Adsorption characteristic studies of phosphorus onto laterite

Liang Zhang¹, Song Hong², Jing He², Fuxing Gan², Yuh-Shan Ho³,⁴, *

¹Institute of Geodesy and Geophysics, Chinese Academy of Sciences, Wuhan 430077, China
²School of Resource and Environmental Science, Wuhan University, Wuhan 430079, China
³Water Research Centre, Asia University, Taichung 41354, Taiwan
⁴Department of Environmental Sciences, Peking University, The Key Laboratory of Water and Sediment Sciences, Ministry of Education, Beijing, 100871, China

Tel. +86 64 2332 3456 ext. 1797; Fax +86 64 2330 5834; email: ysho@asia.edu.tw

Received 26 February 2010; Accepted in revised form 1 May 2010

**ABSTRACT**

Soil has been widely used in many wastewater treatment systems, and proved to be an effective substrate for phosphorus removal and retention. It is significant to study its adsorption characteristics by using appropriate theoretical models. In this study, laterite (or red soil) was selected as an example to investigate the adsorption characteristic of phosphorus onto soil with the Langmuir, Freundlich, and Redlich–Peterson isotherms by both the linear and non-linear regression methods. The adsorption experiment was conducted at the temperatures of 283, 288, 298, and 308 K, respectively, to choose the appropriate method and obtain the credible adsorption parameters for soil adsorption equilibrium studies. The results showed that the non-linear regression method would be a better way to compare the better fit of isotherms for the adsorption of phosphorus onto laterite. Both the two-parameter Freundlich and the three-parameter Redlich–Peterson isotherms had higher coefficients of determination for the adsorption of phosphorus onto laterite at various temperatures. In addition, a relationship between Freundlich isotherm parameters and Redlich–Peterson isotherm parameters was presented.

**Keywords:** Adsorption; Isotherm; Non-linear regression; Soil; Temperature

* Corresponding author.