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Kinetics of Activated Sludge Protein Extraction by Thermal Alkaline Treatment

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Highlights

- Effects of thermal alkaline on activated sludge protein were investigated.
- Extraction kinetics of the sludge protein was studied.
- The protein extraction yield could reach 69%.

Abstract: In order to explore an effective method to enhance application of activated sludge, kinetic model to describe extraction process of sludge protein was investigated based on experimental results. Relative molecular mass of sludge protein was tested using sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE). The results showed that the extraction mechanism of sludge protein under thermal alkaline hydrolysis condition was in line with first-order continuous reaction kinetics. The kinetic model was established to explain relationships among first-order rate constant, pH value, and temperature. The optimum conditions were sludge retention time of 21d, extraction time of 2h，*pH* of 12, and temperature of 130℃. The extraction yield of sludge protein was 69% under the optimized conditions. Relatively molecular mass of sludge protein was between 26.478 kDa and 430.86 kDa, and the protein