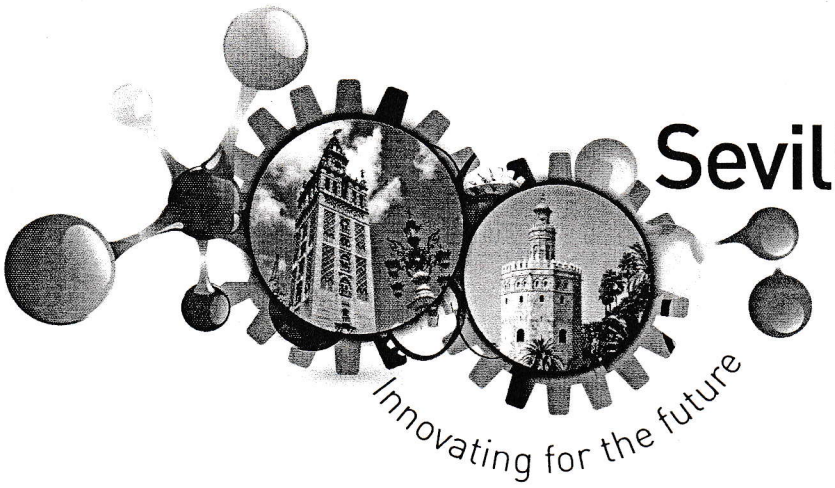

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ORAL SESSION T7.6 – WATER INTEGRAL MANAGEMENT

Chairperson

Javier Benítez, University of Extremadura, Spain

Keynote

T7-043	ENHANCING THE EFFECTIVENESS OF TEXTILE EFFLUENTS TREATMENT FOR WATER RECLAMATION J. Lora Garcia[1], J.M. Arnal Arnal[2], F. López Pérez[1], M.C. Vincent Vela[2], M.C. León Hidalgo[2] 1EPSA, Alcoy (Alicante) 2ETSII, Valencia Department of Chemical and Nuclear Engineering, Polytechnic University of Valencia, Spain

Lectures

T7-016	COMBINATION OF COAGULATION, ADSORPTION AND ULTRAFILTRATION TECHNIQUES FOR REMOVAL OF EMERGING CONTAMINANTS J.L. Acero, F.J. Benitez, F.J. Real, F. Teva Chemical Engineering and Physic Chemistry Department, University of Extremadura, Spain
T7-035	TREATMENT OF AN AGROCHEMICAL WASTEWATER EFFLUENT BY COMBINATION OF A COAGULATION-FLOCCULATION AND THERMAL INTEGRATED PROCESS M.I. Pariente, R. Molina, F. Castillejo, J.A. Melero Department of Chemical and Environmental Technology, ESCET, Rey Juan Carlos University, Spain
T7-063	TECHNOLOGY AND PILOT PLANT RESULTS OF THE OXIC-SETTLING-ANOXIC (OSA) PROCESS S. Rodríguez-Pérez[1], J.C. Gutiérrez[2], C. Arnáiz[1] [1] Departamento de Ingeniería Química y Ambiental. Escuela Politécnica Superior. University of Sevilla, Spain [2] Departamento de Biología Molecular e Ingeniería Bioquímica. Pablo de Olavide University of Sevilla, Spain
T7-051	REMOVAL OF PB(II) FROM WATER BY HETEROGENEOUS PHOTOCATALYSIS L. Cerro, J.M. Ráez, J. Aguado, M.J. López-Muñoz Department of Chemical and Environmental Technology, ESCET, Rey Juan Carlos University, Spain

TECHNOLOGY AND PILOT PLANT RESULTS OF THE OXIC-SETTLING-ANOXIC (OSA) PROCESS

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T7. Integrated Water Management. T7.3. Water Treatment. Advanced Technologies.

In most biological wastewater treatment process such as conventional activated sludge (CAS) system, though they have been recognized to be effective for organic wastewater treatment, the large amount of excess sludge derived from microbial growth generates high costs in equipment, operation, and final disposal. Handling, treatment, and disposal of this solid waste accounts for 50-60% of the operating cost of a secondary treatment plant[1-5]. In Europe, the implementation of the municipal wastewater directive (Directive 91/271/EEC), it was expected to see the production volume of sludge to increase to 8 million tons per years. All Member States will see their volume increase. The directive was introduced to improve the water quality of the rivers across Europe by cleaning municipal wastewater before the release into the environment and reducing the adverse effect of such discharges. The drawback is the sludge production making its safe disposal a critical aspect of its implementation[6]. The annual generation of sewage sludge in the European Community is heading from some 5.5 Mt of dry solids in 1992, through 7 Mt in 1997 towards about 9 Mt by the end of 2005. This production is estimated in 13 Mt by the end of 2020 [7-10].

Main conventional methods for sludge disposal in EU are landfill, land application and incineration, accounting for nearly 90% of total sludge production in EU. Hence, the current legal constraints, the rising costs and public sensitivity of sewage sludge disposal have provided considerable impulse to explore and develop strategies and technologies for minimization of sludge production[5].

As one of the most inexpensive ways for excess sludge reduction, an oxic-settling-anoxic (OSA) process has been discussed. The OSA process is a modification of CAS process, which can reduce sludge production by an alternating exposure of activated sludge to oxic and anoxic environments [11-18]. The anoxic holding tank is inserted into the sludge recirculation line. There is no oxygen input promoting anoxic conditions (< 2 mg L^{-1}). Recent investigations show that the OSA process could result in a significant decrease in excess sludge production (up to 100%), and the chemical oxygen demand (COD) removal and sludge settleability could also be improved[4].

However, a better understanding of the cause enabling excess sludge reduction in this process is necessary for full-scale experience.

A 6.5 L d^{-1} lab-scale pilot plant has been designed and constructed for the study of the reduction of excess sludge in wastewater treatment plants. In this study, the experiments were carried out in two CAS systems, one of them modified to an OSA system. Both systems were operated with synthetic wastewater for 200 days. DO concentration and pH value in the reactors and holding tank were measured by a DO (HQ30D Flexi, Hach-Lange) and pH (GLP22, Crison) meter, respectively. Seeded sludge was taken from the recirculation line of the aeration tank of the West Urban Wastewater Treatment Plant of Sevilla, (Spain). The hydraulic retention time (HRT) was controlled at 12 h, in the aerobic reactors and at 3.5 h in the anoxic holding tank. The operation was conducted at a room temperature of 25°C.

After 200 days of operation, removal efficiencies of COD were above 64% and 79% under control CAS and OSA system, respectively. The Suspended Solids in the effluent from the settling tanks of the two pilot plants were also examined and similar results were found in both systems. It was found that sludge reduction percentage in the OSA system ranged between 53% under the experimental conditions, when comparing with the reference system. The microscopic analysis revealed that bacterial communities in the processes were different. The environment conditions produced in the OSA system affected the microbial population in abundance, diversity and density. Nevertheless, these conditions did not affect significantly the performance of the system. These findings indicate that the impact of the OSA system adjust the microbial community structure, while maintaining the metabolic activity.

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