

# ANTIOXIDANTS OF HYDROCARBONS: FROM SIMPLICITY TO COMPLEXITY

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As far as the antioxidative properties of additives to lubricating oils and fuels are essentially related to the presence of certain functional groups in their composition, the researches on the synthesis and studying the antioxidant action mechanism of organic compounds, containing two or more functional groups in the molecule, allowing to combine in one compound useful properties of various antioxidants, are undoubtedly of great interest.

This report presents the results on the synthesis, investigating the action mechanism and also the relation between the structure and efficiency of antioxidant action of organic compounds, containing several functional groups (sulphur-containing derivatives of phenol and amines, aminothiols and others) in the molecule, imparting to the compound the properties of two types of antioxidants, namely, the antioxidant effectively terminating the oxidation chains by reaction with peroxide radicals, and the antioxidant decomposing the hydroperoxides.

The antioxidant action mechanism of the compounds synthesized was studied by their reaction with cumylperoxide radicals and cumyl hydroperoxide.

The researches showed that the compounds synthesized combine in themselves not only the property of sulphides to decompose hydroperoxides and the property of phenols and amines to terminate oxidation chains reacting with peroxide radicals, but also exhibit the property not inherent to the indicated classes of compounds: the compounds synthesized catalytically destruct hydroperoxides into the molecular products.

It was established that the catalytic decomposition of cumyl hydroperoxide in the presence of antioxidants studied proceeds not under the action of the initial antioxidant but its transformation products. It was also found out that the reaction product of the compounds investigated with cumyl hydroperoxides efficiently and even repeatedly terminate the oxidation chains reacting with peroxide radicals.

For all sulphur-containing antioxidants the reaction with cumyl hydroperoxide is of first order concerning both the antioxidant and cumyl hydroperoxide. It was studied influence of free radicals, oxygen and other products forming during the oxidation of hydrocarbons on reaction of sulphur-containing antioxidants with cumyl hydroperoxide.

The kinetic regularities and quantitative characteristics of the relations of the above antioxidants with cumylperoxide radicals and cumyl hydroperoxide, and also interrelation between their structure and activity in the reaction were established.

Thus, the results of researches carried out showed that the compounds synthesized as antioxidants exhibit the intramolecular synergism and are antioxidants of the combined action: they terminate the oxidation chains by reaction with peroxide radicals, oxidizing with hydroperoxides form the products, catalytically destructing the hydroperoxides into the molecular products and actively reacting with peroxide radicals.