

论文

牛血清白蛋白与荧光增白剂相互作用的荧光光谱法研究

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摘要:

应用荧光光谱法研究了牛血清蛋白与荧光增白剂CBS-X、BBU、VBL的相互作用.通过Stern-Volmer方程、Lineweaver-Burk方程和双对数曲线进行计算,研究了FWA对BSA内源荧光的猝灭机制.FWA对BSA内源荧光的猝灭主要为静态猝灭和荧光共振能量转移猝灭.测定了荧光增白剂CBS-X、BBU、VBL对BSA的猝灭常量和扩散常量(283 K),确定了荧光增白剂与BSA结合位点数均为1.根据Förster非辐射能量转移理论,计算了BSA与荧光增白剂分子间的结合距离和能量转移效率.通过测定283 K和298 K时供体与受体分子间结合常量,计算了BSA与荧光增白剂作用的热力学参量.BSA与FWA作用的 $\Delta H < 0$, $\Delta S > 0$,并以此确定了BSA与荧光增白剂分子主要通过静电力进行作用.

关键词: 荧光增白剂 牛血清白蛋白 荧光猝灭 荧光共振能量转移 相互作用

Interaction for Bovine Serum Albumin with Fluorescent Whitening Agent by Fluorescence Spectroscopy

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Abstract:

Interaction of bovine serum albumin(BSA) with fluorescent whitening agent(FWA) CBS-X, BBU and VBL were studied by fluorescence spectrometry. The quenching mechanism of intrinsic fluorescence of BSA with FWAs were studied by Stern-volmer curve, Lineweaver-Burk curve and double reciprocal curve. The experimental results show that static quenching and fluorescence resonance energy transfer quenching are the main factors of the quenching mechanism of intrinsic fluorescence. The quenching constants and diffusion constants between BSA and FWAs(283 K) were measured, and all of the numbers of binding sites are 1. Based on the theory of Förster energy transfer spectroscopy, the binding distance r and the energy transfer efficiency between BSA and FWAs were obtained. The thermodynamic parameters of binding reactions were determined by the binding constants in 283K and 298K. All of the reaction enthalpies and the entropy were decreased. According to these, the interaction between BSA and FWAs were driven mainly by electrostatic force.

Keywords: Fluorescent Whitening Agent(FWA) Bovine Serum Albumin(BSA) Fluorescence quenching Fluorescence Resonance Energy Transfer(FRET) Interaction

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