Abstract

The main purpose of the study was to check how sewage from slaughterhouses affects methanogenesis in the anaerobic reactor. The influence of previous hydrolysis on the anaerobic wastewater treatment process was also tested. To determine the effectiveness of the processes of hydrolysis and methane fermentation, a proprietary method, developed for this purpose, was used, using coagulation, which removes from the wastewater small proteins found in the blood plasma passing through the filter during the determination of the dissolved wastewater fraction and increasing the dissolved COD result by about 30% . The course of the hydrolysis at 22°C and 35°C was checked. and additionally, for both temperatures, the process was checked at an increased pH to 9. The tests were carried out for 1, 2, 3 and 5 days duration of the process. After the selected detention times, the methane potential of the hydrolysed wastewater was tested using the AMPTS device. The control sample was the sewage subjected to hydrolysis at the temperature of 22°C. The highest value of methanogenic potential was obtained in the sample after 5-day hydrolysis at 35C□C and in the sample after 3-day hydrolysis at 35°C and pH 9, obtaining 34.8% and 14% more methane, respectively, compared to the control sample. The suitability of the selected hydrolysis variants was tested by using them as a pre-methane fermentation process in continuously operating systems, where the control was an anaerobic reactor fed with raw sewage. The best removal of impurities was achieved in a system operating with hydrolysis at 35°C with a holding time of 5 days, resulting in a COD reduction of 75.7%. In the system operating with 3-day hydrolysis carried out at 35°C and pH 9, the COD reduction was 65.5%. The reduction in the control reactor was 73%. A negative effect of increased pH was observed on the ability to reduce the load of organic compounds and on methanogenesis in the reactor fed with sewage after hydrolysis at 35°C and pH 9. The most stable operation was found in the system with 5-day hydrolysis at 35°C. In the reactor fed with raw sewage, in the reactor fed with sewage, after 5 days of hydrolysis and after 3 days of hydrolysis at pH 9, 0.24, 0.24 and 0.2 l of CH_4 were produced per g of COD removed, respectively. The implementation of the technology at EMI will focus on a 1-stage anaerobic reactor without hydrolysis. Still, systems with hydrolysers will be of interest to the company for wastewater containing more difficult to decompose organic compounds.