

Discussion

Comments on “Biosorption of nickel from protonated rice bran”

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**Abstract**

This letter explains the appropriate way to calculate the parameters in pseudo first and second order kinetics, Langmuir and Freundlich isotherm. © 2007 Elsevier B.V. All rights reserved.

**Keywords:** Sorption; Kinetics; Isotherm

Table 1  
Isotherm and kinetic expressions for sorption systems

Models/expression	Reported in the paper by Zafar et al. [1]	Correct expression/model	Reference
Lagergren pseudo first order kinetics	$\log(q_e - q) = \log(q_e) - k_1 t/2.303$	$\log(q_e - q) = \log(q_e) - k_1 t/2.303$	[2]
Pseudo second order kinetics	$t/q = 1/k_2 q_e^2 + 1/tq_e$	$t/q = 1/k_2 q_e^2 + t/q_e$	[3]
Freundlich	$\log(q_e) = \log(K_F) + 1/n \log(C_e)$	$\log(q_e) = \log(K_F) + 1/n \log(C_e)$	[4]
Langmuir	$C_e/q_e = 1/K_L q_0 + 1/C_e q_0$	$C_e/q_e = 1/K_L q_0 + C_e/q_0$	[5]

Recently Zafar et al. [1] had published the paper entitled above. In the published paper, it was found that the widely used kinetic and isotherm expressions such as Lagergren pseudo first order kinetics, pseudo second order kinetics, Freundlich isotherm and Langmuir isotherm were incorrectly formulated as in Table 1. The authors are encouraged to address this issue in terms of whether the forms of these equations simply represent typographical errors in the published paper or, more significantly, the incorrect forms of the equations were actually used in the analysis. Table 1 also suggests the correct expressions of Freundlich, Langmuir, pseudo first order and pseudo second order kinetics. Thus, it will be appreciated and more informative if the authors to reconsider and recalculate the kinetic and isotherm parameters using the correct expression as given in Table 1 of this communication.

In addition, in the above referred paper [1], second hand references are cited for pseudo first order kinetics, Langmuir isotherm and Freundlich isotherm. Thus, it is also suggested to cite the original papers by Lagergren and Sven [2], Langmuir [5] and Freundlich [4] to explain the pseudo first order kinetics, Langmuir isotherm and Freundlich isotherm, respectively.

**References**

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