نویسندگان:

MOHAMED EL AMINE EL AISSAOUI EL MELIANI - *Saharan Natural Resources Laboratory, Faculty of Science and Technology, Ahmed Draia University, Algeria*

MENG SUN - *Recycle Engineering Laboratory, Faculty of Environmental Engineering, The University of Kitakyushu, Japan*

TAREQ W. M. AMEN - *Laboratory of Inorganic Materials and Soft Chemistry, Department of Life, Environment and Applied Chemistry, Graduate School of Engineering, Fukuoka Institute of Technology, Japan*

HOUCINE CHOUBANE - *Laboratory of Organic Synthesis, Physico-chemistry, Biomolecules and Environment, Department of Chemical Engineering, University of Science and Technology of Oran Mohamed Boudiaf, Algeria*

ABDELKADER IDDOU - *Saharan Natural Resources Laboratory, Faculty of Science and Technology, Ahmed Draia University, Algeria*

BING LIU - *Resources and Environment Innovation Research Institute, School of Municipal and Environmental Engineering, Shandong Jianzhu University, China*

MITSUHARU TERASHIMA - *Recycle Engineering Laboratory, Faculty of Environmental Engineering, The University of Kitakyushu, Japan*

خلاصه مقاله:

The present work investigates the aeration pressurization effect by monitoring the airflow (Qg) variations during its injection at various diffuser arrangements in an activated sludge (AS) system and its impact on the overall energy-saving strategy. To this extent, a laboratory pilot-scale system (۴۵۰ mm in length, ۴۰۰ mm in width, and ۴۷۰ mm high) was built to conduct the experiments with an effective volume of ۸۴.۶ L. To determine the optimum operating conditions, an experimental design combined with the grey method was used to establish the optimal tests to minimize the process's energy footprint based on the pressurization effect due to various diffuser arrangements. Successful implementation of this operation confirmed that controlling the local diffuser densities (DDL) benefits the power consumption value by experiment ( ) savings and the mixing performances at a DDL = ۰.۰۱۴۴. Undoubtedly, increasing the DDL improved the mixing performance of the AS and reduced the inhibition of the oxygen mass transfer coefficient by the mixed liquor suspended solids (MLSS). Furthermore, an empirical model was built to describe the nature of the power consumed accurately. The outcomes showed that the coefficient of determination was R^2 = ۰.۹۸۵۶ with a significant corresponding probability (P-values) < ۰.۰۵. As a result, the multiple linear regression model (MLR), which

means that the model's reliability to predict the data revealed an $R^2 > 80$ %, confirmed that the model is reliable at a 95% confidence interval (CI).

کلمات کلیدی:
Optimization, Wastewater, Modeling, Diffuser, Aeration

لینک ثابت مقاله در پایگاه سیویلیکا:

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