



## Removal of hexavalent chromium from wastewater by acid-washed zero-valent aluminum

Fenglian Fu\*, Weijiang Han, Zihang Cheng, Bing Tang

*School of Environmental Science and Engineering, Guangdong University of Technology, Guangzhou 510006, China, Tel. +86 20 39322291; email: fufenglian2006@163.com (F. Fu), Tel. +86 20 39322296; emails: 931648160@qq.com (W. Han), 283328746@qq.com (Z. Cheng), Tel. +86 20 39322295; email: renytang@163.com (B. Tang)*

Received 6 August 2014; Accepted 22 December 2014

---

### ABSTRACT

This paper deals with the treatment of hexavalent chromium (Cr(VI)) and its removal mechanism using acid-washed zero-valent aluminum (ZVAL). The acid-washed ZVAL before and after reaction was characterized by scanning electron microscope, X-ray diffraction, and X-ray photoelectron spectroscopy. The influence factors such as ZVAL loading, acid washing time, and pH values on Cr(VI) removal were studied. Cr(VI) removal by acid-washed ZVAL was also evaluated under different humic acid and Fe<sup>2+</sup> concentrations. The removal of Cr(VI) was accelerated with increasing acid-washed ZVAL loadings and decreasing initial pH. The addition of humic acid inhibited the Cr(VI) removal, while Fe<sup>2+</sup> significantly accelerated the Cr(VI) removal. More than 98% Cr(VI) was removed from synthetic wastewater containing 20.0 mg/L Cr(VI) in 180 min by 0.4 g/L acid-washed ZVAL at initial pH 2.0. Cr(VI) removal by acid-washed ZVAL is proved by reduction, not by adsorption. The remarkable capacity of acid-washed ZVAL in removing Cr(VI) from wastewater displays its potential application in the treatment of wastewater-containing Cr(VI).

*Keywords:* Cr(VI); Wastewater; Zero-valent aluminum; Removal; Humic acid; Fe(II)

---

\*Corresponding author.