

Continuous Ethanol Production from Cheese Whey Permeate

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Abstract:

Cheese whey permeate poses a severe problem because of its high biological oxygen demand (35-60 g/l). Cheesemakers have been concerned with its disposal being its valorization into secondary products such as whey protein concentrate (WPC) considered to be profitable. The lactose content (50-60 g/l) of the obtained cheese whey permeate makes it a valuable source for the production of ethanol. Nevertheless, the economic success of this process depends on the development of high productivity systems. In this work, a high ethanol productivity process for the conversion of whey permeate into ethanol using an air-lift continuous system with flocculating yeast cells is described. For that, a lactose fermenting recombinant flocculent *Saccharomyces cerevisiae* was used. Continuous experimental data, at increasing dilution rates, on yeast fermentation and growth on cheese whey permeate from a Portuguese dairy industry are presented. In the continuous bioreactor, it was possible to operate at a dilution rate of 0.45 h⁻¹, with total lactose consumption (residual lactose concentration less than 1 g/l) corresponding to an ethanol productivity of 10 g/l.h. which is 6 times larger than continuous conventional fermentation systems. The system stability was confirmed by keeping in operation for six months.

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