

研究论文

人血清白蛋白与季铵盐双子表面活性剂的相互作用

刘敏^{1,2}, 孙德志², 林瑞森^{*1}, 曲秀葵², 王旭¹, 李玲²

(¹浙江大学化学系 杭州 310027)

(²聊城大学化学化工学院 聊城 252059)

收稿日期 2006-3-22 修回日期 2006-6-29 网络版发布日期 2007-1-12 接受日期 2006-9-20

摘要 在298.15 K下,应用等温滴定量热法研究了人血清白蛋白(HSA)与两种季铵盐双子表面活性剂[(C_nN)₂Cl₂, n=12, 14]在缓冲溶液(pH=7.0)中相互作用的热力学性质.实验结果表明, HSA对这两种表面活性剂有两类结合位点,分别为结合时需要吸收热量的强结合位点和可放出热量的弱结合位点.两种表面活性剂对应的第一类结合——强结合为熵驱动过程,且该结合位点对应的结合位点数、结合常数和热力学参数差别不大.至于第二类结合——弱结合位点,由于(C₁₄N)₂Cl₂疏水链过长,只有部分进入HSA的疏水空腔内,因此相应的结合位点数和放热量减小,而熵变增加,为焓和熵共同驱动的反应.圆二色研究表明(C_nN)₂Cl₂的加入使HSA的二级结构发生变化,这说明(C_nN)₂Cl₂与HSA的相互作用既包含结合反应也包含(C_nN)₂Cl₂诱导该蛋白部分结构改变的过程.

关键词 [等温滴定量热法](#) [圆二色法](#) [季铵盐双子表面活性剂](#) [人血清白蛋白](#)

分类号

Interaction between Human Serum Albumin and Bis-quaternary Ammonium Surfactants

LIU Min^{1,2}, SUN De-Zhi², LIN Rui-Sen^{*1}, QU Xiu-Kui², WANG Xu², LI Ling²

(¹ Department of Chemistry, Zhejiang University, Hangzhou 310027)

(² College of Chemistry and Chemical Engineering, Liaocheng University, Liaocheng 252059)

Abstract Thermodynamics of the interaction of human serum albumin (HSA) with bis-quaternary ammonium surfactants, (C_nN)₂Cl₂ (n=12 and 14), in buffer solution (pH=7.0) has been investigated by isothermal titration calorimetry at 298.15 K. The results show that there are two types of binding sites on HSA for the two surfactants. One is endothermic high-affinity binding, and the other is exothermic low-affinity binding. For the two surfactants, the first type of binding, high-affinity binding is entropy driven process, and the differences of binding site number, binding constants and thermodynamic parameters are small. While as for the second binding sites, low-affinity binding sites, only portion of hydrophobic chains of (C₁₄N)₂Cl₂ can penetrate into the hydrophobic cavity because its hydrophobic chains are too long, which leads to the reduction of binding site number and evolved heat as well as the increasing of entropy. The low-affinity binding of (C_nN)₂Cl₂ to HSA is driven by a favorable entropy increasing with a less favorable enthalpy decrease. Circular dichroism (CD) spectra show that the two surfactants can change the secondary structure of HSA. These results indicate that the interaction of (C_nN)₂Cl₂ with HSA includes contributions of the binding and the partial change of structure of the protein induced by the two surfactants.

Key words [isothermal titration calorimetry](#) [circular dichroism](#) [bis-quaternary ammonium surfactant](#) [human serum albumin](#)

DOI:

通讯作者 林瑞森 ruisenlin@zju.edu.cn

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF\(382KB\)](#)

▶ [\[HTML全文\]\(66KB\)](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中 包含“等温滴定量热法”的相关文章](#)

▶ [本文作者相关文章](#)

· [刘敏](#)

·

· [孙德志](#)

· [林瑞森](#)

·

· [曲秀葵](#)

· [王旭](#)

· [李玲](#)