Modeling of ethanol fermentation from low-grade raw materials, including cellulose and hemicellulose in a two-step bioreactor

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The successful ethanol fermentation from lignocellulosic substrates is impeded by the fact, that cellulose and hemicellulose must be digested by different strains, hence full substrate utilization is not possible in one process. That is why these two polysaccharides should be treated separately by different microbial strains. The simplest way to accomplish these processes is to use bioreactor with separated compartments where cellulose and hemicellulose are fermented by different strains: S.cerevisae for cellulose and P. pastoris for hemicellulose. In the present work such a two-step process is modelled for a continuous operation. As substrates glucose (a hexose) and xylose (a pentose) resulting of the raw material acid pre-treatment are used. The addition of the produced ethanol in the first compartment to the second one as starting substrate and its inhibition impact are taken into account. The dilution rate, the initial substrate concentration and the inhibition effects are considered too.

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