411 Enzymatic Dehalogenation of 2-Halo Acids in Nonaqueous Medium

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L-2-Halo acid dehalogenase catalyzes the dehalogenation of L-2-haloalkanoic acids with carbon numbers less than 4 to produce the corresponding D-2-hydroxy acids. The enzyme was purified to homogenity from *Pseudomonas putida* and its enzymological properties have been studied [Motosugi, K. *et al.*, (1982) Agric. Biol. Chem. *46*, 837]. Here, we report the dehalogenation of L-2-halo acids by L-2-halo acid dehalogenase in various organic solvents as the reaction medium.

All experiments were done with the lyophilized enzyme suspended in a number of polar and nonpolar organic solvents and the reaction mixtures were incubated at 30°C for 10 min with mild shaking. We found that the enzyme catalyzes the dehalogenation of L-2-halo acids in both polar and nonpolar organic solvents. Dimethylsulfoxide was the best medium for the enzymatic dehalogenation. L-2-Chloropropionic acid was dehalogenated in this solvent at a rate of about 40% as compared with the reaction in water. Various longer chain 2-haloalkanoic acids and aromatic 2-halo acids which are not substrates of this enzyme in aqueous medium were dehalogenated to produce the corresponding 2-hydroxy acids in dimethylsulfoxide medium. Thus, the substrate specificity of L-2-halo acid dehalogenase is changed in organic solvents.

412 Improved Ethanol Production by Saccharomyces cerevisiae CM-4 Adsorbed on Ceramic Carrier

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A new fixed-bed bioreactor system, consisting of Saccharomyces cerevisiae CM-4* adsorbed onto ceramic beads with the following characteristics: a) average bead size 3-4 mm , b) average pore diameter 80-90 μm , and c) surface area 0.03 m^2/g , has been developed. The system maximizes the utilization of high concentrations of glucose (200-250 g/l) at 38°C, producing 9.4% and 12.2%, v/v ethanol, respectively and 9.5%, v/v ethanol for 20 repeated batches; while diminishing the fermentation time from 8 h to 4-5 h and the problems inherent in the classical and alginate-entrapped ethanol fermentation processes.

Various types and shapes of ceramic supports such as beads, cylinder, and plate were used for ethanol production. Ceramic beads and cylinder type no.30 gave the most satisfactory results.

This potentiation when applied in the continuous mode, using a single-stage ceramic bead bioreactor, produces 9.4%, v/v ethanol from a well-controlled glucose concentration of 200 g/l ; pH 4.5 at 38°C and at a substrate feed rate of 12 ml/h . The system was stable for at least 20 days of continuous operations.

*L.A. Santiago, H. Horitsu, and K. Kawai , Abstracts of Papers, The Annual Meeting of The Society of Fermentation Technology, Japan, Osaka, November, 1988, p 163 .