
Performance evaluation of slow sand filter after pretreated with coagulant chemical in Kilinochchi wtp

Anoja N.^{1*}, Thadshagini R.², Thushyanthy M.²

¹National Water Supply and Drainage Board, Jaffna, Sri Lanka.

²Department of Agricultural Engineering, University of Jaffna, Sri Lanka.

The Kilinochchi water treatment plant (KWTP) which has a Roughing Filter, an Aerator and Slow Sand Filters (SSF-KWTP) had been designed to meet the increasing water demand of Kilinochchi district. The Source for the KWTP is Dry Aru which is fed by Iranamadhu reservoir. Huge seasonal fluctuation of turbidity and the algal population in Dry Aru affect the performance of the KWTP and the plant shut down for several months. The decision has been taken to incorporate the coagulation flocculation treatment system to KWTP to improve the treatment efficiency. Slow sand filtration works primarily through biological activity on the sand bed and it is a chemical free treatment system. Adding pre-treatment chemical may affect the biofilm layer as well as the performance of the slow sand filter. Hence the purpose of the study is to evaluate the filtration efficiency of the slow sand filter after pretreatment with poly aluminium chloride (PACL) coagulant chemical. Real Slow sand filter model (SSF-Model) has been built and connected with coagulation flocculation system. Turbidity reduction percentage of the SSF-Model and SSF-KWTP was in the range of 75-97.05% and 90.63-97.30% respectively. Average colour reduction % of the SSF-Model was 83.87%. Algal removal efficiency of the SSF-Model was 58% and the SSF-KWTP was 63.7%. There was no significant difference in performance of SSF-Model in terms of Turbidity (4%), Manganese (3.9%), Total iron (0.4%) and Algal removal (5.6%) efficiency compared with the SSF-KWTP. Colour removal efficiency (14%) of SSF-Model was significantly lower than SSF-KWTP. It can be concluded that coagulation flocculation treatment system with pretreatment chemical as PACL can be incorporated to improve the treatment efficiency to KWTP.

Keywords: Slow sand filter, Filtration efficiency, Coagulation and flocculation

*Corresponding author: nanoja11@gmail.com