Biodegradation of effluents from wood furniture industry in anaerobic reactors

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Wood furniture industry is an important sector of the forest based industries in the EU. Only a few of these industrial plants have wastewater treatment systems despite the potential for energy recovery from this type of wastes through biological processes. The aims of this study were the evaluation of the anaerobic biodegradability of a wastewater from a wood furniture industry in Up-flow Anaerobic Sludge Blanket (UASB) reactor and the establishment of values for operating parameters that lead to the optimization of energy recovery in the form of methane rich biogas. A wastewater from a paint and varnishing booth was used to test several experimental conditions such as organic loading, flow rate and temperature. The assays were performed in UASB reactors with effluent recirculation in a closed system and monitored for methane production and removal of organic matter. Microbial population shifts were also monitored by Fluorescence in situ Hybridization. The anaerobic biodegradability of the wastewater was 68%. The metanization efficiency of the removed Chemical Oxygen Demand (COD) reached up to 80% when the optimal conditions were applied: Organic loading rate of 0.67 g COD total/L, flow rate of 0.25 L/h and temperature of 35 °C. This maximum methane production was accompanied by an increase of the relative abundance of Archaea microorganisms responsible for methane production and a relative decrease of the Bacteria microorganisms. A first order kinetic model was used to predict methane production resulting in correlation coefficients above 94% for all the tests performed. It was concluded that anaerobic treatment in UASB reactors is an interesting option for bioenergy recovery from this type of wastewater.

Biography

Maria Helena Gomes has both MSc and a BSc in Chemical Engineering from Instituto Superior Tecnico of Lisbon University and has a PhD in Sciences Applied to the Environment from the University of Aveiro. She is an Assistant Professor in the Environment and Planning Department at the University of Aveiro. Her research interests are centered on biological processes for water treatment and for the treatment and material and energetic valorization of wastewaters and wastes. She is a full Member of the research center CESAM. Presently she supervises 3 PhD students on the development of new methods for physical-chemical and/or biological processes for water and wastewater treatment. She also supervises a PhD work in collaboration with CUF-Estarreja on the optimization of water use in the industry by means of process integration. She has done several works on consultancy and training in organizations and is presently working with two industrial companies for the implementation of quality and environmental management systems. With a total of over 65 communications she has 25 papers published in international scientific magazines with peer review, 4 international book chapters and 32 communications in Portuguese and international meetings with peer review.

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