

Economic Analysis of an Integrated Anaerobic Digestion and Ozonolysis System

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Abstract : The distillery wastewater has become major issues in sanitation sectors. One of the solutions to overcome this sewage is to install the Wastewater Treatment Plant. Economic analysis is fundamentally required for its viability. Integrated anaerobic digestion and advanced oxidation (AD-AOP) in the treatment of distillery wastewater (DWW), anaerobic digestion achieved sufficient biochemical oxygen demand (BOD) and chemical oxygen demand (COD) removals of 95% and 75%, respectively, and methane production of 0.292 L/g COD removed at an organic loading rate of 15 kg COD/m³/d. However, a considerable amount of biorecalcitrant compounds still existed in the anaerobically treated effluent, contributing to a residual COD of 4.5 g/L and an intense dark brown color. To remove the biorecalcitrant color and COD, ozonation, which is an AOP, was introduced as a post-treatment method to AD. Ozonation is a highly competitive treatment technique that can be easily applied to remove the biorecalcitrant compounds, including color, and turbidity. In the ozonation process carried out for an hour, more than 80% of the color was removed at an ozone dose of 45 mg O₃/L/min (corresponding to 1.8 g O₃/g COD). Thus, integrating AD with the AOP can be effective for organic load and color reductions during the treatment of DWW. The deliverable established the best configuration of the AD-AOP system, where DWW is first subjected to AD followed by AOP post-treatment. However, for establishing the feasibility of the industrial application of the integrated system, it is necessary to carry out the economic analysis. This may help the starting point of the wastewater treatment plant construction and its operation and maintenance costs.

Keywords : distillery wastewater, economic analysis, integrated anaerobic digestion, ozonolysis, treatment

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