

LETTER TO THE EDITOR

COMMENTS ON "ISOTHERMIC AND KINETIC MODELING OF FLUORIDE REMOVAL FROM WATER BY MEANS OF THE NATURAL BIOSORBENTS SORGHUM AND CANOLA"

Dear Editor,

Recently, Zazouli et al.¹ published a paper entitled "Isothermic and kinetic modeling of fluoride removal from water by means of the natural biosorbents sorghum and canola." In the MATERIAL AND METHODS section of their paper, the authors mentioned that the pseudo-second-order rate equation has been given by the following equation:

$$\frac{t}{q} = \frac{1}{k_2 q_e^2} + \frac{1}{q_e t}$$

where k_2 is the second order rate constant ($\text{g mg}^{-1} \text{min}^{-1}$), and q and q_e are the amount of F adsorbed on the adsorbent (mg/g) at equilibrium and at time t , and gave a self-citation of secondary material² as a reference.

However, the equation in the cited paper is incorrect. In addition, a citation error was present in the reference to Zazouli et al.² as the correct page numbers are 195-204 rather than 208-17.

In fact, the pseudo-second-order kinetic expression for the adsorption systems of divalent metal ions using sphagnum moss peat was presented by Ho in 1995.³ The pseudo-second-order kinetic model has a non-linear form:⁴

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

and the following four linear forms:⁴

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

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

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

$$\frac{q_t}{t} = k q_e^2 - k q_e q_t$$

The model has also been widely used for describing a number of adsorption systems in subsequent years.⁵ Furthermore, an article entitled "Pseudo-second order model for sorption processes" by Ho and McKay⁶ has been ranked number one in annual citations in the Web of Science category of "Chemical Engineering" since 2008.⁷ A review of second-order models for adsorption systems gave more details.⁸

Furthermore, the mistake in the model made by Zazouli et al. in their 2014 paper in *Journal of Mazandaran University Medical Sciences*² was also repeated that year in another paper in *Fluoride*.⁹

It is worth stating again 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."¹⁰ In addition, typical isotherms such as BET,¹¹ Langmuir,¹² and Freundlich¹³ have all witnessed increased trends in citations, especially in the last two decades.^{14,15} In my view, Zazouli *et al.* should have cited the original paper for the pseudo-second-order kinetic model, which would have provided greater accuracy and additional information about the kinetic expression they used.

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REFERENCES

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- 2 Zazouli MA, Belarak D, Karimnezhad F, Khosravi, F. Removal of fluoride from aqueous solution by using of adsorption onto modified *Lemna minor*: adsorption isotherm and kinetics study. *Journal of Mazandaran University Medical Sciences* 2014;23(109):195-204.
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- 6 Ho YS, McKay G. Pseudo-second order model for sorption processes. *Process Biochemistry* 1999;34(5):451-65.
- 7 Ho YS. Top-cited articles in chemical engineering in Science Citation Index Expanded: a bibliometric analysis. *Chinese Journal of Chemical Engineering* 2012;20(3):478-88.
- 8 Ho YS. Review of second-order models for adsorption systems. *Journal of Hazardous Materials* 2006;136(3):681-9.
- 9 Zazouli MA, Mahvi AH, Dobaradaran S, Barafrashtehpour M, Mahdavi Y, Balarak, D. Adsorption of fluoride from aqueous solution by modified *Azolla filiculoides*. *Fluoride* 2014;47(4):349-58.
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CORRECTIONS

Isothermic and kinetic modeling of fluoride removal from water by means of the natural biosorbents sorghum and canola by Mohammad Ali Zazouli, Amir Hossein Mahvi, Yousef Mahdavi, and Davoud Balarak in *Fluoride* 2015;48(1):37-44. The page numbers for reference 24, by Zazouli MA, Balarak D, Karimnezhad F, and Khosravi F, Removal of fluoride from aqueous solution by using of adsorption onto modified *Lemna minor*: adsorption isotherm and kinetics study, *Journal of Mazandaran University Medical Sciences* 2014;23(109), should have been 195-204 rather than 208-17. The pseudo-second-order rate equation on page 40 should have been

$$\frac{t}{q} = \frac{1}{k_2 q_e^2} + \frac{t}{q_e}$$

where k_2 is the second order rate constant ($\text{g mg}^{-1} \text{min}^{-1}$), and q and q_e are the amount of F adsorbed on the adsorbent (mg/g) at equilibrium and at time t , rather than

$$\frac{t}{q} = \frac{1}{k_2 q_e^2} + \frac{1}{q_e t}$$

Similarly, in Adsorption of fluoride from aqueous solution by modified *Azolla filiculoides* by Mohammad Ali Zazouli, Amir Hossein Mahvi, Sina Dobaradaran, Mansour Barafrashtehpour, Yusef Mahdavi, and Davoud Balarak in *Fluoride* 2014;47(4):349-58, the page numbers for reference 21, by Zazouli MA, Balarak D, Karimnezhad F, and Khosravi F, Removal of fluoride from aqueous solution by using of adsorption onto modified *Lemna minor*: adsorption isotherm and kinetics study, *Journal of Mazandaran University Medical Sciences* 2014;23(109), should have been 195-204 rather than 208-17 and the pseudo-second-order rate equation in Table 1 on page 351 should also have the same correction as above.

Dr Balarak indicated that the correct form of the pseudo-second-order rate equation was used in the calculations in his two papers.

I apologize for the errors.

Bruce Spittle, Editor-in-Chief, *Fluoride*.