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# Summaries 5

## *Systems and technology*

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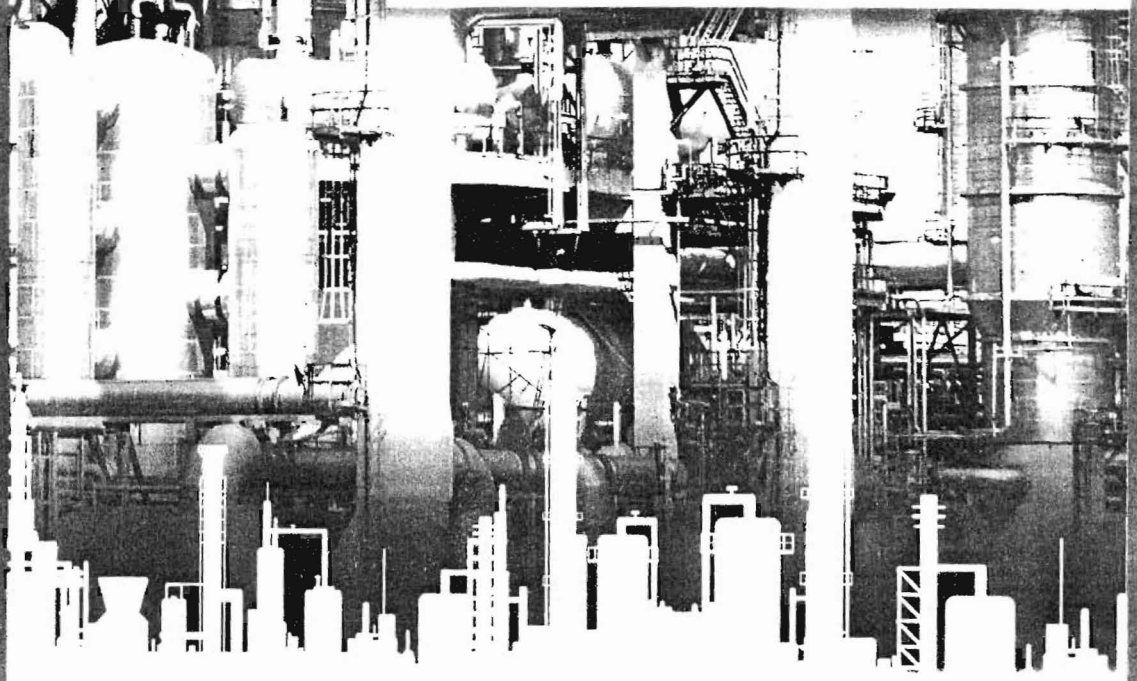

# Flexible approach by development of fed-batch algorithms for fermentations under $pO_2$ cascade control

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Different tasks of fermentation processes are determined to a great extent by the potentialities of the process controller. The typical potentialities of fermentation control are commonly included in the commercially available basic configuration of a bioreactor controller. However, most of parameters of real value for the fermentation culture cannot be measured directly and controlled on-line. In this connection, it is important to take as possible more information from fermentations not only with the help of specially developed experimental devices and systems, but also using the versions of sensors, executive elements and process controllers available in the market.

Summarizing and analyzing the commercially available fed-batch realization potentialities in bioreactors, it can be concluded that users, without the additional equipment, resources and training in respect to fed-batch, cannot ensure more than the execution of the time-dependent feeding profile and varying the feed rate depending on $pO_2$.

The aim of the present work was to develop the approaches and algorithms of microorganism cultivation processes, the concept of which could be used as a realizable solution in controllers of fermentation processes. The developed solutions are oriented to the bioreactors equipped according to the basic configuration. Due to this, these will be potentially available for relatively wide circles of users. Algorithms and approaches were developed and tested in the fermentations using two strains of yeasts (*Saccharomyces cerevisiae* DY 7221 and *Candida tropicalis* CK-4), and bacteria *Escherichia coli*.

The development and application of a flexible process controller in fed-batch yeast fermentations using $pO_2$ cascade control was performed. A new algorithm for fed-batch fermentations using $pO_2$ cascade control was developed, the concept of which could be used as a realizable solution in fermentation systems equipped according to the basic configuration. The algorithm is based on the combined influence of $pO_2$ and pH on the substrate feeding intensity.

As can be seen in the present work, employing the bioreactor controller's flexibility, the relatively prompt and demonstrative visualization of fermentations in the process control program was possible. Employing this approach, there are potentialities of the further upgrading of process control.