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Thermodynamic denaturation of glucose oxidase in aqueous dodecyl trimethyl ammonium bromide solution between 25 and 65°C

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Abstract

The denaturation of glucose oxidase has been studied as a function of dodecyl trimethyl ammonium bromide (DTAB) concentration at temperatures between 25 and 65°C, with 2.5 mM phosphate buffer and pH 6.4. DTAB was found to be very effective in denaturing glucose oxidase, normally resistant to other denaturing agents. At 55°C, the enzyme is expected to have minimum stability in the hydrocarbon environment provided by the detergent. In an otherwise identical situation, when water surrounds the protein, maximum stability is suggested. These predictions are made using the Gibbs free energies of the transition in water $\Delta G_D(H_2O)$, and in a hydrophobic environment $\Delta G_D(hc)$. The values of $\Delta G_D(H_2O)$ and $\Delta G_D(hc)$ were 26.84 and -180.2 kJ mol⁻¹, respectively.

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