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Carbon Source Recovery on Wastewater Treatment Plant

Wastewater treatment in Sweden has been developed since the late 1800s to mitigate the pollution problem caused by human activity. One of the biggest pollution problems that have been the eutrophication caused by nutrients such as phosphorus and ammonium in the water body. The wastewater treatment process is an expensive process; therefore, it is very important to develop an energy effective and resources efficient treatment plant.

Enhanced Biological Phosphorus Removal (EBPR) is one of the best technologies on phosphorus removal. EBPR efficiency on phosphorus removal process can reach 97%. This process relies on enhancing the Polyphosphate Accumulating Organisms (PAOs) ability to remove the phosphorus in the wastewater. The removal efficiency requires the availability of readily degradable carbon source such as Volatile Fatty Acids (VFAs). To create an efficient treatment plant, it is necessary to recover the resources such as VFAs through a resource recovery process.

Hydrolysis is a degradation process that breaks down the organic matter into smaller substances (VFAs). The VFAs production is depended in the sludge composition, temperature, and pH. Primary sludge is rich in organic matter, and very beneficial for energy recovery by producing methane. Activated sludge in the EBPR process is rich with PAOs. The combination of these two sludges is beneficial to generate VFAs and nutrients. In the other hand, reject water from primary sludge thickener is having the lowest organic matter content compared to activated sludge and primary sludge.

What we have done in this study? In this study, we investigated which sludge composition that generating the most VFAs. Two experiments with different sludge mixture were hydrolyzed for 10 days to provide the data about the carbon

recovery possibility. The first experiment was using the sludge mixture that contains activated sludge and primary sludge with various concentration. The second experiment was using the mixture that contains activated sludge and reject water with various concentration. This study concludes that activated sludge and primary sludge mixture generated the most VFAs. Addition of a certain amount reject water is beneficial for the hydrolysis process. Addition of 10% reject water into activated sludge mixture generates more VFAs than 100% activated sludge.