Adsorption of Cr(VI) from aqueous solution onto short-chain polyaniline/palygorskite composites

Jiahong Wang[a,*], Xiaojing Han[b], Yanfen Ji[c], Hongrui Ma[a]

[a]College of Resource and Environment, Shaanxi University of Science and Technology, Xi'an 710021, P.R. China,
Tel. +86 029 8616 8291; emails: wangjiahong@sust.edu.cn (J. Wang), mahr@sust.edu.cn (H. Ma)
[b]College of Chemistry and Chemical Engineering, Shaanxi University of Science and Technology, Xi'an 710021, P.R. China,
Tel. +86 029 8616 8291; email: 418663757@qq.com
[c]State Key Laboratory of Pollution Control and Resource Reuse, and School of the Environment, Nanjing University, Jiangsu
210093, China, Tel. +86 025 8368 6096; email: jiyanfen06@163.com

ABSTRACT

Hexavalent chromium in aqueous environment may result in severe environmental and public health problems. In this study, short-chain polyaniline/palygorskite composites (PANI/PA) were prepared and developed to remove aqueous Cr(VI). Characterized results showed that short-chain polyaniline was successfully incorporated on the surface of PA. The maximum Cr(VI) adsorption amount was found to be 11.54, 14.34, and 16.22 mg/g at 15, 25, and 35℃, respectively, and polyaniline on the adsorbent surface may account for the enhanced Cr(VI) adsorption. Cr(VI) adsorption was highly dependent on both solution pH and ionic strength, which indicates that electrostatic force and anion exchange may account for the increased Cr(VI) adsorption onto PANI/PA. Cr(VI) saturated PANI/PA can be easily desorbed in alkaline solution and regenerated adsorbents still possess high adsorption amount for aqueous Cr(VI). The current study shows that PANI/PA can be used as an effective and recyclable adsorbent for the removal of Cr(VI) in water and wastewater treatment.

Keywords: Hexavalent chromium; Short-chain polyaniline/palygorskite composites; Adsorption; Regeneration

*Corresponding author.