

COAGULATION–FLOCCULATION AS A POLISHING STRATEGY FOR SECONDARY EFFLUENTS IN MUNICIPAL WASTEWATER TREATMENT PLANTS**Ivette Echeverría, Valeria Vargas****ABSTRACT**

Efficient treatment of municipal wastewater faces challenges due to both the limitations of conventional technologies and rapid urban growth. To improve the quality of the secondary effluent from the Pucara wastewater treatment plant (WWTP) in Sacaba, coagulation-flocculation tests were conducted using aluminum sulfate, ferric chloride, and polyaluminum chloride (PAC) combined with an organic flocculant (FLOC). This process enhances the removal of colloidal solids and improves the reduction of organic matter. The tests were carried out using a low-cost jar test apparatus built with locally available materials. Although the plant currently achieves close to 90% efficiency in organic matter removal, its effluent (195 mg/L COD) does not comply with regulatory limits for discharge into the Rocha River (<60 mg/L COD). The optimal doses were 60 ppm of aluminum sulfate, 60 ppm of ferric chloride, and 40 ppm of PAC + 2 ppm of FLOC, achieving turbidity reductions between 73% and 79%, and residual COD values ranging from 93 to 141 mg/L. Ferric chloride showed the best overall performance, with an estimated daily requirement of 187 kg and the need for structural modifications, which highlights the importance of conducting a technical and economic feasibility analysis. The estimated sludge production was 93 m³/day, further reinforcing the need to assess the viability of its management from both technical and economic perspectives. Coagulation-flocculation emerges as a viable alternative for polishing secondary effluents in expanding urban areas, provided that proper operation is ensured and long-term sustainability is carefully evaluated.

Keywords: Wastewater, Effluent Quality, Coagulation-flocculation, Polishing

DOI: 10.23881/idupbo.025.1-4i