

Purification of 1-monoacylglycerols Prepared by the Reaction of Glycidol and Fatty Acids to Eliminate Cr(III) Catalyst Residues

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Introduction

The main aim of this work is the purification of monoacylglycerols (MAGs) from reaction residues of chromium complexes, which are used as catalysts during MAGs' production. Chromium content reduction or its total elimination results in better possibilities of MAGs' application. To verify the efficiency of purification technique with regard to the chain length of fatty acid residue, esters of caprylic (MAG C8:0) and palmitic (MAG C16:0) acids were used for the experiments.

Methods

Products dissolved in ethanol were purified by filtration to remove precipitated, insoluble part of catalyst. Double recrystallization in ethanol followed and then ion exchangers were used for the final purification of soluble Cr(III) complexes. Content of chromium in monoacylglycerols was monitored after the previous mineralization of samples ($\text{HNO}_3 + \text{H}_2\text{O}_2$) by atomic absorption spectroscopy (AAS).

Results

Filtering out the precipitated catalyst part in ethanol resulted in the elimination of 38% Cr^{3+} of its original amount from palmitic acid monoester and 47% Cr^{3+} from caprylic acid monoester. After the recrystallization of samples in ethanol at -18°C the chromium content decreased to 18% (MAG C16:0), or 30% (MAG C8:0) of its original amount. Combination of filtration and crystallization enabled to reduce chromium content by 82% in MAG C8:0 and 70% in case of MAG C16:0. For the removal of soluble Cr(III) complexes the cationic exchanger Amberlist 15 (Aldrich) proved to be the most effective from the group of tested ion exchangers. It was managed to catch 59% from original $234\mu\text{g Cr}^{3+}/ 1\text{g MAG C16:0}$ and 26% in MAG C8:0 with this type of ion exchanger.

Conclusion

Combination of filtration, recrystallization and sorption on ion-exchangers resulted in a significant decrease of Cr(III) residues in monoacylglycerols prepared from glycidol and caprylic or palmitic acid.

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