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Dissertation abstract

Epoxidation and evaluation of properties of selected plant oils

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The subject of the research was a chemical modification of vegetable oils by epoxidation. The results of the epoxidation of commonly available oils: linseed, sesame, and tung oil with the help of peroxyacids: formic and acetic, in the presence of sulfuric acid(VI) as a catalyst are presented. The optimal variable technological parameters of linseed oil and sesame oil epoxidation were developed using the single variable method. The influence of: temperature, amount of catalyst, $H_2O_2/-C=C-$ molar ratio, $HCOOH/-C=C-$ and $CH_3COOH/-C=C-$ molar ratio, mixing intensity and process time were investigated. Based on the determined epoxy number, the iodine number and the amount of glycol groups, after the mass balance calculation: the conversion of unsaturated bonds (K), selectivity of transformation to epoxy groups (S), yield as a relative percentage conversion to oxirane (RCO) were calculated.

On the basis of the single variable method, the influence of the mentioned technological parameters on the course of processes was elaborated and the optimal epoxidation parameters of linseed oil and sesame oil epoxidation were determined using acetic and formic peracids. The basis for the process evaluation were the values of the process variables mentioned: K, S, RCO.

For the most advantageous established values of technological parameters of epoxidation of sesame and linseed oil, the courses of change of iodine and epoxide numbers during epoxidation with acetic and formic acids were compared.

The test method does not initiate the epoxidation of tung oil, despite the use of changes in the mentioned technological parameters. This caused a search for the relationship between the epoxidation capacity and the chemical structure of the oils (type and amount of unsaturated fatty acids).

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