

Application of *Moringa oleifera* coagulant protein as natural coagulant aid with alum for removal of heavy metals from raw water

Mohammad Hadi Mehdinejad^{a,*}, Bijan Bina^b

^aEnvironmental Health Research Center, Department of Environmental Health Engineering, Faculty of Health, Golestan University of Medical Sciences, Gorgan, Iran, Tel. +98 1732436107, email: hmnejad@yahoo.com (M.H. Mehdinejad)

^bDepartment of Environmental Health Engineering, School of Public Health, Isfahan University of Medical Sciences, Isfahan, Iran, Tel. +983137923275, email: bbina123@yahoo.com (B. Bina)

Received 1 November 2017; Accepted 23 May 2018

ABSTRACT

Presence of aluminum residues in treated water has various health and environmental consequences such as neurotoxicity and possibly Alzheimer's disease. This study investigated the effects of coagulation/flocculation/sedimentation processes using alum as a coagulant in conjunction with *Moringa oleifera* coagulant protein (MOCP) as coagulant aid on alkalinity and hardness as well as removal of metal ions and turbidity from turbid water. In this study, MOCP was synthesized and used as a new method of treating turbid water. A conventional jar test apparatus was utilized for the tests. Optimal dosage for MOCP was found at pH of 7–7.5 for all turbidities. Maximum turbidity removal of 99% was achieved. MOCP significantly reduced the required dosage of alum. The values of TOC in treated water in low, medium and high turbidity were 0.55, 0.5 and 0.65 mg L⁻¹, respectively. The efficiency of metal ion removal in the present study was as follows: Fe²⁺ > Cu²⁺ > Zn²⁺ > Mn²⁺. We demonstrated that this method is an efficient approach for optimization of the coagulation-flocculation process in the treatment of raw water.

Keywords: Coagulant; Metals removal; *Moringa oleifera* coagulant protein (MOCP); Water treatment

*Corresponding author.