Available online at www.sciencedirect.com
SCIENCE DIRECT®
Journal of Colloid and Interface Science 272 (2004) 249–250
Journal of Colloid and Interface Science
www.elsevier.com/locate/jcis

Letter to the Editor

Comment on "An alternative Avrami equation to evaluate kinetic parameters of the interaction of Hg(II) with thin chitosan membranes," by E.C.N. Lopes, F.S.C. dos Anjos, E.F.S. Vieira, and A.R. Cestari

Yuh-Shan Ho

School of Public Health, Taipei Medical University, No. 250, Wu-Hsing Street, Taipei, Taiwan

Received 7 October 2003; accepted 12 December 2003

Abstract

A history of using and applying Ho's pseudo-second-order kinetic expression for adsorption systems is presented. A reference section in a paper is important to researchers interested in the paper's statement and in following the study or finding useful information from the paper. This section is as important as the core of a paper. This comment offers information on citing the original idea of pseudo-second-order kinetic expression.

In a recent publication [1], in Section 3.1, Kinetics of adsorption, Lopes et al. mentioned a pseudo-second-order mechanism, Eqs. (7)–(9). In fact, it was Ho [2] who first developed a pseudo-second-order kinetic expression for the sorption of divalent metal ions using sphagnum moss peat. 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. [3], and adsorption of lauryl benzyl sulfonate on algae by Fernadez et al. [4].

The pseudo-second-order rate expression of Ho has also been applied to the sorption of metal ions, dyes, and organic substances from aqueous solutions (Table 1). In addition, discussion of the reaction order has been reported, such as the comparison of chemisorption kinetic models [5] and pseudo-second-order models [6]. Furthermore, Ho's kinetic expression has also been applied to a multistage batch sorption design [7] and a two-stage batch sorption optimized design [8]. Numerous applications of Ho's kinetic expression have been reported in recent years. A list of pseudo-second-order systems is given in Table 1.

I suggest that Lopes et al. should have cited Ho's original pseudo-second-order kinetic expression paper.

Table 1
Pseudo-second-order kinetic models of various related systems from the literature

Sorbent	Sorbate	References
Sphagnum moss peat	Cu(II), Ni(II)	[3]
Algae	Lauryl benzyl sulfonate	[4]
2-Mercaptobenzimidazole–clay	Hg(II)	[9]
Activated carbon	Hg(II)	[10]
Activated carbon	Pb(II), Hg(II), Cd(II), Co(II)	[11]
Activated carbon	Cd(II)	[12]
Activated carbon	Pb(II)	[13]
Activated clay	Basic Red 18, Acid Blue 9	[14]
Arundo canes	Cd(II), Ni(II)	[15]
Aspergillus niger	Pb(II), Cd(II), Cu(II), Ni(II)	[16]
Aspergillus niger	Basic Blue 9	[17]
Aspergillus niger	Acid Blue 29	[18]
Aspergillus niger	Congo Red	[19]
Baker's yeast	Cd(II)	[20]
Banana stalk (*Musa paradisiaca*)	Hg(II)	[21]
Calcined alunite	Phosphorus	[22]
Chitin, Chitosan, *Rhizopus arrhizus*	Cr(VI), Cu(II)	[23]
Coir	Cu(II), Pb(II)	[24]
Coir pith carbon	Congo Red	[25]
Fly ash	Omega Chrome Red ME, *o*-cresol, *p*-nitrophenol	[26]
Grafted silica	Pb(II), Cu(II)	[27]
Microcystis	Ni(II), Cr(VI)	[28]

(*continued on next page*)

E-mail address: ysho@tmu.edu.tw.

0021-9797/$ – see front matter
doi:10.1016/j.jcis.2003.12.033

Table 1 (*Continued*)

Sorbent	Sorbate	References
Microporous titanosilicate ETS-10	Pb(II)	[29]
Mixed clay/carbon	Acid Blue 9	[30]
Peat	Basic Blue 69, Acid Blue 25	[31]
Peat-resin particle	Basic Magenta, Basic Brilliant Green	[32]
Perlite	Cd(II)	[33]
Pith	Basic Red 22, Acid Red 114	[34]
Polysaccharide	Pb(II), Cu(II), Zn(II), Cd(II), Ni(II)	[35]
Sago	Cu(II), Pb(II)	[36]
Spent grain	Pb(II), Cd(II)	[37]
Sphagnum moss peat	Chrysoidine (BO2), Astrazone Blue (BB3), Astrazone Blue (BB69)	[38]
Sphagnum moss peat	Cu(II), Ni(II), Pb(II)	[39]
Tree fern	Cu(II)	[40]
Vermiculite	Cd(II)	[41]
Waste tires, sawdust	Cr(VI)	[42]
Wood	Basic Blue 69, Acid Blue 25	[43]

