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DISCUSSION

Comment on "Genetic characterization, nickel tolerance, biosorption, kinetics, and uptake mechanism of a bacterium isolated from electroplating industrial effluent"[1]

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Recently, Nagarajan et al. (2015) published the paper entitled "Genetic characterization, nickel tolerance, biosorption, kinetics, and uptake mechanism of a bacterium isolated from electroplating industrial effluent". In the "Kinetic studies" section of the original paper, the authors mentioned that "The linear form of pseudo-first- and pseudo-second-order kinetic equations is given as follows:"

$$\log(q_e - q_t) = \log(q_e) \times (k_1 t/2.303) \quad (7)$$

$$t/q = \left(kt/k_2 q_e^2\right) + (t/q_e) \quad (8)$$

and provided these equations without appropriate citations.

Equation (7) is not correct. In fact, it is Lagergren (1898) who first presented the first-order rate equation for the adsorption of oxalic acid and malonic acid onto charcoal. To distinguish kinetics equation based on adsorption capacity of solid from concentration of solution, Lagergren's first-order rate equation has been called pseudo-first order since 1998 (Ho and McKay 1998). In addition, a citation review of Lagergren's kinetic rate equation on adsorption reactions has been presented by Ho (2004*a*).

Plagiarism is defined as when the authors of a scientific publication duplicate previously published idea, text, or figures in the scientific literature without any citations (Noè and Batten 2006). It is worth stating that "To cite the original paper is not only respecting authors who presented a novel idea in research but also to read the original idea in detail of the work" (Ho 2010*a*).

The pseudo-second-order kinetic equation eq. (8) in the paper by Nagarajan et al. (2015) is incorrect. The pseudo-second-order kinetic expression for the adsorption systems of divalent metal ions using sphagnum moss peat was presented by Ho in 1995 (Ho 1995). The pseudo-second-order kinetic model has a nonlinear form

$$q_t = \frac{q_e^2 kt}{1 + q_e kt}$$

and the following 4 linear forms (Ho 2006*a*):

$$\frac{t}{q_t} = \frac{1}{kq_e^2} + \frac{t}{q_e},$$

$$\frac{1}{q_t} = \left(\frac{1}{kq_e^2}\right)\frac{1}{t} + \frac{1}{q_e},$$

$$q_t = q_e - \left(\frac{1}{kq_e}\right)\frac{q_t}{t},$$

and

$$\frac{q_t}{t} = kq_e^2 - kq_e q_t$$

The model has also been widely used for describing a number of adsorption systems in subsequent years (Ho 2004*b*). Furthermore, an article entitled "Pseudo-second order model for sorption processes" by Ho and McKay (1999) has ranked number one in annual citations in the Web of Science category of "Chemical Engineering" since 2008 (Ho 2012). A review of second-order models for adsorption systems gave more details (Ho 2006*b*).

This type of error could be avoided if authors paid more attention to details about the model from the original paper. It is worth stating that "Citing the original paper not only respects the work of the authors who presented a novel research idea but also discussed this idea in detail in the body of their paper" (Ho 2010*b*). In addition, typical isotherms, such as Brunauer–Emmett–Teller (BET) (Brunauer et al. 1938), Langmuir (Langmuir

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1918), and Freundlich (Freundlich 1906), have witnessed increased trends in citations especially in the last 2 decades (Fu and Ho 2014; Ho and Kahn 2014). In my view, Nagarajan et al. (2015) should have cited the original paper for the pseudo-first-order and pseudo-second-order rate equations and thereby provided greater accuracy and detail about the kinetic expression they employed.

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