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Letter to the Editor

Affinity adsorption of lysozyme with Reactive Red 120-modified magnetic chitosan microspheres

Dear Sir

Recently, Li et al. published the paper entitled "Affinity adsorption of lysozyme with Reactive Red 120-modified magnetic chitosan microspheres" (Li et al., 2014).

In the Section 3.2.3. Kinetics, the authors presented a pseudo first-order kinetic model:

$$\frac{1}{q_t} = \frac{k_1}{q_m t} + \frac{1}{q_m} \tag{1}$$

In 1898, Lagergren presented the first order rate equation for the adsorption of oxalic acid and malonic acid onto charcoal (Lagergren, 1898). In order to distinguish kinetics equation based on concentration of solution and adsorption capacity of solid, Lagergren's first order rate equation has been called "pseudo-first order" since 1998 (Ho & McKay, 1998a, 1998b). Details of the Lagergren rate equation for adsorption reactions were published in 2004 (Ho, 2004). The most popular form used is:

$$\log(X - x) = \log(X) - \frac{k}{2.303} t \tag{2}$$

A review of second-order models for adsorption systems has also been presented in detail (Ho, 2006b). The correct expression for the pseudo-second order kinetic model was reported by Ho and McKay (1998a, 1998b) and may be written as:

$$\frac{t}{q_t} = \frac{1}{k q_e^2} + \frac{1}{q_e} t, \tag{3}$$

However Eq. (1) is the same as Eq. (3). Thus results in "Affinity adsorption of lysozyme with Reactive Red 120-modified magnetic chitosan microspheres" might not be correct.

In the same section, the authors also presented a pseudo second-order kinetic model without any citations:

$$\frac{t}{q_t} = \frac{1}{k_2 q_m^2} + \left(\frac{1}{q_m}\right) t \tag{4}$$

In fact, the pseudo-second-order kinetic expression for the adsorption systems of divalent metal ions, using sphagnum moss peat, has already been presented (Ho, 1995). The pseudo-second order kinetic model has a non-linear form $q_t = \frac{q_e^2 kt}{1 + q_e kt}$ and four linear forms, namely $\frac{t}{q_t} = \frac{1}{kq_e^2} + \frac{1}{q_e} t$, $\frac{1}{q_t} = \left(\frac{1}{kq_e^2}\right)\frac{1}{t} + \frac{1}{q_e}$, $q_t = q_e - \left(\frac{1}{kq_e}\right)\frac{q_t}{t}$, and $\frac{q_t}{t} = kq_e^2 - kq_e q_t$ (Ho, 2006a). The model was also used in numbers of adsorption systems in subsequent years (Ho, 2005). A review of second-order models for adsorption systems gave more details (Ho, 2006b). Furthermore, an article, entitled "pseudo-second order model for sorption processes" by Ho and McKay (1999), has been ranked top in annual citations, in the Web of Science category of chemical engineering since 2008 (Ho, 2012).

In order to stop the proliferation of the mistake of the pseudo-first order model, a comment has been made (Ho, 2004). Citing the original paper not only respects the work of the authors who presented a novel research idea but would also focus on this idea, in detail, in the body of their paper. When a scientific publication duplicates previously published ideas, text, equations, or figures without any citations, it is frequently regarded as a sign of possible plagiarism (Noè & Batten, 2006). In my view, Li et al. should have cited the original paper for the pseudo-first and pseudo-second order kinetic models and thereby providing greater accuracy and information details about the kinetic expression that they employed.

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Yuh-Shan Ho *

Water Research Centre, Asia University, Taichung 41354, Taiwan

* Tel.: +886 4 2332 3456x1797; fax: +886 4 2330 5834.

E-mail address: ysho@asia.edu.tw

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