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SYNTHESIS OF 2,3,11,12-DIBENZO-1,4,7,10,13,16-HEXAOXACYCLOOCTADECA-2,11-DIENE

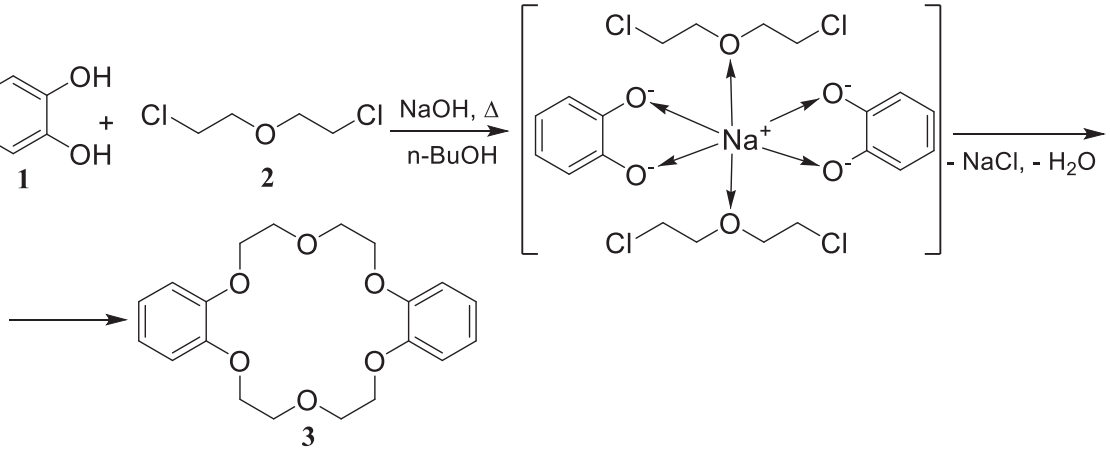
The formation reaction of dibenzo-18-crown-6 (2,3,11,12-dibenzo-1,4,7,10,13,16-hexaoxacyclooctadeca-2,11-diene, DB18C6) is a matrix reaction, which is carried out due to the so-called template effect. The reason for the formation of a cyclic product is the ability of Na^+-ion to organize reacting substances around itself, which results in formation of an intermediate that is pre-organized for the formation of a macrocyclic compound. The functional groups -OH and -Cl come into direct contact through coordination with the sodium-ion, a fast cyclization occurs. An organic base is unable to cause the formation of this intermediate, the reaction proceeds along an intermolecular path leading to polymeric products, not along an intramolecular pathway. It is thought that Na^+-ion is a template for the reaction. The metal cation acts as a stabilizer of the cyclic intermediate, due to which the rate of formation of the cyclic product sharply increases.

A unique property of crown compounds is their ability to form with high selectivity “guest-host” complexes with certain metal ions, which are incorporated into the internal cavities of ligand molecules. The selectivity of complexation in the first-order approximation is determined by the match of the sizes of the metal cation and the cavity.

This ability underlies the practical application of these compounds. The use of crown ethers as extractants is determined by a rare combination of opposite properties – a hydrophilic cavity that is formed by electron-donor atoms and a hydrophobic outer shell. Crown compounds allow to dissolve significant amounts of inorganic compounds with organic solvents. It is possible to use monomers, polymers and immobilized crown compounds as phase-transfer catalysts. Ion-selective electrodes based on various types of macrocyclic compounds have been developed and are being industrially produced.

Crown ethers also have antimicrobial and antiparasitic activity. Moreover, they help to remove ions of toxic heavy metals, radioactive isotopes of cesium and strontium from the body.

We synthesized dibenzo-18-crown-6 according to an original method [1]. Crown ether **(3)** was obtained by the interaction of β,β'-dichlorodiethyl ether **(2)** with pyrocatechol **(1)**, which was carried out in n-butanol environment in the presence of sodium hydroxide at an elevated temperature with stirring. Then the solvent was distilled off from the reaction solution. The target product **(3)** was isolated by precipitation with acetone.



Yield 41%. Physicochemical parameters correspond with those in the literature.

LITERATURE

1. Pedersen, C. J. Cyclic Polyethers and Their Complexes with Metal Salts / C. J. Pedersen // J. Am. Chem. Soc. – 1967. – Vol. 89, № 10. – P. 7017–7036.