SOME PROPERTIES OF THE PHENOLOXIDASE OF THE COTTON PLANT

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We have investigated the nature and some properties of the phenoloxidase that we isolated from the cotton plant [1, 2]. The content of copper in the phenoloxidase has been studied. This was determined spectrophotometrically at 440 nm [3] from a calibration curve. The protein was dissolved in distilled water, distilled in a glass apparatus with a quartz condenser, and dialyzed against the same water for two days. Then the protein solution was freeze-dried, and the copper was determined. The protein was digested in quartz test-tubes at 120°C for 3 h, a weighed sample being dissolved in 1 ml of concentrated H_2SO_4 (KhCh ["chemically pure"]) and one drop of HNO_3 (KhCh) (the results are summarized in Table 1). The results of an investigation of the dependence of the activity of the phenolaxidase on the pH showed that the enzyme has a pH optimum between 7.6 and 7.8. At this value of the pH there are two temperature optima – at 30 and 60°C, the activity at 60°C being 2.5 times greater than that at 30°C. In view of the fact that the enzyme exhibited a high activity at elevated temperatures, we studied the stability of the phenoloxidase at 70°C (see Fig. 1). As can be seen from the graph, the enzyme is completely inactivated in 30 min.

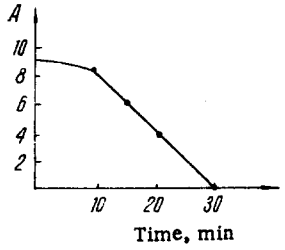

Fig. 1

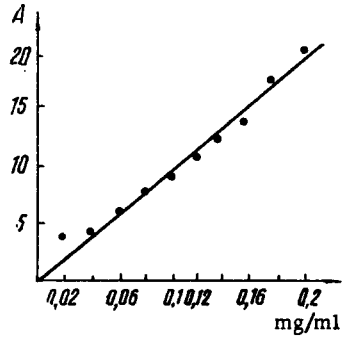

Fig. 2

Fig. 1. Stability of the enzyme at 70°C.

Fig. 2. Dependence of the activity of the phenoloxidase on the concentration of the actual enzyme.

TABLE 1

Expt.	Sample, mg	No. of μg of Cu^{2+} in 1 mg of protein	Mean value per 1 mg of protein	Cu^{2+} in the protein, %
I	1,5	10	9,1 μg	0,9
II		8,3		
I	2	9,3		
II		8,7		

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We have also investigated the dependence of the activity of the phenoloxidase on its concentration; this relationship is linear (Fig. 2).

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3. S. C. Dhar and S. M. Bose, Leather Science, 12, 54 (1965).