



Comparison of the performance of *Moringa oleifera* seed protein and polyaluminum chloride in removal of humic acid from water

Jingxi Tie^a, Zhihong Zheng^{a,*}, Xiaomei Zheng^b, Yaru Hao^c

^aSchool of Environmental and Municipal Engineering, North China University of Water Resources and Electric Power, Zhengzhou 450045, China, Tel. +86 371 6579 0528; emails: zzh_ncwu@163.com (Z. Zheng), 15202843@qq.com (J. Tie)

^bHenan Yellow River hydrological Survey and Design Institute, Zhengzhou 450000, China, email: 9068442@qq.com

^cSchool of Municipal and Environmental Engineering, Harbin Institute of Technology, Harbin 150090, China, email: haoyaru123@126.com

Received 5 March 2017; Accepted 18 August 2017

ABSTRACT

The water-soluble protein was extracted from *Moringa oleifera* seed press cake and tested its performance as a natural coagulant for removing humic acid (HA) from water solution when comparing to polyaluminum chloride (PAC), a commercial coagulant. Influencing factors including pH, coagulant dosage, temperature and suspended solid were investigated in this study. The results indicated that the coagulating efficiencies of HA using the *Moringa oleifera* seed protein (MOSP) were better than those by PAC under all the experimental conditions at the same dosage. MOSP could increase the zeta potential more efficiently than PAC. The Fourier transform infrared spectra revealed that no new compounds were generated during the coagulation process. Hence, adsorption and charge neutralization could be the main mechanism contributing to the HA removal using MOSP as coagulant. MOSP is an ideal natural coagulant for HA removal.

Keywords: Humic acid; *Moringa oleifera* seed protein; Polyaluminum chloride; Coagulant; Coagulation

* Corresponding author.