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Synthesis of the new monomeric fragments for the construction of paracyclophanes

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Abstract

In recent years, the pillar[n]arenes (n = 5-10) – paracyclophanes, available in one-pot synthesis macrocycles, containing fragments of 1,4-alkoxybenzene and having a unique column spatial form have attracted special attention. Pillar[n]arenes are able to form inclusion complexes with different linear "guests"-molecules. One of the widely used methods for the synthesis of substituted pillar[5]arenes is the condensation of pre-functionalized derivatives of hydroquinone. However, the number of functional groups, that can be introduced in this way, is limited by the synthetic availability of the monomer units. Thus, the development of accessible methods for the production of substituted hydroquinones opens the possibility of directed design of macrocyclic receptors. In turn, the introduction of amide, ammonium and amino groups into the pillar[5]arene platform will make it possible to obtain new substances with practically significant properties. In this study new monomeric fragments of hydroquinone acting as precursors for the synthesis of the derivatives of pillar[5]arenes have been synthesized. It was shown that the model derivatives enter into the aminolysis reaction and subsequent alkylation under mild conditions. As a result, the target compounds containing amide and ammonium fragments are formed. The method of condensation of monomeric fragments into the target functionalized derivatives of the pillar[5]arene has been developed. Amphiphilic hydroquinone derivatives containing simultaneously ammonium and amide groups were obtained, which opens the possibility of their use as a surfactants. Thus, the development of new approaches to the directed functionalization of the pillar[5]arenes will allow the construction of new compounds with specified physical and chemical properties, such as solubility, optical and mechanical properties, and will also open the possibilities for their further functionalization with high yields.

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