EFFECT OF FLOC POROSITY ON BIOSLUDGE SETTLING PROPERTIES IN PULP AND PAPER INDUSTRY ACTIVATED SLUDGE PROCESS

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ABSTRACT

In this study, a novel approach was taken to evaluate the porosity of flocs in the activated sludge process using computer vision. The aim was to investigate the correlation between floc porosityand biosludge settling properties in 5 pulp and paper mill activated sludge processes, located in Northern Europe.

The results of the image analysis revealed a correlation between floc porosity and biosludge settling properties. Flocs with a higher level of porosity and wider porosity distribution resulted in decreased settling properties, as indicated by higher sludge volume index (SVI) values. In addition, the correlation between average floc porosity and SVI values was consistent across all the mills studied, with an R^2 value greater than 0.5.

Traditionally, the number of filamentous bacteria and prevalence of protozoa have been used to monitor and evaluate biosludge characteristics. By monitoring changes in floc porosity in parallel with number of filamentous bacteria using computer vision technology, the early deterioration of the activated sludge process could be identified. This would provide more time to react and implement measures to ensure stable and efficient wastewater treatment performance. Therefore, the evaluation of floc porosity should be considered as a novel parameter in the assessment of activated sludge processes.

Keywords: activated sludge process, computer vision, floc porosity, microscopic images, settling properties.