

热动力学研究L-抗坏血酸和Cu~2+对过氧化氢酶的协同抑制

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摘要 在310.15K, pH=7.0的0.1mol·L⁻¹Na₂HPO₄-NaH₂PO₄缓冲液二者同时存在时,过氧化氢酶催化H₂O₂分解反应的动力学规律。发现L-抗坏血酸和Cu~(2+)单独存在时对酶反应没有明显的抑制作用,二者共存时,对反应有非线性抑制作用。在一定的酶和底物浓度下,L-抗坏血酸和Cu~(2+)不影响速率方程的形式,只减小了一级反应速率常数。酶活性随抑制剂浓度变化关系呈S形曲线。结合实验结果和文献,提出了一L-抗坏血酸和Cu~(2+)协同抑制过氧化氢酶的可能机理。

关键词 [过氧化酶](#) [抗坏血酸](#) [热动力学](#) [协同效应](#) [过氧化氢](#) [抑制](#)

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Thermokinetic Studies on the Cooperative Inhibition of Catalase by L-Ascorbic Acid and Cu²⁺

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Abstract The reaction of catalase catalyzed decomposition of H₂O₂ was studied by thermokinetic method in 0.1 mol·L⁻¹ Na₂HPO₄-NaH₂PO₄ buffer solution at 310.15 K and pH 7.0 in the presence of L-ascorbic acid or Cu~(2+) or of the both. There is no apparent inhibition effect on catalase when L-ascorbic acid or Cu~(2+) is present solely. However, when they are present simultaneously, a non-linear inhibition of the reaction can be observed. At definite enzyme and substrate concentrations, L-ascorbic acid and Cu~(2+) have no effect on the form of kinetic equation of the overall reaction. In other words, the overall reaction of H₂O₂ decomposition catalyzed by catalase is according to pseudo-first order rate equation when L-ascorbic and Cu~(2+) are present or absent, but the rate constant decrease when the concentrations of L-ascorbic and Cu~(2+) increase. Dose relation of the enzyme activity with the concentrations of L-ascorbic and Cu~(2+) is a sigmoidal curve. Combined the results of this experiment with the conclusions of literatures, a possible mechanism of L-ascorbic acid and Cu~(2+) cooperative inhibition on catalase was proposed.

Key words [PEROXIDASE](#) [ASCORBIC ACID](#) [THERMODYNAMICS](#) [COOPERATIVITY](#) [HYDROGEN PEROXIDE](#) [DEPRESSING](#)

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