



Water quality effluent treatment using macro-composite technology at a residential flat area: hydraulic retention time effects

Nurul Najiha A Razak^a, Mohamed Zuhaili Mohamed Najib^{b,*}, Muzaffar Zainal Abideen^b, Salmiati Salmiati^c, Shamila Azman^b, Kogila Vani Annammala^c, Muhammad Noor Hazwan Jusoh^d, Yong Ee Ling^b, Budhi Setianto^e, Achmad Syafiuddin^{e,*}, Mohamed Saad Ahmed^f, Mika Sillanpää^g

^aSchool of Civil Engineering, Universiti Teknologi Malaysia, 81310 Johor Bahru, Johor, Malaysia

^bDepartment of Water and Environmental Engineering, School of Civil Engineering, Universiti Teknologi Malaysia, 81310 Johor Bahru, Johor, Malaysia, email: mohamedzuhaili@utm.my (M.Z.M. Najib)

^cCentre for Environmental Sustainability and Water Security (IPASA), Research Institute for Sustainable Environment (RISE), Universiti Teknologi Malaysia, 81310 Johor Bahru, Johor, Malaysia

^dDepartment of Civil Construction Engineering, Faculty of Engineering Science, Curtin University, Malaysia

^eDepartment of Public Health, Universitas Nahdlatul Ulama Surabaya, 60237 Surabaya, Indonesia, email: achmaadyafiuddin@unusa.ac.id (A. Syafiuddin)

^fDepartment of Geology and Geophysics, College of Science, King Saud University, Riyadh 11451, Saudi Arabia

^gDepartment of Biological and Chemical Engineering, Aarhus University, Norrebrogade 44, 8000 Aarhus C, Denmark

Received 30 December 2021; Accepted 3 August 2022

ABSTRACT

Most of the causes of river pollution are due to the impact of human activities through the development of new construction projects, agriculture, industry and others. As an alternative to deal with this problem, macro-composite has been used as a pretreatment process to treat wastewater before discharge into the river. Therefore, this study aims to characterize the water quality of the effluent and to investigate the treatment efficiency of different hydraulic retention times (HRTs) using macro-composite technology in treating the effluent from Flat Taman Jaya. The parameters tested were chemical oxygen demand (COD), biochemical oxygen demand, ammonia nitrogen (NH₃-N), pH, total suspended solid (TSS), turbidity and total phosphate (TP). The efficacy of the macro-composites was tested by immersing 70% of the macro-composites into the 750 mL wastewater sample for five different periods. The results of each wastewater sample were measured after 2 d of treatment. The results showed that the most efficient treatment was achieved with the macro-composite at 3 d HRT with COD, NH₃-N, TSS, turbidity and TP removal of 80%, 97%, 60%, 49% and 89%, respectively, at pH 7.33.

Keywords: Water quality; Hydraulic retention times; Water pollution

* Corresponding authors.