

Effect of effluent and sludge recirculation ratios on integrated fixed films A2O system nutrients removal efficiency treating sewage

Shamas Tabraiz^{a,b,*}, Sarmad Hassan^a, Aumber Abbas^b, Sadia Nasreen^a, Muhammad Zeeshan^a, Sadia Fida^a, Burhan Abdullah Shamurad^b, Kishor Acharya^b, Evangelos Petropoulos^b

^aEnvironmental Engineering Department, University of Engineering and Technology Taxila, Rawalpindi, Pakistan, emails: s.tabraiz2@newcastle.ac.uk (S. Tabraiz), sarmad.hassan143@gmail.com (S. Hassan), sadia.nasreen@uettaxila.edu.pk (S. Nasreen), zeeshan.m@uettaxila.edu.pk (M. Zeeshan), sadia.fida@uettaxila.edu.pk (S. Fida)

^bSchool of Engineering, Newcastle University, Newcastle upon Tyne, UK, emails: a.abbas2@newcastle.ac.uk (A. Abbas), b.a.s.shamurad@newcastle.ac.uk (B.A. Shamurad), kishor.acharya@newcastle.ac.uk (K. Acharya), evangelos.petropoulos2@newcastle.ac.uk (E. Petropoulos)

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ABSTRACT

Anaerobic-anoxic-oxic (A2O) reactors are commonly used to remove nutrients from wastewater due to their high biological nutrient removal (BNR) potential as compared with conventional activated sludge. A2O often allows sludge and treated effluent recirculation to enhance biological total nitrogen (TN) and total phosphorous (TP) removal. Addition of fixed film in A2O reactors promotes attached biomass growth and accelerates BNR process. A bench scaled A2O reactor with integrated fixed film in all three zones was set to evaluate the effect of the effluent and secondary sludge recirculation rate to the chemical oxygen demand (COD), TN, TP removal efficiency. Five different recirculation scenarios were tested, sludge-effluent:influent of 0%, 10%, 20%, 30%, and 40%. The results showed that COD, TN, and TP can be in principle reduced without recirculation; however, the effluent is significantly polished when a recirculation stream is added at an optimum of 30%, achieving a maximum of 92.0%, 97.7%, and 74.6% removal for COD, total Kjeldahl nitrogen, and TP, respectively. Further increase of the recirculation ratio does not significantly improve the treatment process.

Keywords: Integrated fixed film A2O; Recirculation ration; Nutrients removal; Sewage

* Corresponding author.