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Development under discontinuous operation of an anaerobic microbial community acclimated to high oleate loads

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Anaerobic conversion of lipid-rich effluents to biogas is enhanced when a discontinuous operation is applied[1,2]. In this work, sludge changes during the discontinuous operation of an anaerobic reactor fed with an oleate-rich effluent[3] were evaluated. Specific methanogenic activity (SMA) in the presence of acetate and H_2/CO_2 and the influence of increasing oleic acid concentrations (between 0 and 900 mg/L) on the aceticlastic methanogenic activity were studied in batch assays, at the beginning and end (t = 213 days) of the operation. The shifts on the composition of bacterial and archaeal communities were also characterized by DGGE analysis of PCR amplified 16S rRNA fragments from sludge samples collected at time 0, 100 and 213 days. Aceticlastic and hydrogenotrophic SMA increased sharply from the beginning till the end of the operation, but the aceticlastic tolerance to oleate was not significantly affected, for all concentrations studied. Molecular techniques showed that bacterial community was more affected by the conditions imposed within the reactor than the archaeal one and that the major shift in the archaeal community was verified during the first 100 days of operation. The results obtained show that the operating conditions applied produced significant changes on the microbial community, leading to gradual development of a specialized consortium adapted to high oleate loads.

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2. Sousa, D. Z. (2006) *PhD Thesis.*
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