

研究论文

芥子酸及其衍生物对酪氨酸酶抑制作用的电化学研究

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摘要 采用电化学方法研究了芥子酸、芥子酸甲酯及芥子碱对酪氨酸酶的抑制作用. 结果发现, 酪氨酸酶电极对其底物邻苯二酚有良好的电催化作用, 电流响应在底物 $1.0 \times 10^{-7} \sim 6.0 \times 10^{-5}$ mol/L的浓度范围内呈线性关系, 并具有较高的灵敏度($60.93 \text{ nA} \cdot \text{L}/\mu\text{mol}$); 芥子酸及其衍生物都对酪氨酸酶的活性有抑制作用, 抑制能力大小的顺序为芥子酸>芥子酸甲酯>芥子碱. 通过对这3种物质的抑制参数的计算结果表明, 芥子碱是非竞争型抑制, 而芥子酸和芥子酸甲酯是混合型抑制. 这3种物质对酪氨酸酶可能的抑制机理一是抑制物与底物竞争酶的双铜活性中心; 二是抑制物具有抗氧化活性, 因而抑制酶对底物的催化反应.

关键词 [酪氨酸酶](#) [化学修饰电极](#) [芥子酸](#) [芥子酸甲酯](#) [芥子碱](#)

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Electrochemical Study of the Inhibitory Effect of Sinapic Acid and Its Derivatives on Tyrosinase Reactivity

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Abstract On the basis of the electrocatalytic response of tyrosinase to catechol, an enzyme electrode, which was prepared by immobilizing tyrosinase in silica sol-gel, was employed to investigate the inhibitory effect of sinapic acid and its derivatives, the components in the chinese traditional medicine, *Semen sinapis*. This electrode exhibited a fast and steady state response to catechol, with a linear range from 1.0×10^{-7} to 6.0×10^{-5} mol/L and a sensitivity of $60.93 \text{ nA} \cdot \text{L}/\mu\text{mol}$. The kinetic process of the chronoamperometric response to catechol, performed in the absence and in the presence of sinapine, sinapic acid and sinapic-acid methyl ester, was analyzed. Sinapic acid was known to show the highest inhibition ability, followed by sinapic-acid methyl ester and sinapine. Further studies reveal that the inhibition mechanism of sinapine corresponds to the noncompetitive one, while those of sinapic acid and sinapic-acid methyl ester can be modeled as the mixed one. Using the Lineweaver-Burk linearization and a secondary one, the inhibition parameters (inhibition constant and coefficient of 50% inhibition) were calculated.

Key words [Tyrosinase](#) [Chemically modified electrode](#) [Sinapic acid](#) [Sinapic-acid methyl ester](#) [Sinapine](#)

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