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Influence of applied voltage on the performance of bioelectrochemical anaerobic digestion of sewage sludge and planktonic microbial communities at ambient temperature

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Abstract

The influence of applied voltage on the bioelectrochemical anaerobic digestion of sewage sludge was studied at ambient temperature ($25\pm 2^\circ\text{C}$). The stability of the bioelectrochemical anaerobic digestion was considerably good in terms of pH, alkalinity and VFAs at 0.3V and 0.5V, but VFA accumulation occurred at 0.7V. The specific methane production rate ($370\text{ mL CH}_4/\text{L.d}$) was the highest at 0.3V, but the methane content (80.6%) in biogas and the methane yield ($350\text{ mL CH}_4/\text{g COD}_r$) were higher at 0.5V, significantly better than those of 0.7V. The VS removal efficiency was 64-66% at 0.3V and 0.5V, but only 31% at 0.7V. The dominant species of planktonic microbial communities was *Cloacamonas* at 0.3V and 0.5V, but the percentage of hydrolytic bacteria species such as *Saprospiraceae*, *Fimbriimonas*, and *Ottowia pentelensis* was much higher at 0.7V. The optimal applied voltage for bioelectrochemical anaerobic digestion was 0.3-0.5V according to digestion performance and

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