PHYSICO-CHEMICAL PROPERTIES OF THE *TRAMETES VERSICOLOR* LACCASE -DIACETYL OXIME SYSTEM IN THE PROCESSES OF DYE DECOLORIZATION

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Every year, 7×10^5– 1×10^8 tons of synthetic dyes are produced in the world, a tenth of which is thrown into water bodies along with industrial waste. Due to their chemical structure, the dyes are resistant to fading in water. However, a wide range of physical and chemical methods for decolorizing dyes are currently available. One of the alternative methods is the biocatalytic process of enzymatic catalysis with the participation of the laccase. Recently, it has attracted a lot of attention as an effective approach to degradation of the dyes. The use of mediators makes it possible to oxidize nonspecific substrates with laccase in biocatalytic systems.

Trametes versicolor laccase and diacetyl oxime (DAO) as mediator were used for study. DAO is an inexpensive, non-toxic, small and highly water-soluble oxime molecule. Synthetic dyes such as Methylene Orange, Acid Red 1, Mordant Blue 13, Methylene Green, Crystal Violet; Reactive Blue 4; Methylene Blue and Indigo Carmine (IC) were studied in the process of dye decolorization in the presence of laccase-mediator system (LMS).

The degradation of the dye solutions was investigated spectrophotometrically using an Analytic Jena SPECORD 50 spectrophotometer equipped with a thermostatically controlled cuvette holder. The decrease in absorption at the maximum wavelength of each dye was monitored. The dye decolorization rate in the presence of the laccase – DAO system was studied as a pH function. The pH profile of the laccase activity has the usual bell-shaped shape for laccase. Optimal pH values are largely dependent on the substrate and lie in the range of 4.0–6.0. The effect of temperature on dye decolorization rate in the presence of LMS was evaluated in the temperature range 15–85 °C. The results show (Fig. for example IC) an increase in the initial of IC decolorization with increasing temperature from 15 to 65 °C, however, with a further increase in temperature to 85 °C, the degree of dye decolorization decreased.

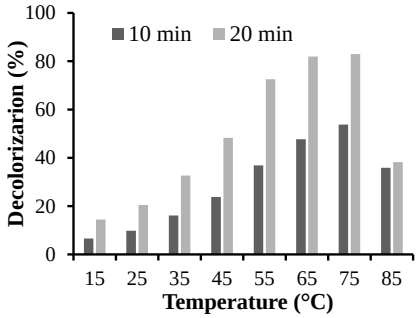

Fig. Influence of temperature on the rate of discoloration of IC after 10- and 20-minutes incubation in the presence of laccase-DAO system in citrate-phosphate buffer pH 4.5