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# Kinetic models and process design of sugar beet processing intermediates fermentation to ethanol

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Ethanol technology represents an important scientific discipline in this age of dynamic development. The production of ethanol, as a substitute for fossil fuels, receives the primacy of international scale, both for economic and environmental reasons. This is where the potential of sugar beet processing intermediates was recognized as renewable resources for attaining sustainability in ethanol production. Results from analyzing the annual sugar production and consumption in some European countries indicated to the existence of surplus sugar beet, i.e. that sugar factories can be reconstructed and empowered to simultaneously produce sugar and ethanol. With this increasing interest in the industrial application of batch alcoholic fermentation, significant parameters (sugar concentration, inoculum size, temperature, agitation rate, pH value, etc.) for achieving the highest ethanol yield were examined and optimized in experiments performed in 3 L bioreactors. After obtaining the optimal conditions, various kinetic models have been examined for microbial growth, product formation and substrate consumption in 14 L bioreactors. Kinetic modeling may be regarded as an important step in developing a fermentation process, since models help in process control, reducing process costs and increasing product quality. Thus, by defining the kinetics and kinetic parameters of this biotechnological process facilitates the struggle towards translating this process to industrial scales. Finally, the kinetic models were incorporated into simulation software (SuperPro Designer®) for designing a process and cost model of a plant producing 44 million L of 99.6% pure ethanol annually. Results from this base-case model can help researchers develop novel ethanol production technologies.

## Biography

Damjan Vučurović obtained his master's degree at the age of 24 at the University of Novi Sad in Serbia, Faculty of Technology, Department of Biotechnology and Pharmaceutical Engineering where he is currently attending his Ph.D. studies. He was awarded with the Best Student of the University of Novi Sad Award in 2010, as well as the EURECHA Student Contest Problem Awards at the ESCAPE-21 Symposium in 2011. Parallel to his research on a project supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia, which is reflected in numerous published articles, he is working as an assistant on the courses Bioprocess Engineering, Bioreactors, Bioprocess Equipment and Bioprocess Design.

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