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Summary of the doctoral dissertation entitled:

"THE EPOXIDATION OF DIALLYL ETHER AND ALLYL-GLYCIDYL ETHER WITH HYDROGEN PEROXIDE OVER TITANIUM-SILICALITE CATALYSTS"

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In the literature section of this work the issues regarding epoxidation processes were presented. First of all, the basic knowledge about the epoxy compounds, methods of receiving them, their properties and applications was presented in this part. Also information about the structure and properties of the titanium-silicalite catalysts, that were used in this work as heterogeneous catalysts in the epoxidation processes of allylic compounds, was also presented. A special attention was paid to such epoxy compounds as: diallyl ether (DAE), allyl-glycidyl ether (AGE) and diglycidyl ether (DGE). Diallyl ether and allyl-glycidyl ether were the raw materials used in the studied epoxidation processes (in the first of them allyl-glycidyl ether was also one of the products), while diglycidyl ether was one of the products in the studied epoxidation processes.

The experimental part was developed on the basis of the performed studies, which concerned the influence of the selected technological parameters on the course of the epoxidation DAE and AGE. These studies were carried out to determine the most favourable values of the following technological parameters of the studied processes: temperature, the molar ratio of allylic compound to hydrogen peroxide, solvent concentrations, type of solvent - polar protic solvent (methanol) and polar aprotic solvent (acetonitrile), content of the catalyst (TS-1 or Ti-SBA-15) and reaction time. In the experimental part, the methods of the synthesis of TS-1 and Ti-SBA-15 catalysts were also described, and moreover, the results of the instrumental studies on these catalysts were presented. Furthermore, the influence of the application of inorganic salts was examined, e.g. potassium dihydrogen phosphate (KH_2PO_4) or sodium sulphate (Na_2SO_4), as a potential additive to the reaction mixture in the epoxidation process, increasing the effective conversion of hydrogen peroxide into organic compounds. In order to determine the most favourable parameters of the epoxidation process, changes in values of the main functions describing the process, such as the selectivity of transformation to epoxy compound (allyl-glycidyl ether and diglycidyl ether), the conversion of the allylic compound, the conversion of hydrogen peroxide into organic compounds and the selectivity of the transformation to organic compounds in relation to hydrogen peroxide consumed, were studied. After the performing of this part of the studies the results were analyzed, and the selection of

the best catalyst and the best solvent for the epoxidation of the tested allylic compounds was performed. Also one of the two studied ethers was selected. The final stage of the studies was the optimization of the epoxidation process. The studies on the optimization of the epoxidation process were carried out with diallyl ether and hydrogen peroxide, over the TS-1 catalyst and in the presence of acetonitrile as the solvent. This optimization was performed with mathematical methods of experiential planning, with help of a rotatable-uniform design.

Keywords: epoxidation, diallyl ether, allyl-glycidyl ether, diglycidyl ether, TS-1 catalyst, Ti-SBA-15 catalyst

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