References

[1] E.C.N. Lopes, F.S.C. dos Anjos, E.F.S. Vieira, A.R. Cestari, J. Colloid Interface Sci. 263 (2003) 542.
[2] Y.S. Ho, Ph.D. thesis, University of Birmingham, Birmingham, UK, 1995.
[3] Y.S. Ho, D.A.J. Wase, C.F. Forster, Environ. Technol. 17 (1996) 71.
[4] N.A. Fernadez, E. Chacin, E. Gutierrez, N. Alastre, B. Llamoza, C.F. Forster, Bioresour. Technol. 54 (1995) 111.
[5] Y.S. Ho, G. McKay, Process. Safe. Environ. Protect. B 76 (1998) 332.
[6] Y.S. Ho, G. McKay, Process Biochem. 34 (1999) 451.
[7] Y.S. Ho, G. McKay, Adsorpt. Sci. Technol. 17 (1999) 233.
[8] Y.S. Ho, G. McKay, Process. Safe. Environ. Protect. B 76 (1998) 313.
[9] D.M. Manohar, K.A. Krishnan, T.S. Anirudhan, Water Res. 36 (2002) 1609.
[10] K.A. Krishnan, T.S. Anirudhan, J. Hazard. Mater. 92 (2002) 161.
[11] K.A. Krishnan, T.S. Anirudhan, Ind. Eng. Chem. Res. 41 (2002) 5085.
[12] K.A. Krishnan, T.S. Anirudhan, Water SA 29 (2003) 147.
[13] K.A. Krishnan, A. Sheela, T.S. Anirudhan, J. Chem. Technol. Biotechnol. 78 (2003) 642.
[14] Y.S. Ho, C.C. Chiang, Y.C. Hsu, Sep. Sci. Technol. 36 (2001) 2473.
[15] M.C. Basso, E.G. Cerrella, A.L. Cukierman, Ind. Eng. Chem. Res. 41 (2002) 180.
[16] A. Kapoor, T. Viraraghavan, D.R. Cullimore, Bioresour. Technol. 70 (1999) 95.
[17] Y.Z. Fu, T. Viraraghavan, Water Qual. Res. J. Can. 35 (2000) 95.
[18] Y.Z. Fu, T. Viraraghavan, AATCC Rev. 1 (2001) 36.
[19] Y.Z. Fu, T. Viraraghavan, Adv. Environ. Res. 7 (2002) 239.
[20] P. Vasudevan, V. Padmavathy, S.C. Dhingra, Bioresour. Technol. 89 (2002) 281.
[21] I.G. Shibi, T.S. Anirudhan, Ind. Eng. Chem. Res. 41 (2002) 5341.
[22] M. Özacar, Adsorpt. J. Int. Adsorpt. Soc. 9 (2003) 125.
[23] Y. Sağ, Y. Aktay, Biochem. Eng. J. 12 (2002) 143.
[24] S.Y. Quek, B. Al Duri, D.A.J. Wase, C.F. Forster, Process. Safe. Environ. Protect. B 76 (1998) 50.
[25] C. Namasivayam, D. Kavitha, Dyes Pigment. 54 (2002) 47.
[26] Y.S. Ho, G. McKay, J. Environ. Sci. Health Part A 34 (1999) 1179.
[27] N. Chiron, R. Guilet, E. Deydier, Water Res. 37 (2003) 3079.
[28] S. Singh, B.N. Rai, L.C. Rai, Process Biochem. 36 (2001) 1205.
[29] G.X.S. Zhao, J.L. Lee, P.A. Chia, Adsorpt. J. Int. Adsorpt. Soc. 19 (2003) 1977.
[30] Y.S. Ho, C.C. Chiang, Adsorpt. J. Int. Adsorpt. Soc. 7 (2001) 139.
[31] Y.S. Ho, G. McKay, Chem. Eng. J. 70 (1998) 115.
[32] Q.Y. Sun, L.Z. Yang, Water Res. 37 (2003) 1535.
[33] T. Mathialagan, T. Viraraghavan, J. Hazard. Mater. 94 (2002) 291.
[34] Y.S. Ho, G. McKay, Resour. Conserv. Recycl. 25 (1999) 171.
[35] Z. Reddad, C. Gérente, Y. Andres, P. Le Cloirec, Environ. Sci. Technol. 36 (2002) 2067.
[36] S.Y. Quek, D.A.J. Wase, C.F. Forster, Water SA 24 (1998) 251.
[37] K.S. Low, C.K. Lee, S.C. Liew, Process Biochem. 36 (2000) 59.
[38] Y.S. Ho, G. McKay, Can. J. Chem. Eng. 76 (1998) 822.
[39] Y.S. Ho, G. McKay, Water Res. 34 (2000) 735.
[40] Y.S. Ho, Water Res. 37 (2003) 2323.
[41] T. Mathialagan, T. Viraraghavan, Sep. Sci. Technol. 38 (2003) 57.
[42] N.K. Hamadi, X.D. Chen, M.M. Farid, M.G.Q. Lu, Chem. Eng. J. 81 (2001) 95.
[43] Y.S. Ho, G. McKay, Process. Safe. Environ. Protect. B 76 (1998) 183.