

Derivation of Theoretical Mass Balance COD fractions for a return sludge in anaerobic tank one: The case of Polokwane Wastewater Treatment Plant

Matome Hosea Modipane¹, Samuel Lesiba Seboya¹

Abstract— The main aim of this paper is to develop a theoretical mass balance COD fraction for a return sludge in anaerobic tank one. Recently, Polokwane Wastewater Treatment Plant is dysfunctional, because almost all the components of the plant are not working. The plant does not have synthesis data which can be used to compute the mass balance equation and to inform the decision to improve the quality of the final effluent to meet the set standards. This paper will use desktop data to develop equations needed for the mass balance model. Each treatment process (hydrolysis, acidogenesis fermentation, DO and Denitrification) in the first anaerobic tank will be examined to find biodegradable and non-biodegradable organic materials to be removed. This paper will also derive COD and biomass fractions for all treatment processes based on the existing literature.

Keywords— Mass balance, Wastewater treatment, COD fractions, Return sludge.