

Letter to the editor

## Comments on “An adsorption and kinetic study of lac dyeing on silk”

Recently, Chairat et al. [1] published the paper entitled as above. In Section 3.3. Kinetics of adsorption, the authors mentioned that “a simple kinetic analysis of adsorption is the pseudo first-order rate expression of the Lagergren equation” using Eqs. (8) and (9) in the paper and cited 3 papers as secondary references. In the first reference [2], there are errors in the citation of reference for the first-order rate equation of Lagergren. In the second reference [3], the authors discussed the first-order rate equation of Lagergren in their publication without citing Lagergren’s paper or any other references. In the last reference [4], the authors cited 2 papers published by Ho and McKay [5,6] for pseudo-first-order rate equation as secondary references but did not mention Lagergren. A citation review of the Lagergren rate equation for adsorption reactions has been presented [7]. The correct reference citing the original Lagergren paper was first presented by Ho and McKay in 1998 [5,8–10]; “S. Lagergren, Zur theorie der sogenannten adsorption gelöster stoffe, *Kungliga Svenska Vetenskapsakademiens. Handlingar*, Band 24, No. 4, (1898), 1–39. [11]” Its English translation is “S. Lagergren, About the theory of so-called adsorption of soluble substances, *Kungliga Svenska Vetenskapsakademiens. Handlingar*, Band 24, No. 4, (1898), 1–39.” and the abbreviated style is “S. Lagergren, Zur theorie der sogenannten adsorption gelöster stoffe. *K. Sven. Vetenskapsakad. Handl.*, Band 24, No. 4, (1898), 1–39.” In order to distinguish a kinetics equation based on the adsorption capacity of a solid from the one based on the concentration of a solution, Lagergren’s first-order rate equation has been called pseudo-first-order [5,8–10]. Ho pointed that Lagergren’s equation has been widely cited, but there are far more mistakes made in the quotation and in the reference section of papers, including the title, the author’s name, journal title, year of publishing, volume, and page number [7]. It is clear that most of the papers citing Lagergren’s original paper published in 1898 are incorrect. However, numerous researchers use secondary references without knowing that mistakes have already been made in their source of references, such as taking references straight from secondary references.

In the same Section 3.3. Kinetics of adsorption, the authors mentioned the pseudo-second-order equation based on adsorption equilibrium capacity, using Eqs. (10)–(12) in the paper and cited the same 3 papers as secondary references as in the case of pseudo-first-order equation. In the first reference [2], there are errors in the quotation and the citation of reference for the pseudo-second-order rate equation. In the paper, authors even have cited a pseudo-first-order equation paper [12] to be a reference of pseudo-second-order rate equation. In the second reference [3], the authors only discussed the first-order rate equation of Lagergren in their paper without mentioning anything about pseudo-second-order rate equation. In the last reference [4], the authors cited 2 papers published by Ho and McKay [5,13] for pseudo-second-order rate equation. In addition, Chairat et al. also mentioned the initial adsorption rate, using Eq. (13) in the paper and cited a secondary reference for the initial adsorption rate. In the reference [14], there is an error of the order of authors in the citation of reference. Indeed, the second order kinetic expression for the adsorption systems of divalent metal ions using sphagnum moss peat has been reported by Ho [15]. At the same time Ho has presented a definition for the initial sorption rate,  $h$ , from the pseudo-second order equation. To distinguish the kinetic equation based on the adsorption capacity of a solid from the concentration of the solution, the second-order rate expression has been named pseudo-second-order [5,6,8–10,13–31]. The earlier application of the pseudo-second-order equation to the kinetic studies of competitive heavy-metal adsorption by sphagnum moss peat was undertaken by Ho et al. [16]. A modified pseudo-second-order kinetic expression was reported in 1997 [17] and has also been presented in the following years [5,6,8–10,13,18–31]. In addition, Azizian [18] presented a theoretical analysis of pseudo-second-order equations. The most frequently cited pseudo-second-order kinetic expression papers were published in *Environmental Technology* [16], *Process Safety and Environmental Protection* [5,8], *Journal of Environmental Science and Health Part A-Toxic/Hazardous Substances & Environmental Engineering* [6],

*Chemical Engineering Journal* [9], *Resources, Conservation and Recycling* [19], *Process Biochemistry* [20], *Water Research* [13], and *Adsorption-Journal of the International Adsorption Society* [21]. Moreover, similar comments have also been published in *Adsorption Science & Technology* [22], *Journal of Colloid and Interface Science* [23–25], *Journal of Chemical Technology and Biotechnology* [26], *Biochemical Engineering Journal* [27], *Bioresource Technology* [28], *Environmental Science & Technology* [29], *Water Research* [30], *Fresenius Environmental Bulletin* [31], and *Industrial & Engineering Chemistry Research* [32]. The pseudo-second-order rate expression of Ho has been widely applied to the sorption of metal ions, dyes, herbicides, oil, pesticide, and organic substances from aqueous solutions [22–32].

Citation errors tend to perpetuate themselves so that once entered into the literature they can be difficult to eradicate. A classic error of Lagergren equation that occurred in the adsorption field has been reported [7]. The error was repeated and indeed, expanded upon, until 1998 when Ho and McKay presented correct citation style in their publication. Errors of this type still occur, as some authors do not see whether the correct one has been published and also do not read the original Lagergren's paper.

Accuracy in referencing is important for the transmission of scientific knowledge. It is imperative that they should be written properly to make searching easy for following up researches. Poor referencing reflects on the article, the authors, and the journal itself. It can be a source of frustration to the reader, particularly when major errors are present [33]. However, an unacceptable rate of citation and quotation errors has been found in the literature [33–36]. Greater emphasis and responsibility must be placed on authors to check the accuracy of cited references in their submitted manuscripts [35]. Reviewers should also take the responsibility for this section of the manuscript. Finally the journal editors have to insist on reference accuracy in article accepted for publication [34]. I suggest that Chairat et al. cite Lagergren's pseudo-first-order kinetic model paper and Ho's original pseudo-second-order kinetic expression paper.

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