

International Conference on

Industrial Chemistry

June 27-28, 2016 New Orleans, Louisiana, USA



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Elimination of nitrogen and phosphorous compounds from industrial and domestic effluents using vertical bioreactors

Eutrophication, the environmental effects of excess nitrogen and phosphorous compounds in water, has the most deleterious effects on water quality and aquatic species. This is characterized by an uncontrollable growth of algae, and the appearance of hypoxia. The annual economic losses due to eutrophication are measured in billions of dollars and affect a spectrum of economic activities all over the world. Eutrophication has a largely anthropogenic origin created by industrial farming, emissions from wastewater treatment plants, emissions from power plants, and other industrial activities. The largest majority of nutrient removal plants are planar and demand big and expensive construction area. Furthermore, mixing is inadequate due to their rectangular cross section. In this presentation, we describe the economic and operational advantages of a novel multistage vertical bioreactor, with a high nutrient removal efficiency, installation simplicity and easy scale-up. The bioreactor is especially suited for retrofitting nutrient removal plants located in urban or highly populated areas. A demonstration plant of 20,000 L/day based on our US Patent is being built in Pickering, Ontario.

Biography

Manuel Alvarez Cuenca has 25 years of industrial experience in Wastewater Treatment (Ecotechnos Inc.), Energy Transformation, Liquid and Solid Fuels (ESSO); Coal Combustion and Environmental Pollution (Ontario Hydro); Pressurised Fluid Bed Combustion (ENDESA). He has 22 years of experience in the development of technologies for water/wastewater treatment including fixed film bioreactors; nitrification-denitrification in rotating biological contactors and fluidized beds; nutrient removal (phosphorous and nitrogen) in wastewater. He is President of Ecotechnos Inc. (Toronto). The firm designs and manufactures advanced wastewater treatment plants for small and medium-size industries. Ecotechnos Inc. develops and manufactures compact, modular fixed film technologies for the treatment of wastewater from food processing industries, subdivisions, tourist resorts, shopping centres and in general for the replacement or upgrading of obsolete facilities like septic tanks, ponds and conventional activated sludge facilities. He also has 24 years of research and academic experience as University Professor in Canada, Spain and Ibero-America in universities like Ryerson University, University of Western Ontario, University of Waterloo, University of Guelph, University of Windsor (Canada); Universidad Politécnica de Madrid (Spain), Universidad de Cartagena (Colombia), Corporacion Universitaria de la Costa (Colombia), and Universidad Nacional de Colombia (Colombia).

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