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FOULING POTENTIAL DETERMINATION OF A UASB EFFLUENT USING DIFFERENT ASSESSMENT METHODS

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The fouling potential of a pilot-scale UASB effluent was determined using different assessment methods (SDI and MFI tests and a mathematical analysis based on a saturation curve model). The UASB reactor was operated at HRT of 4; 8 and 12 h. Although the three methods employed were adequate as a predictive tool for UF membrane fouling, the saturation curve analysis revealed a clearer relationship between the fouling potential of the UASB effluent and the HRT applied. It was found that operating a UASB reactor under short HRT, such as 4 h, could increase membrane fouling in a post-treatment UF module.

Keywords: modified fouling index, saturation curve model, silt density index, ultrafiltration membrane.

Introduction

The combination of anaerobic bioreactors and membrane filtration is becoming increasingly popular for municipal wastewater treatment in recent years. The main advantages of this arrangement are complete biomass retention, lower sludge production, enhanced quality effluent and lower energy demand if compared to aerobic treatment processes. However, membrane fouling remains the critical obstacle limiting the widespread application of anaerobic membrane bioreactors (AnMBR) in wastewater treatment [1].

Membrane fouling results from an interaction between the membrane material, the specific system configuration and the components of membrane feed water. In that sense, extracellular polymeric substances (EPS), in either bound or soluble form, are currently considered as the predominant cause of membrane fouling in membrane bioreactors (MBR) [2]. Sludge retention time (SRT), hydraulic retention time (HRT) and organic loading rate (OLR) are the main operating parameters affecting the production of bound EPS since they govern biomass growth and decay [2]. Also, the formation of EPS is growth-

[3] *Laspidou C.S., Rittmann B.E.* //Ibid. – 2002. – **36**, N11. – P. 2711.
[4] *Cho J., Song K.-G., Hyup Lee S., Ahn K.-H.* //Desalination. – 2005. – **178**, N1/3. – P. 219.
[5] *Chae S.-R., Ahn Y.-T., Kang S.-T., Shin H.-S.* // J. Membr. Sci. – 2006. – **280**, N1/2. – P. 572.
[6] *Meng F., Shi B., Yang F., Zhang H.* // Bioprocess Biosyst. Eng. – 2007. – **30**, N5. – P. 359.
[7] *Salazar-Peláez M. L., Morgan-Sagastume J. M., Noyola A.* // Water Sci. Technol. – 2011. – **64**, N11. – P. 2299.
[8] *Chuang S.-H., Chang W.-C., Chang M.-C., Sung M.-A.* //Biores. Technol. – 2009. – **100**, N5. – P. 1875.
[9] *Alhadidi A., Kemperman A.J.B., Blankert B. et al.* //Desalination. – 2011. – **273**, N1. – P. 48.
[10] *Lee S., Cho J., Elimelech M.* // J. Membr. Sci. – 2005. – **262**, N1/2. – P. 27.
[11] *Khirani S., Ben Aim R., Manero M.-H.* //Desalination. – 2006. – **191**, N1/3. – P. 1 – 7.
[12] *American* Society for Testing and Materials (ASTM): Standard Test Method for Silt Density Index (SDI) of Water (D4189–4195). – Pennsylvania, USA, 1995.
[13] *Environmental* Protection Agency. Membrane Filtration Guidance Manual. – Ohio, USA, 2005.
[14] *Schippers J.C.,Verdouw J.* //Desalination. – 1980. – **32**, N1. – P. 137.
[15] *Le-Clech P., Chen V., Fane A.G.* // J. Membr. Sci. – 2006. – **284**, N1/2. – P. 17.
[16] *Eaux L.* Water treatment membrane processes. – New York: McGraw-Hill, 1996.
[17] *Koo C.H., Mohammad A.W., Suja' F., Talib M.Z.M.* //Desalination. – 2012. – **287**, N15. – P. 167.
[18] *Yiantsios S.G., Sioutopoulos D., Karabelas A.J.* // Ibid. – 2005. – **183**, N1/3. – P. 257.
[19] *Javeed M.A., Chinu K., Shon H.K., Vigneswaran S.* // Ibid. – 2009. – **238**, N1/3. – P. 98.
[20] *SimL.N., YeY., Chen V., Fane A.G.* // J. Membr. Sci. – 2010. – **360**, N1/2. – P. 174.
[21] *Yiantsios S.G., Karabelas A.J.* //Desalination. – 2003. – **118**, N3. – P. 131.
[22] *Yu Y., Lee S., Hong K., Hong S.* // J. Membr. Sci. – 2010. – **362**, N1/2. – P. 279.
[23] *Fawehinmi F., Lens P., Stephenson T. et al.* // Proc. of the Water Environment-Membrane Technol. Conf. (Seoul, Korea, 2004). – Seoul, 2004.
[24] *Rosenberger S., Evenblij H., TePoele S. et al.* //. J. Membr. Sci. – 2005. – **263**, N1/2. – P. 113.

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