



Influence of sand filter in wastewater treatment (a case study in Gaza City, Gaza Strip wastewater treatment plant)

Yasser El-Nahhal^{a,*}, Omran El-Dahdouh^a, Husam Al-Najar^{a,b}

^aFaculty of Science, Islamic University Gaza, Palestinian Authority, emails: y_el_nahhal@hotmail.com (Y. El-Nahhal), nabila.dahdouh@hotmail.com (O. El-Dahdouh), halnajar@iugaza.edu.ps (H. Al-Najar)

^bFaculty of Engineering, Islamic University Gaza, Palestinian Authority

Received 29 June 2017; Accepted 28 August 2017

ABSTRACT

Scarcity of water resources increases the pressure to develop methods for wastewater treatments. In this study, modifications of sand filter were made by installing vertical devices with different length to change the conditions inside the sand filter; consequently, the produced water may be suitable for reuse. We assessed the performance of modified sand filters cultivated with and without reed plant in changing the flow rate, removing biochemical oxygen demand (BOD₅), chemical oxygen demand (COD), removal of ammonia, total Kjeldahl nitrogen (TKN), removal of nitrate, total suspended solids (TSS), and fecal coliforms (FC). Two types of sand filters were used in this study: one sand filter was planted with reed bed and the second without reed bed. Results showed that modified sand filters had the ability to reduce the flow rate nearly 10 times lower than regular sand filter (horizontal flow). Moreover, removal of BOD₅, COD, nitrogen compound, TSS, and FC was also significant. An interesting outcome of the study is that sand filter removed 52% of BOD₅, 32% of COD, 39% of TKN, 35% of NH₄ as result of NH₃ conversion to NO₃, 93% of FC, and 71% of TSS. It is evident that modified filters have higher efficiency in removing pollutants from wastewater. It can be concluded that application of sand filters will significantly improve the quality of treated wastewater. The study revalued that increasing retention time in the sand filters considerably increased the removal efficiency.

Keywords: Wastewater; Sand filter; Reed bed; Biochemical oxygen demand; Chemical oxygen demand; Total suspended solids; Fecal coliforms; Total Kjeldahl nitrogen; TKN

* Corresponding author.