Study on water quality improvement by bank filtration

Dae-Young Kwon

Department of Civil and Urban Engineering, Inje University, 607 Eobang-dong, Gimhae 621 749, Gyeongsangnam-do, Korea, Tel. +82 55 3203855; Fax: +82 55 3213410; email: dykwon@inje.ac.kr

Received 14 December 2013; Accepted 25 February 2014

ABSTRACT

The possibility of bank filtration as a water purification technique was assessed by comparing water quality of a river and bank filtrate obtained from a pilot plant operation during 7 months from November 2010 to May 2011. The research began with soil analysis, including soil adsorption characteristic, and then a comparison was performed in terms of total dissolved solids (TDS), suspended solids (SS), potassium permanganate (KMnO4) consumption, biological oxygen demand (BOD), and ammonium (NH4-N), nitrate (NO3-N), iron (Fe), and manganese (Mn) concentrations. The study area showed high concentrations of Fe (470 mg/kg), Mn (80 mg/kg), and NH4-N (15 mg/kg). The adsorption coefficients of k and 1/n were 0.00159 and 0.8714, respectively, which implied that adsorption of the soil depended on organic matter contents. Water quality comparisons revealed that TDS remained consistent, but SS was lower by 84% in bank filtration samples. NH4-N concentration increased from 0 mg/L to ≥1 mg/L possibly due to agricultural activities in the study area, while NO3-N concentration dropped to nearly 0 mg/L because of soil adsorption. Bank filtration reduced KMnO4 consumption and BOD of river water by 54 and 71%, respectively. Concentrations of Fe and Mn significantly increased in bank filtration samples.

Keywords: Bank filtration; Water quality; River water; Bank filtrate; Soil analysis; Adsorption characteristics

Presented at the 6th International Conference on the “Challenges in Environmental Science and Engineering” (CESE-2013), 29 October–2 November 2013, Daegu, Korea

1944-3994/1944-3986 © 2014 Balaban Desalination Publications. All rights reserved.