac{q_e}{1 + kq_e t} \\
q_t &= q_e - \frac{q_e}{1 + kq_e t} \\
q_t &= \frac{(1 + kq_e t)q_e - q_e}{1 + kq_e t} \\
q_t &= \frac{q_e + kq_e^2 t - q_e}{1 + kq_e t} \\
q_t &= \frac{kq_e^2 t}{1 + kq_e t} \\
\frac{1}{q_t} &= \frac{1}{kq_e^2 t} + \frac{1}{q_e} \\
\frac{t}{q_t} &= \frac{1}{kq_e^2} + \frac{t}{q_e}.
\end{aligned} \tag{6}$$

Eq. (6) is not second order but it is pseudo-second order kinetic model [2]. Eq. (7) is an incorrect pseudo-second order kinetic model [3,4].

All related discussion in the original paper [1] would not be appropriate. In order to stop the proliferation of the mistake a comment has been made [5]. This type of error could be avoided if authors have had paid more attention to details about the model from the original paper.

References

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