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研究论文

盐酸表柔比星与核酸相互作用的共振瑞利散射光谱研究及其分析应用

刘绍璞*, 王芬, 刘忠芳, 胡小莉

(西南大学化学化工学院 重庆 400715)

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摘要 用共振瑞利散射光谱研究了盐酸表柔比星(EPI)与小牛胸腺DNA(ctDNA)、鲑鱼DNA(sDNA)、鲱鱼精DNA(hsDNA)和酵母RNA(yRNA)等核酸之间的相互作用. 实验表明在pH 2.0左右的酸性介质中, 表柔比星及核酸本身的共振瑞利散射(RRS)均十分微弱, 但是当它们相互作用形成结合产物时, 将导致RRS增强并出现新RRS光谱. 不同核酸与表柔比星结合产物的RRS 光谱特征略有差异, 散射增强程度则各不相同, 其相对散射强度的顺序是ctDNA≈sDNA＞hsDNA＞yRNA . 在一定范围内核酸浓度与散射强度成正比, 据此可以建立一种新的用表柔比星测定DNA的 RRS 法, 方法具有高灵敏度, 对于不同DNA 其检出限(3s)在24.0 ng/mL 至28.0 ng/mL 之间, 用于合成样品分析, 结果满意. 文中还研究了适宜的反应条件, 影响因素和结合产物的分析化学性质. 结合吸收光谱和荧光光谱特征对表柔比星与DNA 的反应机理进行了讨论.

关键词 共振瑞利散射 盐酸表柔比星 DNA

分类号

Study on the Interaction between Epirubicin Hydrochloride and Nucleic acid and Its Analytical Application by Resonance Rayleigh Scattering Spectra

LIU Shao-Pu*, WANG Fen, LIU Zhong-Fang, HU Xiao-Li

(*School of Chemistry and Chemical Engineering, Southwest China University, Chongqing 400715*)

Abstract The interaction between epirubicin hydrochloride and DNA such as calf thymus DNA(ct DNA), salmon DNA (sDNA), herring sperm DNA(hsDNA) was studied using resonance Rayleigh scattering (RRS) method. In pH 2.0 acidic medium, the RRS signal of epirubicin or nucleic acid alone was very weak, but it was enhanced greatly and new RRS spectra appeared when they interacted with each other to form a bound product. There was a little difference of RRS spectra of the bound products for a variety of DNA and their increments of RRS intensity were followed by this sequence, ctDNA≈sDNA＞hsDNA. Furthermore the RRS intensity is proportional to the concentration of DNA in a certain range, and so a new method for the determination of DNA with epirubicin by RRS technique was developed. The sensitivity of the method was high with detection limits of different DNA being between 24.0 ng/mL and 28.0 ng/mL and the results of determination of DNA in the synthetic samples with RRS method were satisfactory. The optimum conditions, influence effects and the properties of analytical chemistry of the bound products were also investigated and the reaction mechanism was discussed using RRS associated with absorption and fluorescence spectra.

Key words resonance Rayleigh scattering epirubicin hydrochloride DNA

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通讯作者 刘绍璞 liusp@swu.edu.cn