

Comments on using of “pseudo-second-order rate equation” in *Journal of Radioanalytical and Nuclear Chemistry*, Volume 283

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Accuracy of referencing is important for the transmission of scientific knowledge. However, an unacceptable rate of citation and quotation errors has been found in the literature [1, 2]. Greater emphasis and responsibility must be placed on authors to check the accuracy of cited references in their submitted manuscripts [2]. In *Journal of Radioanalytical and Nuclear Chemistry*, Volume 283, two articles, entitled “influence of contact time, pH, soil humic/fulvic acids, ionic strength and temperature on sorption of U(VI) onto MX-80 bentonite” [3] and “effect of pH, fulvic acid and temperature on sorption of Th(IV) on zirconium oxophosphate” [4], presented a “pseudo-second-order rate equation,” but cited 2 and 3 secondary material, respectively, as references.

In these two articles, the authors presented the “pseudo-second-order rate equation” with equation $\frac{t}{q_t} = \frac{1}{2kq_e^2} + \frac{t}{q_e}$ while in fact, the definition of the equation for the adsorption systems of divalent metal ions using sphagnum moss peat has been presented by Ho [5], and this expression has also been published in 1996 [6]. A modified equation was presented in 1998 to correct a mistake in the previous paper published in 1996 [7, 8]. Two most suggested papers for the pseudo-second-order kinetic equation were published in 1984 and 1995 by Blanchard et al. [10] and Ho [5, 9], respectively. Blanchard et al. noticed the overall exchange reaction of NH_4^+ ions fixed in zeolite by divalent metallic ions in the solution using a second-order kinetic model $\frac{1}{(n_0-n)} - \alpha = Kt$ where n is amount of M^{2+} fixed or the amount of NH_4^+ released at each instant, n_0 is exchange capacity, and K is rate constant [10]. Ho used the

pseudo-second-order kinetic model to the divalent metal ions/sphagnum moss peat adsorption system. The adsorption involved not only cation exchange but also chemical bonding [5, 11]. 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 such as $\frac{t}{q_t} = \frac{1}{kq_e^2} + \frac{t}{q_e}$, $\frac{1}{q_t} = \left(\frac{1}{kq_e^2}\right)\frac{1}{t} + \frac{1}{q_e}$, $q_t = q_e - \left(\frac{1}{kq_e}\right)\frac{q_t}{t}$, and $\frac{q_t}{t} = kq_e^2 - kq_e q_t$ [12].

I would suggest that Ren et al. and Qian et al. should cite the original research articles that presented the pseudo-second-order rate equation to provide accurate and detail information about kinetic expression for readers who wish to follow up the research.

References

1. Roach VJ, Lau TK, Kee WDN (1997) Am J Obstet Gynecol 177:973
2. Siebers R (2000) J Allergy Clin Immunol 105:837
3. Ren XM, Wang SW, Yang ST, Li JX (2010) J Radioanal Nucl Chem 283:253
4. Qian LJ, Zhao JN, Hu PZ, Geng YX, Wu WS (2010) J Radioanal Nucl Chem 283:653
5. Ho YS (1995) Ph.D. Thesis, University of Birmingham, Birmingham
6. Ho YS, Wase DAJ, Forster CF (1996) Environ Technol 17:71
7. Ho YS, McKay G (1998) Chem Eng J 70:115
8. Ho YS, McKay G (1998) Process Saf Environ Prot 76B:332
9. Ho YS (2006) J Hazard Mater 136:681
10. Blanchard G, Maunay M, Martin G (1984) Water Res 18:1501
11. Ho YS, McKay G (2000) Water Res 34:735
12. Ho YS (2006) Water Res 40:119

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