

ALCOHOLIC FERMENTATION IN THE PRESENCE OF MICROWAVES

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Bio-ethanol is the main biofuel, obtained by glucose fermentation. To increase the productivity, microwaves (MWs) irradiation of yeasts gains interest as intensification technique. In food and beverage industry, microwaves are mainly used to destroy microorganisms, i.e. sterilization at low temperatures^{1,2}. Only few information related to the intensification of biological process due to MWs have been published^{3,4,5}.

The fermentation of glucose in the presence of *Saccharomyces cerevisiae* under continuous MWs irradiation was studied. A multimode MW applicator was used, the MW energy was fed from a solid-state MW generator using a coaxial antenna. Such a constructive solution makes possible the irradiation of fermentation broth with small, perfectly controlled radiation doses. MWs irradiation was performed simultaneously with cooling and mixing of fermentation broth, to guarantee an isothermal regime. The temperature distribution in the fermentation vessel was modeled in Comsol Multiphysics[®], the results matching the obtained experimental ones. The experiments proved that MWs irradiation increases the rate of fermentation, stimulating yeast cells' activity during fermentation, irrespective of the concentrations of glucose and yeast. Under optimal conditions of irradiation (SAR=25 W/kg), the rate of fermentation is up to 40% higher than the rate obtained in conventional fermentation, for the same operating conditions.

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