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新的偶氮酚型和酚兰型生色开链冠醚的合成和配位性质

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摘要　用酚型开链冠醚1a和1b为原料, 在碱溶液中合成了两类生色开链冠醚: 一类是与对硝基苯重氮氟硼酸盐反应生成的偶氮酚型(2b和2b); 另一类是与N, N-二甲基对苯二胺和K~3[Fe(CN)~6]反应生成的酚兰型(3a和3b)。用紫外-可见光谱法研究了这些生色开链冠醚与碱金属和碱土金属离子的配位性质。发现在THF-H~2O中, 2a对LiClO~4和Ca(ClO~4)~2, 2b对LiClO~4、NaClO~4和Ca(ClO~4)~2, 有较显著的选择性变色作用; 而3a和3b在CH~3CN中, 则对LiClO~4、NaClO~4和各种碱土金属盐,均有不同程度的变色作用, 尤其以对Ca^{2+}和Sr^{2+}作用时的$\triangle\lambda_{max}$为最大。这些结果表明, 2a和2b的配位性质分别与由邻苯二酚衍生的2'a和2'b相似, 而3a和3b的配位性质则分别与由邻苯二酚衍生的3'b相似。

关键词　紫外分光光度法　冠醚　配位性能　选择性变色作用

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Synthesis and complexation properties of new azophenol type and phenol blue type chromogenic acyclic crown ethers

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Abstract Two types of new chromogenic acyclic crown ethers were synthesized from the diphenols 1a and 1b in alkaline solutions. One is azophenol compounds 2a and 2b. They were produced by reacting 1a and 1b with p- nitro-benzenediazonium fluoroborate separately. The other one is phenol blue type compounds 3a and 3b. They were obtained from the oxidative condensation of 1a and 1b with N, N-dimethyl-p- phenylenediamine promoted by K~3[Fe(CN)~6]. Their properties of complexation with alkali and alkaline earth metal ions have been investigated by means of UV-visible spectrometry. It was observed that 2a has apparently selective coloration properties with LiClO~4 and Ca(ClO~4)~2 but 2b was selectively colored with LiClO~4, NaClO~4 and Ca(ClO~4)~2 in THF-H~2O (95:5, v/v). 3a and 3b exhibited some degrees of coloration with Li^+, Na^+ and several alkaline metal ions, especially with Ca^{2+}, Sr^{2+} and Ba^{2+} in CH~3CN. These results show that the complexation properties of 2a and 2b are similar to 2'a and 2'b, and 3a and 3b similar to 3'b.

通讯作者