

Revitalization of the Yeast Cream to Improve the Ethanol Production in a Cell-Recycling Fermentation Process

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In a fed-batch process operating in industrial plants, the yeast cells are harvested and acid treated to kill contaminants prior to use as the starter of the next fermentation cycle. Literature reports that the fermentative capacity of baker's yeast after cold storage is dependent on the initial physiological state of the cells. The aim of the present work was to improve the fermentation activity and to maintain a high viability by exposing the cells to appropriate media between one fermentation run and the next. Fed-batch fermentations were carried out using high cell densities in molasses and in a synthetic medium in which the growth is poor. The revitalization of the yeast cream containing 24mg/mL of cell biomass was indicated by the increases in biomass after incubation periods of 16h at temperatures varying from 30°C to 34°C. During the revitalization process, the viability was kept constant, while the biomass varied within the range of 1.7% (v/v) to 37.2% (v/v). Cells were pre-incubated prior to the fermentation runs in 5% molasses or water solutions containing 1% yeast extract and sucrose concentrations varying from 5% to 10%. The benefits of the revitalization or cell renewal were confirmed by the maintenance of cell viability within the range 90- 70% and ethanol yields varying from of 8.9% (v/v) to 10.0 % (v/v) after ten fermentation cycles at 34°C. The generation of new cells is relevant to obtain robust cell able to tolerate the acid and nutritional stresses throughout the succession of fermentation cycles.

Keywords: *Saccharomyces cerevisiae*, conditions for storage of the yeast cream, ethanol production.

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