

疏水-亲脂作用对反应性的影响 III:

环糊精对碳氟表面活性剂的熵驱动包结以及亲脂作用对形成糖淀粉型包结物的贡献

蒋锡夔, 顾建华, 程贤恩, 惠永正

中国科学院上海有机化学研究所

收稿日期 修回日期 网络版发布日期 接受日期

摘要 用表面张力-浓度曲线法系统地研究了环糊精(CD)和羧甲基糖淀粉钠(Na-CMA)与 $H(CF_2)_{12}CO_2K$ (I), $Cl(CF_2)_nCH_2CH_2N^+(CH_3)_3I^-$ [$n=8(3), 10(5)$]和相应的碳氢表面活性剂(2,4和6)的相互作用. 由于几何尺寸的限制, 碳氟表面活性剂不能与 α -CD形成包结络合物, 但3与 β -CD形成的包结络合物的稳定性远大于相应的碳氢受体4、3与 β -CD的相互作用是熵驱动过程, 而 $C_{12}H_{25}N^+(CH_3)_3I^-(6)$ 则是焓有利的. 与具有“预组织化”内穴的CD不同, 糖淀粉的包结是与大分子从线团到螺旋构象变化的协同过程, 由于缺乏宿主-受体间的亲脂相互作用, Na-CMA不能与所有的碳氟受体形成包结络合物.

关键词 [表面活性剂](#) [核磁共振谱法](#) [环糊精](#) [熵](#) [离解平衡](#) [疏水性质](#) [表面张力](#) [驱动](#) [包合物](#) [糖淀粉](#) [全氟代烃](#)

分类号 [0621.16](#)

The effect of hydrophobic-lipophilic interactions on chemical reactivity III: Contributions of hydrophobic interactions to the binding of fluorocarbon surfactants by β -cyclodextrin and of lipophilic interactions to the binding of hydrocarbon substrates

JIANG XIKUI, GU JIANHUA, CHENG XIANEN, HUI YONGZHENG

Abstract With cyclodextrin (α - and β -CD) and Na carboxymethylamylose (Na-CMA) substrates, and with $H(CF_2)_{12}CO_2K$, $CH_3(CH_2)_{10}CO_2K$, $Cl(CF_2)_8CH_2CH_2N^+Me_3I^-$ (I), $CH_3(CH_2)_8CH_2CH_2N^+Me_3I^-$ (II), $Cl(CF_2)_{10}CH_2CH_2N^+Me_3I^-$ and $CH_3(CH_2)_{10}CH_2CH_2N^+Me_3I^-$ (III) as guests, the different behaviors of fluorocarbon and hydrocarbon surfactants were studied by surface tension measurements. Limited cavity size prevents the inclusion of fluorocarbon surfactants by α -CD, but the binding by β -CD is stronger for the fluorocarbon (I) than that for its hydrocarbon analog (II). A comparison of the thermodynamic parameters of the β -CD binding process for (I) and (III) reveals that for the former the binding process is driven by entropy or hydrophobic forces, but for the latter the process is enthalpy-favored. Notably, Na-CMA fails to bind the fluorocarbons. A crucial difference between the cyclodextrins and the amylose-type hosts lies in the fact that the former possess pre-organized cavities whereas the latter have to readjust their conformations from loose and extended helices with random coils to interrupted helices during the process of binding. Apparently, this extra energy requirement demands contributions from lipophilic interactions for accomplishment which do not exist between fluorocarbon chains and the hosts. Thus lipophilic forces are significant in hydrophobic-lipophilic interactions.

Key words [SURFACTANTS](#) [NMR SPECTROMETRY](#) [CYCLODEXTRIN](#) [ENTROPY](#) [DISSOCIATION](#) [EQUILIBRIUM](#) [HYDROPHOBIC PROPERTIES](#) [SURFACE TENSION](#) [DRIVE](#) [CLATHRATES](#) [AMYLOSE](#) [PERFLUORO-HYDROCARBON](#)

DOI:

通讯作者

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(0KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [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“表面活性剂” 的相关文章](#)
- ▶ [本文作者相关文章](#)

- [蒋锡夔](#)
- [顾建华](#)
- [程贤恩](#)
- [惠永正](#)