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Letter to the Editor

"Kinetic modeling and equilibrium studies during cadmium biosorption by dead *Sargassum* sp. biomass" by Cruz, C.C.V., da Costa, A.C.A., Henriques, C.A., Luna, A.S., Bioresource Technology, 91(3) (2004) 249–257.

In a recent publication Cruz et al. (2004), in Section 3.5 "Biosorption kinetics of cadmium ions", authors mentioned a pseudo-second-order mechanism from Eqs. (9)–(11). In fact, it is Ho (1995) who first developed a pseudo-second-order kinetic expression for the sorption systems 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. (1996) and adsorption of lauryl benzyl sulfonate on algae by Fernadez et al. (1995).

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 (Ho and McKay, 1998a) and pseudo-second-order model (Ho and McKay, 1999a).

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

Sorbent	Sorbate	References
2-Mercaptobenzimidazole-clay	Hg(II)	Manohar et al. (2002)
Activated carbon	Hg(II)	Krishnan and Anirudhan (2002a)
Activated carbon	Pb(II), Hg(II), Cd(II), Co(II)	Krishnan and Anirudhan (2002b)
Activated carbon	Cd(II)	Krishnan and Anirudhan (2003)
Activated carbon	Pb(II)	Krishnan et al. (2003)
Activated clay	Basic Red 18, Acid Blue 9	Ho et al. (2001)
Algae	Lauryl benzyl sulfonate	Fernadez et al. (1995)
Arundo canes	Cd(II), Ni(II)	Basso et al. (2002)
Aspergillus niger	Pb(II), Cd(II), Cu(II), Ni(II)	Kapoor et al. (1999)
Aspergillus niger	Basic Blue 9	Fu and Viraraghavan (2000)
Aspergillus niger	Acid Blue 29	Fu and Viraraghavan (2001)
Aspergillus niger	Congo Red	Fu and Viraraghavan (2002)
Baker's yeast	Cd(II)	Vasudevan et al. (2003)
Banana stalk (*Musa paradisiaca*)	Hg(II)	Shibi and Anirudhan (2002)
Bentonite	Oil	Viraraghavan and Moazed (2003)
Calcined alunite	Phosphorus	Özacar (2003)
Chitin, chitosan, *Rhizopus arrhizus*	Cr(VI), Cu(II)	Sağ and Aktay (2002)
Coir	Cu(II), Pb(II)	Quek et al. (1998a,b)
Coir pith carbon	Congo Red	Namasivayam and Kavitha (2002)
Fly ash	Omega Chrome Red ME, *o*-cresol, *p*-nitrophenol	Ho and McKay (1999c)
Grafted silica	Pb(II), Cu(II)	Chiron et al. (2003)
Microcystis	Ni(II), Cr(VI)	Singh et al. (2001)
Microporous titanosilicate ETS-10	Pb(II)	Zhao et al. (2003)
Mixed clay/carbon	Acid Blue 9	Ho et al. (2001)
Peat	Basic Blue 69, Acid Blue	Ho and McKay (1998c)
Peat-resin particle	Basic Magenta, Basic Brilliant Green	Sun and Yang (2003)
Perlite	Cd(II)	Mathialagan and Viraraghavan (2002)
Pith	Basic Red 22, Acid Red 114	Ho and McKay (1999d)
Polysaccharide	Pb(II), Cu(II), Zn(II), Cd(II), Ni(II)	Reddad et al. (2002)
Sago	Cu(II), Pb(II)	Quek et al. (1998a,b)
Spent grain	Pb(II), Cd(II)	Low et al. (2000)
Sphagnum moss peat	Cu(II), Ni(II)	Ho et al. (1996)
Sphagnum moss peat	Chrysoidine (BO2), Astrazon Blue (BB3), Astrazone Blue (BB69)	Ho and McKay (1998d)
Sphagnum moss peat	Cu(II), Ni(II), Pb(II)	Ho and McKay (2000)
Tree fern	Cu(II)	Ho (2003)
Vermiculite	Cd(II)	Mathialagan and Viraraghavan (2003)
Waste tyres, sawdust	Cr(VI)	Hamadi et al. (2001)
Wood	Basic Blue 69, Acid Blue 25	Ho and McKay (1998e)

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Furthermore, Ho's kinetic expression has also been applied to a multi-stage batch sorption design (Ho and McKay, 1999b) and a two-stage batch sorption optimized design (Ho and McKay, 1998b). 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 Cruz et al., cite Ho's original pseudo-second-order kinetic expression paper.

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