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# Upgrading the performances of Ultrafiltration Membrane system coupled with Activated Sludge Reactor by addition of biofilm supports for the treatment of hospital effluents

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**Abstract**

The biological treatment of an hospital effluent has been monitored during 150 days in an activated sludge system followed by an ultrafiltration membrane (BBR-UF). After 75 days, support media was added into the bioreactor to develop a biofilm and to compare process performances of the two reactor configurations: Activated Sludge (AS-UF) or Biofilm Biological reactor (BBR-UF). The removal efficiencies of (Chemical oxygen demand) COD, (Total suspended solids) TSS, (Volatiles suspended solids) VSS, and (Total nitrogen) TN with the BBR-UF were 93.2, 100, 99.9 and 91.3 % respectively, compared to 87.9, 99.6, 97.5 and 91.1% with the AS-UF. Codeine, ketoprofen, diclofenac, naproxen, roxithromycin, metronidazole, hydrochlorothiazide, furosemide, gemfibrozil, pravastatin, and iohexol were highly removed by BBR-UF, while low removal was observed for the same molecules in the AS-UF. This could be attributed 1) to the increase of biomass concentration, 2) to the increase of sludge resident time or 3) to sorption on the biofilms. During continuous reactor operation, (Trans Membrane Pressure) TMP increase in BBR-UF was negligible whereas membrane module in AS-UF required a regular physical maintenance. In the last case, membrane fouling was attributed to the modification of the concentration of the produced exopolymeric substances like protein and polysaccharide. The addition of biofilm supports media improved the performances of AS-UF and also decreased the negatives effects of the biomass on the membrane for the treatment of hospital wastewaters.

**Key words:** Biofilms, membrane, micropollutant, hospital, wastewater, EPS.

## 1. Introduction

The wastewater treatment processes which combine biological treatment and membrane filtration has turned out as an attractive option for liquid solid separation combined with micropollutant removal. The membrane separation technique could be used to avoid problem of non-settling sludge, to replace a secondary clarifier, to obtain a high effluent quality and a compactness of treatment plants. In a tertiary

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