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The antioxidant properties of calixarenes

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Abstract

The antioxidant effect was studied (AO) n t-butyl Calix [4] arene (calixarene C) (**I**) and p.tretbutyl tiokaliks [4] arene (calixarene S) (**II**) in comparison to known natural and synthetic. phenols and quinones. In the presence of **I** and **II** was studied initiated oxidation kinetics model substrate (methyl oleate) (MO) (c = 0.67 mol/l) in an inert solvent in chlorobenzene Warburg manometric-type plants at 60±0.20 °C, while stirring 1000 rpm / min. The process was initiated by thermal decomposition of AIBN (c = $1 \cdot 10^{-3}$ mol/l). It was shown that calixarenes containing within its structure 4 phenolic groups exhibit AO action. Calixarene C is more effective than calixarene S. The dependence of actions on the concentration of calixarenes is an extreme character, typical of the weak inhibitors (α-tocopherol, β-carotene, vitamin A, astaxanthin, etc.), Forming during the oxidation sufficiently active radicals. It is found that the oxidation rate with increasing number in the system is reduced by **I** procedure, whereas **II**, by contrast, increases in direct proportion. The dependence is explained by the presence in the structure **II** sulfide group, forming during oxidation thienyl radicals involved in the continuation of oxidation chains. Comparison with known oxidation inhibitors showed significantly inferior to that calixarenes such as an AO α-tocopherol, BHT, tyrosol C, ubiquinone (coenzyme Q_{10}). The relatively low efficiency is related, most likely, with the possibility of the formation of intramolecular hydrogen bonds between the phenolic groups and the lack of spatial screening. A modification of the calixarenes and justified structure, allowing us to obtain a new class of high-performance AD, operating in the process of oxidation in several mutually independent mechanisms.