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NOVEL ANTIOXIDANTS – 4-(3',4'-DIHYDROXY-PHENYL)THIAZOLE DERIVATIVES

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The work aims at a comprehensive study of a new antioxidants – derivatives of the 4-(3', 4'-dihydroxyphenyl)thiazole (DPT). DPT effectively inhibit the process of liquid-phase oxidation of ethylbenzene by trapping chain-propagating peroxyl radicals. DPT inhibit Fe^{2+}-initiated oxidation of the Tween-80 (aquatic medium). This system reproduces the basic patterns of blood lipids oxidation [1].

The dihydroxyaryl fragment is responsible for the antioxidant activity of DPT. The antiradical properties of DPT are confirmed in model reactions with the stable 1,1-diphenyl-2-picrylhydrazyl radical (·DPPH) and the cation-radical of 2,2-azinobis-(3-etylbenztiazoline-6-sulfonic acid) ($ABTS^{\bullet+}$). It was found that all studied DPT reacted with DPPH faster than their non-thiazolyl structure analogues. The rate constant values of the reaction of DPT with DPPH are directly proportional to the energy of O-H bond calculated by B3LYP/6-31G(p,d) (PCM) method [2].

Phenolic nature of DPT determines their propensity to oxidation in aqueous-alkaline media. Hydrogen peroxide and corresponding quinones are intermediates of the oxidation. Obviously, the quinone is formed in the electronic excited state and caused chemiluminescence emission that confirms the radical mechanism of the autoxidation of DPT. The rates of the radical formation were determined by using inhibitor method with ascorbate [3]. The radical formation rates were found to be inversely proportional to the redox potential of compounds. It is expected that the radicals appear in the direct interaction between the phenolate anion of DPT and oxygen.

Thus, in the polar media antioxidant action of DPT noticeably exceeds that of their structural analogues – pyrocatechol, due to the influence thiazole fragment which stabilizes phenolate anion-radical of DPT. On the side, antibacterial properties of DPT and average toxicity cause promising application of DPT as the antioxidant additives.

[1] I.Opeida, A.Shendrik, I.Kachurin, et al. *Kinet Catal.*, **1994**, 35, 31–36 (in Russian).
[2] N.Khlestov, A.Shendrik. *Teor. Exp. Khim.*, **2010**. 46, 279-283.
[3] A.Shendrik, I.Odaryuk, L.Kanibolotska, el al. *Int J Chem Kinet.*, **2012**, 44, 414–422.