化学学报 2002 60 (10): 1834-1840 ISSN: 0567-7351 CN: 31-1320/06

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β-环糊精/萘丁美酮/直链醇体系的超分子作用机理及其分析应用的研究

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收稿日期 修回日期 网络版发布日期 接受日期

摘要 利用稳态荧光法研究了β-环糊精（β-CD）与新型抗炎药物萘丁美酮（NAB） 间的超分子相互作用，探讨了直链醇（ROH）对该超分子体系的影响。研究表明无 论体系中是否含有直链醇，β-CD和萘丁美酮均形成1/1的超分子包合物其表观结合 常数K_(app)随醇碳链长度的增长而逐渐减小。将这一现象归因于醇对β-CD疏水性 空腔的竞争作用，而非β-CD/NAB/ROH三元包合物的形成所致。荧光猝灭实验表明 水相中β-CF增敏萘丁美酮荧光是源于其疏水性空腔对萘丁美酮激发单重态的屏蔽 效应。直链醇的加入抑制了该效应，从而进一步证实了醇对β-CD空腔的竞争作用 确实导致萘丁美酮被置换到水相中。利用β-CD对萘丁美酮的包结作用使其荧光显 著增大这一特性，建立了水相中高灵敏度测定萘丁美酮的荧光光度法，线性范围为 0～3.0μg·mL~(-1)，检测下限1.05 ng·mL~(-1)。常用药物赋形剂对测定不产生干扰。应用本法测定片剂中萘丁美酮含量，结果令人满意。

关键词 环糊精 萘丁美酮 荧光分光光度法

分类号 0657

Study on the Supramolecular Mechanism of the β- Cyclodextrin/Nabumetone/Linear Alcohol System and Its Analytical Application

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Abstract Nabumetone (NAB) forms a 1/1 supramolecular complex with β- cyclodextrin (β-CD) both in the absence and presence of linear alcohols (ROH). The apparent association constants, K_(app), were measured using a steady-state fluorescence method. K_(app) decreases linearly with an increasing number of carbon atoms in the chain of the alcohol. We attribute this to a competition between nabumetone and linear alcohol for the β-CD hydrophobic cavity as detailed analysis of K_(app) as a function of [alcohol] suggests that the interactions in the β-CD/NAB/ROH system do not result in the formation of ternary supramolecular complex. Quenching the florescence of nabumetone with NaI shows that the β-CD cavity acts as a shield against contact between nabumetone and this aqueous phase quencher, while addition of alcohols inhibits this protective effect. This again suggests that alcohols occupy the space within the β-CD cavity and force nabumetone molecules to reside in the aqueous environment. Based on the significant enhancement of the fluorescence intensity of nabumetone produced through complex formation, a spectrofluorimetric method for the determination of nabumetone in bulk aqueous solution in the presence of β-CD is developed. The linear relationship between the fluorescence intensity and nabumetone concentration was obtained in the range of 0～3.0 μg·mL~(-1), with a correlation coefficient (r) of 0.9997. The detection limit is 1.0 ng·mL~(-1). There is no interference from the excipients normally used in tablet formulations. The application of the present method to the determination of nabumetone in tablets gave satisfactory results and was compared with the reference method.

Key words cyclodextrin nabumetone FLUOROSPECTROPHOTOMETRY

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