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ACIDOGENIC DIGESTION OF DEPROTEINIZED CHEESE WHEY

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Abstract

Exploitation of agroindustrial wastes for the production of biobased chemicals, high added-value compounds and/or biofuels represents a key task in the perspective of increasing the employment of renewable resources. For instance, bioconversion of the organic matter present in biowastes could be addressed towards volatile fatty acids (VFAs) production, in order to employ them as the carbon source for the production of biopolymers such as polyhydroxyalkanoates (PHAs). In this respect, a number of investigations reported the successful use of several different agroindustrial wastes. In the present contribution, anaerobic digestion of deproteinized cheese whey was carried out in order to produce a VFA-rich effluent. A wide screening of the most suitable operating conditions was conducted, by testing pH (5, 6 and 7), temperature (35 and 55°C) and presence/absence of a well characterized acidogenic inoculum together with the microflora carried by the said wastewater. Experiments were conducted in batch conditions throughout 14 days, during which reactors were sampled and pH discontinuously adjusted every 2/3 days. As a whole, highest acidogenesis yields were achieved when operating at 55°C, with a pH equal to 6 and 7, after few days of incubation (4 and 2 days, respectively). In both the latter conditions, bioconversion of the influent organic matter (evaluated as COD) into VFAs not already present in the wastewater was higher than 20%. However, the predominant VFAs produced (that is, acetic and butyric acid) accounted alone for more than 10% with respect to the influent COD. This is relevant when considering that both these VFAs are among the most suitable ones for PHAs synthesis (Dias et al., 2006). Generally, when the deproteinized whey cheese microflora was operated together with the acidogenic inoculum, VFAs production yields were improved. Nevertheless, adaptation of the microflora already present in the wastewater may establish a stronger microbial community, a key factor when moving to continuously operated reactors.