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## Using of “pseudo-second-order model” in adsorption

Yuh-Shan Ho

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**Abstract** A research paper's contribution exists not only in its originality and creativity but also in its continuity and development for research that follows. However, the author easily ignores it. Citation error and quotation error occurred very frequently in a scientific paper. Numerous researchers use secondary references without knowing the original idea from authors. Sulaymon et al. (Environ Sci Pollut Res 20:3011–3023, 2013) and Spiridon et al. (Environ Sci Pollut Res 20:6367–6381, 2013) presented wrong pseudo-second-order models in *Environmental Science and Pollution Research*, vol. 20. This comment pointed the errors of the kinetic models and offered information for citing original idea of pseudo-second-order kinetic expression. In order to stop the proliferation of the mistake, it is suggested to cite the original paper for the kinetic model which provided greater accuracy and more details about the kinetic expression.

**Keywords** Pseudo-second-order model · Adsorption · Kinetics · Secondary references · Citation errors · Quotation errors

In *Environmental Science and Pollution Research*, vol. 20, two articles, entitled “Competitive biosorption of lead, cadmium, copper, and arsenic ions using algae” (Sulaymon et al. 2013) and “Phenol removal from wastewater by adsorption on zeolitic composite” (Spiridon et al. 2013), presented the equation of “pseudo-second-order model” and cited secondary references. Both equations cannot be found in the cited reference and are not correct.

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Y.-S. Ho (✉)  
Water Research Centre, Asia University, Taichung 41354, Taiwan  
e-mail: ysho@asia.edu.tw

In the paper by Sulaymon et al. (2013), authors noticed that “while the linearized form of the pseudo-second-order equation is as follows (Fu and Viraraghavan 2002):”

$$\frac{t}{q_t} = \frac{1}{k_2 \cdot q_e} + \frac{t}{q_e}$$

In the paper by Spiridon et al. (2013), authors noticed that “the pseudo-second-order model is represented by Eq. (11) (Alzaydien and Manasreh 2009):”

$$\frac{t}{q_t} = \left( \frac{1}{k_2} q_e^2 \right) + \frac{1}{q_e} t \quad (11)$$

The pseudo-second-order kinetic expression for the adsorption systems of divalent metal ions using sphagnum moss peat has been presented (Ho 1995). The pseudo-second-order kinetic model has a nonlinear form  $q_t = \frac{q_e^2 kt}{1+q_e kt}$  and four linear forms such as  $\frac{t}{q_t} = \frac{1}{kq_e^2} + \frac{1}{q_e} t$ ,  $\frac{1}{q_t} = \left( \frac{1}{kq_e^2} \right) \frac{1}{t} + \frac{1}{q_e}$ ,  $q_t = q_e - \left( \frac{1}{kq_e} \right) \frac{q_t}{t}$ , 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).

One common mistake is to cite papers that are devoid of the original information, but have used the original information of others to develop their own arguments (Taylor and Brown, 2001). A number of researchers pointed out that the rates of citation and quotation errors are unacceptably high in journals, which significantly diminishes the value of the reference list (Roach et al. 1997; Siebers 2000). The reference section was of great importance to the researchers who were interested in a publication's paper and would like to follow the study or gain further useful information in this specialty (Ho 2004). Authors should make serious efforts to check the accuracy of the references cited in their manuscripts. They should also read the original article before quoting it, rather than citing from

abstracts or cross-references (Gupta et al. 2005). It has also been strongly urged that the peer review of citation and quotation accuracy should be strengthened (Lee and Lee 1999). In my view, Sulaymon et al. and Spiridon et al. should have cited the original paper for the pseudo-second-order model and thereby provided greater accuracy and information details about the kinetic expression they employed.

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