

# Detection Of Homoserine Lactones (Quorum Sensing Molecules) In Wastewater Microbial Flocs

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## ABSTRACT

Biofilms and flocs are microorganisms (including bacteria, protozoa, fungi, and algae), bioorganic and inorganic materials encased in a slime-like extracellular polymeric substance (EPS). Both are used in biological wastewater treatment processes such as activated sludge and biofilters. The high population density of bacteria within biofilms allows biofilm physiology to be associated with cell-to-cell communication quorum sensing systems. Quorum sensing (QS) molecules such as acyl homoserine lactones (AHL) have been detected in naturally occurring biofilms and have been shown to influence biofilm development.

The objective of this project was to detect AHLs in wastewater microbial flocs. Biomass samples were obtained from the Ashbridges Bay Treatment Plant in Toronto, Canada and sequencing batch reactors (SBR) at University of Toronto's Pulp and Paper facility and Ryerson University's Environmental Biotech Lab. AHLs were detected in microbial flocs using a cross-feeding assay with an *Agrobacterium tumefaciens* NTL4 biosensor. In addition, there was a visual difference in the cross-feeding assay for biomass grown under phosphorus-limited conditions (stronger response) compared to non-limiting conditions (weaker response). Although this difference was not quantified, this project demonstrates that microorganisms in flocs produce AHL molecules. This suggests that quorum sensing may play a role in wastewater treatment.