

An efficient synthesis of bis(calix[4]arenes), bis(crown ether)-substituted calix[4]arenes, aza-crown calix[4]arenes, and thiaza-crown calix[4]arenes

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The easy transformation of

5,11,17,23-tetra-tert-butyl-25,27-bis(aminoethoxy)-26,28-dihydroxycalix[4]arene (2) into 5,11,17,23-tetra-tert-butyl-26,28-dihydroxy-25,27-bis(2-isothiocyanoethoxy)calix[4]arene (3) and 5,11,17,23-tetra-tert-butyl-25,27-bis(chloroacetamidoethoxy)-26,28-dihydroxycalix[4]arene (4) has been exploited for the development of an efficient and expeditious synthesis of a variety of calix[4]arene derivatives [bis(calix[4]arenes), bis(crown ether) calix[4]arenes, aza-crown calix[4]arenes, and thiaza-crown calix[4]arenes]. The functionality of compounds 2 and 3 allowed the formation of intramolecular bridges, leading to capped calix[4]arenes (compounds 5, 10, and 14) as well as to the construction of double calix[4]arene units by means of spacers containing thiourea or amide-sulfur groups (compounds 6 and 15, respectively). In addition, the bis(isothiocyanate) derivative 3 gave access to a high-yield preparation of heteroditopic bis(crown ether) calix[4]arenes (7-9) f