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# Comment

## Affinity dye–ligand poly(hydroxyethyl methacrylate)/chitosan composite membrane for adsorption lysozyme and kinetic properties G. Bayramoğlu, M. Yilmaz, M.Y. Arica

Recently, Bayramoğlu et al. [1] published the paper entitled as above. In Section 2, pseudo-first and second order equations, Bayramoğlu et al. mentioned that a pseudo-second order equation based on adsorption equilibrium capacity may be expressed in the form:

$$\frac{dq_t}{dt} = k_2(q_{eq} - q_t)^2$$

In fact it was Ho [2], who first developed a pseudo-second order kinetic expression for the sorption systems of divalent metal ions using sphagnum moss peat. In 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]. The pseudo-second order rate expression of Ho has been applied to the sorption of metal ions, dyes and organic substances from aqueous solution (Table 1). In addition, Ho's kinetic expression has also been applied to the sorption of dye onto the mixture sorbent sorption processes [4]. 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 Bayramoğlu et al. should cite Ho's original pseudo-second order kinetic expression paper.

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

| Sorbent | Sorbate | Reference |
|---|---|---|
| *C. vulgaris* | Cd(II) | [5] |
| *Rhizopus arrhizus* | Remazol Black B | [6] |
| *Trametes versicolor* | Cd(II) | [7] |
| *Arundo* canes | Cd(II), Ni(II) | [8] |
| Zeolite tuff | Pb(II) | [9] |
| Algae | Lauryl benzyl sulfonate | [10] |
| *Aspergillus niger* | Basic Blue 9 | [11] |
| *Aspergillus niger* | Acid Blue 29 | [12] |
| Mixed clay/carbon | Acid Blue 9 | [4] |
| Wood | Basic Blue 69, Acid Blue 25 | [13] |
| Peat | Basic Blue 69, Acid Blue 25 | [14] |
| Sphagnum moss peat | Chrysoidine (BO2), Astrazon Blue (BB3), Astrazone Blue (BB69) | [15] |
| Pith | Basic Red 22, Acid Red 114 | [16] |
| Fly ash | Omega Chrome Red ME, *o*-cresol, *p*-nitrophenol | [17] |
| Sphagnum moss peat | Cu(II), Ni(II) | [3] |
| Sphagnum moss peat | Cu(II), Ni(II), Pb(II) | [18] |
| Activated clay | Basic Red 18, Acid Blue 9 | [19] |
| *Aspergillus niger* | Pb(II), Cd(II), Cu(II), Ni(II) | [20] |
| Activated carbon | Hg(II) | [21] |
| Spent grain | Pb(II), Cd(II) | [22] |
| 2-Mercaptobenzimidazole-clay | Hg(II) | [23] |
| Perlite | Cd(II) | [24] |
| Coir | Cu(II), Pb(II) | [25] |
| Sago | Cu(II), Pb(II) | [26] |
| Glass | Cu(II) | [27] |
| Polysaccharide | Pb(II), Cu(II), Zn(II), Cd(II), Ni(II) | [28] |
| Chitin, Chitosan, *Rhizopus arrhizus* | Cr(VI), Cu(II) | [29] |
| Microcystis | Ni(II), Cr(VI) | [30] |
| *Aspergillus niger* | Congo Red | [31] |
| *Rhizopus arrhizus* | Fe(III), Fe(III)-cyanide complex | [32] |
| Banana stalk (*Musa paradisiaca*) | Hg(II) | [33] |

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Yuh-Shan Ho
*School of Public Health*
*Taipei Medical University*
*No. 250, Wu-Hsing Street, Taipei, Taiwan*
Tel.: +886-2-27361661x6514; fax: +886-2-27384831
*E-mail address:* ysho@tmu.edu.tw (Y.-S. Ho)