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研究论文

缩氨基硫脲衍生物受体的合成及阴离子识别研究

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摘要 利用简便的方法设计合成了三种缩氨基硫脲衍生物受体分子. 利用紫外-可见吸收光谱及^{1}H NMR考察了其与

F^-, Cl^-, Br^-, I^-, CH_3COO^-, $C_3H_7COO^-$, ClO_4^-, NO_3^-等阴离子的作用. 结果表明,
该类受体分子与阴离子形成氢键配合物, 加入F^-, CH_3COO^-, $C_3H_7COO^-$时, 溶液颜色由无色转变为黄色,
而加入其它阴离子则无变化, 从而实现对这三种阴离子的裸眼检测. 通过计算可知,
同种受体分子对此三种阴离子的作用为$F^- > C_3H_7COO^- > CH_3COO^-$. 随着苯环上取代基的变化,
此三种受体分子对三种阴离子的作用呈现出有规律的变化, 即*o*-
F取代的受体分子对阴离子的识别作用大于其它两种受体分子, 且主客体间形成1∶1的配合物. ^{1}H
NMR滴定及质子溶剂效应为受体分子与阴离子间的氢键作用本质提供了直接依据.

关键词 缩氨基硫脲 合成 阴离子识别
分类号

Synthesis of Thiosemicarbazone Derivative Receptors and Their Anion Recognition Properties

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Abstract Three unknown neutral thiosemicarbazone derivative receptors were synthesized in good yields. The binding properties of the receptors with anions such as F^-, Cl^-, Br^-, I^-, CH_3COO^-, $C_3H_7COO^-$, ClO_4^- and NO_3^- in acetonitrile were examined by UV-Vis and ^{1}H NMR spectroscopy methods. A clear color change was observed from colorless to light yellow upon addition of F^-, CH_3COO^- or $C_3H_7COO^-$ to the solution of the three receptors in acetonitrile. The results showed that the three receptors had a better selectivity to F^-, CH_3COO^- and $C_3H_7COO^-$, but no evident binding with Cl^-, Br^-, I^-, ClO_4^- and NO_3^-, and the association constants followed the trend: $F^- > C_3H_7COO^- > CH_3COO^-$, while regularly the three receptors had different binding ability with the three anions because of the electronic effect. The UV-Vis data indicated that a 1∶1 stoichiometry complex was formed between compounds **3a**, **3b**, **3c** and anions, while ^{1}H NMR titrations confirmed hydrogen interaction between the receptors and anions.

Key words thiosemicarbazone synthesis anion recognition

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