Pre-treatment of high fat content dairy wastewater using different commercial lipases

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ABSTRACT
To overcome the shortcomings of direct anaerobic digestion of the dairy waste effluent, an enzymatic pre-treatment have been employed to significantly overcome the sludge problems and other drawbacks. This work describes the application of Lipase Z to perform the enzymatic pre-hydrolysis of a synthetic dairy wastewater containing around 2,000 mg/mL of fat content. Different process parameters like effect of enzyme loading, temperature, different concentration of fats and different concentrations of NaCl were optimized for maximum conversion of fat. The maximum hydrolysis of around 75% is achieved at 0.2% w/v enzyme loading, 30°C and 100 mM NaCl concentration for 2,000 mg/mL fats content. It was contemplated that the enzymatic pre-hydrolysis prior to the anaerobic digestion reduced the reaction time required for anaerobic degradation, improved biogas formation and appreciative chemical oxygen demand removal.

Keywords: Dairy wastewater; Anaerobic treatment; Pre-treatment; Enzymes; Lipase

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