Evaluasi efektivitas unit multi media filter (MMF) sebagai pretreatment unit ultrafiltrasi (UF) dalam daur ulang air limbah domestik rumah sakit X = Effectiveness evaluation of multi media filter (MMF) unit as a pretreatment of ultrafiltration uf unit in the X Hospital domestic wastewater recycling / Arif Prima

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Abstrak

ABSTRAK
 Kombinasi saringan pasir dan karbon aktif pada MMF umum digunakan sebagai pretreatment UF karena efektif menghilangkan padatan tersuspensi sebesar 75-90% dan zat organik hingga 59%. Namun di RS X, UF mengalami fouling dalam waktu singkat disebabkan tingginya konsentrasi konstituen residu di influen yang berasal dari MMF sehingga UF membutuhkan frekuensi backwash lebih tinggi. Kondisi ini dapat mengurangi recovery dan daur ulang air limbah menjadi tidak layak secara ekonomi. Oleh karena itu, diperlukan evaluasi kemampuan MMF eksisting dan dampaknya terhadap kemampuan UF tipe S-640 polysulfone hollow fiber. Evaluasi dilakukan dengan mengukur dan menguji kinerja MMF sebagai pretreatement UF melalui serangkaian percobaan pilot plant pada berbagai variasi kualitas input terhadap periode operasi MMF. Hasil penelitian menunjukan MMF eksisting memiliki kapasitas pengolahan maksimal 616 m3 yang dicapai selama 3 hari operasi untuk satu siklus backwash. Pada periode operasi tersebut, MMF memiliki efisiensi penyisihan (1) tinggi untuk kekeruhan dan TSS rata-rata sebesar 62% dan 74% dan (2) rendah untuk zat organik yang hanya sebesar 14%. Penyisihan zat organik yang rendah disebabkan karbon aktif sudah mengalami penurunan daya adsorpsi sehingga diperlukan penggantian. Dengan kondisi efluen MMF eksisting, UF S-640 Hollow Fiber hanya memiliki efisiensi penyisihan ratarata zat organik 50% (maks. 64%, min. 30%), kekeruhan 73% (maks. 92%, min. 64%), dan TSS 78% (maks. 94%, min. 71%). Recovery rata-rata diperoleh sebesar 52,87% (maks. 89,69% ; min.33,33%) pada range tekanan antar membran 3,5 – 2,8 bar. Sebagai pretreatment UF, MMF eksisting membutuhkan backwash satu kali sehari dengan volume 0,9 m3 dan penggantian media pada MMF yang dilakukan minimal satu kali dalam 6 bulan. <hr> ABSTRACT
 The combination of sand and activated carbon filter in MMF commonly used as pretreatment for UF cause can remove fouling contituens effectively such as solids until 75-90% and organic matter until 59%. However in the X Hospital, UF was going to fouling in a short time due to the high concentration of constituents in the influent residue derived from MMF so that UF require higher backwash frequency. This condition can reduce the recovery and wastewater recycling to be economically unfeasible. Therefore, we need to evaluate the capabilities of existing MMF and its impact on the performance of UF S-640 polysulfone hollow

fiber. Evaluation was conducted by measuring and testing the performance of MMF as a pretreatment of UF pilot plant through a series of experiments on a wide variety of quality inputs to the MMFoperation period. The results showed that existing MMF has a maximum processing capacity of 616 m3 that was achieved during the three days of operation for a backwash cycle. In the period of the operation, the MMF has (1) a high average removal efficiency for turbidity (62%) and TSS (74%) and (2) low average removal efficiency for organic matter (14%). The removal effiency of organic matter is low due to activated carbon adsorption decreased and need to be replaced. At the existing effluent conditions of MMF, UF Hollow Fiber S-640 has only 50% average removal efficiency of organic matter (max. 64%, min 30%), turbidity 73% (max. 92%, min 64%), and TSS 78% (max. 94%, min. 71%) . The average recovery was obtained for 52.87% (max. 89.69%; min.33, 33%) in the transmembrane pressure range from 3.5 to 2.8 bar. As a UF pretreatment, the existing MMF requires backwash at least once in two days with a volume of 0.9 m3 and the media needs to be replaced at least once in 6 months.