ADSORPTIVE REMOVAL OF PHOSPHATE FROM AQUEOUS SOLUTIONS BY WASTE SNAIL AND CLAM SHELLS

Ji Bing Xiong1*, Yong Qin1, Ejazul Islam2

1China University of Mining and Technology, School of Environment Science & Spatial Informatics, Jiangsu Key Laboratory of Resources and Environmental Information Engineering, Xuzhou, 221116 Jiangsu Province, China
2National Institute for Biotechnology and Genetic Engineering (NIBGE), Environmental Biotechnology Division, 38000 Faisalabad, Pakistan

Abstract

Large quantities of snail and clam shells are left as waste material when their meat is used as food for people. It has been a big problem that how to treat these wastes and usually these are land filled as wastes. In the present paper, these shells are studied as recycling resource for phosphate removal from solutions. Laboratory-scale batch experiments were conducted to evaluate the efficiency of snail and clam shells in removing phosphate from aqueous solutions. Major factors investigated were: pH, initial solution phosphate concentration and calcination of shells at 700°C. The results showed that pH is the most important influencing factor among the other factors on phosphate removal by both types of shell powder. The natural snail and clam can remove over 97% of 20 mg/L phosphate especially at initial solution pH 1.5 in 14 h. The saturation adsorption capacities (mg/g) of natural snail and clam shells were 2.99 and 0.85, respectively. Calcination can increase both shells phosphate removal efficiencies especially at high pH values. By oscillation in citric acid (2%) for an hour, more than 86% of the phosphate adsorbed on the natural and calcinated adsorbents dissolve out.

It is concluded that both types of shell powder are efficient adsorption materials for phosphate removal from aqueous solutions.

Key words: adsorption, calcination, phosphate removal, snail and clam shells powder

Received: January, 2012; Revised final: September, 2012; Accepted: September, 2012

* Author to whom all correspondence should be addressed: e-mail: xiongjib108@163.com; Phone: +86-516-83891312