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Comment and Response

Comment on "Removal of heavy metals from aqueous solution by carbon nanotubes: adsorption equilibrium and kinetics" by Li, Y.H., Di, Z.C., Luan, Z.K., Ding, J., Zuo, H., Wu, X.Q., Xu, C.L. and Wu, D.H.

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Recently, Li *et al*. (Li, 2004) published the paper entitled as above. In section 2.2: Adsorption kinetics, authors mentioned three kinetic models, the first-order rate equation, pseudo-second-order rate equation, and second-order rate equation citing a secondary reference (Benguella, 2002). However, there are mistakes occurred in this reference (Ho, 2004a).

It is Lagergren (Lagergren, 1898) who first presented the first-order rate equation for the adsorption of ocalic acid and malonic acid onto charcoal. Lagergren's kinetics equation has been most widely used for the adsorption of an adsorbate from an aqueous solution. In order to distinguish kinetics equation based on adsorption capacity of solid from concentration of solution, Lagergren's first-order rate equation has been called pseudo-first-order since 1998 (Ho, 1998a; 1998b; 1998c; 1998d). In addition, citation review of Lagergren's kinetic rate equation on adsorption reactions has also been reported (Ho, 2004b).

The second-order kinetic expression for the adsorption systems of divalent metal ions using sphagnum moss peat has been presented by Ho (Ho, 1995). At the same time Ho has presented a definition for the initial adsorption rate from the pseudo-second-order equation. In order to distinguish kinetics equation based on adsorption capacity of solid from concentration of solution, Ho's second-order rate expression has been named pseudo-second-order (Ho, 1998a; 1998b; 1998c; 1998d). 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*. (Ho, 1996). The modified pseudo-second-order kinetic expression has been reported since 1997 (Ho, 1997) and also been presented in following years (Ho, 1998a; 1998b; 1998c; 1998d). In addition, Azizian (Azizian, 2004) has also presented a theoretical analysis for pseudo-second-order equation. The most frequently cited papers were published in Environmental Technology (Ho, 1996), Process Safety and Environmental Protection (Ho, 1998a; 1998b), Journal of Environmental Sciences and Health Part A—Toxic/Hazardous Substances & Environmental Engineering (Ho, 1999a), Chemical Engineering Journal (Ho, 1998c), Resources, Conservation and Recycling (Ho, 1999b), Process Biochemistry (Ho, 1999c), and Water Research (Ho, 2000). In addition, similar comments have also been published in Adsorption Science & Technology (Ho, 2002), Journal of Colloid and Interface Science (Ho, 2003a; 2004c; 2004d), Journal of Chemical Technology and Biotechnology (Ho, 2003b), Biochemical Engineering Journal (Ho, 2003c), Bioresource Technology (Ho, 2004e), Environmental Science & Technology (Ho, 2004f), Water Research (Ho, 2004a), and Fresenius Environmental Bulletin (Ho, 2004). The pseudo-second-order rate expression of Ho has been widely applied to the sorption of metal ions, dyes, herbicides, oil and organic substances from aqueous solutions (Ho, 2002; 2003a; 2003b; 2003c, 2004a; 2004c; 2004d; 2004f; 2004).

Research papers conventionally include an introduction, a description of the objectives and procedures of the study, an account of the results and a discussion of the results and their implications. However, a paper's contribution existed not only in its originality and creativity, but also in its continuity and development for the following researches. The reference section can play a key role to researchers that were interested in the paper's statement and would like to follow the study or find useful information from the paper (Ho, 2004b). Calne *et al*. (Calne, 1992) suggested that authors should cite relevant work of others, as well as their own. Authors could merely be instructed to include key citations in their introduction and to verify, in writing, that they have fully reviewed published work. I suggest that Li *et al*. cite Ho's original pseudo-second-order kinetic expression paper and Lagergren's pseudo-first-order kinetic model paper.

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Response to comment on "Removal of heavy metals from aqueous solution by carbon nanotubes: adsorption equilibrium and kinetics"

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We would like to thank Dr. Ho for his careful examination of our paper. We agree with the comment on our paper published in Journal of Environmental Sciences.

The original first-order rate equation was reported by Lagergren (Lagergren, 1898) and the original pseudo second-order rate equation was reported by Ho *et al*. (Ho, 1996). These equations were cited secondarily in our paper (Li, 2004). We have not obtain the references in the equations and we now acknowledge the value of Dr. Lagergren and Dr. Ho's work.

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