Monitoring the Epoxidation of Vegetable Oils by LC-MS for Process Optimization and Control

Sabiqah Tuan Anuar, YuanYuan Zhao, Guoguang Liu and
Jonathan M. Curtis

Lipid Chemistry Group(LCG) and Lipid Products Research Alberta (LiPRA),
Department of Agricultural, Food and Nutritional Science,
University of Alberta Edmonton, Alberta, Canada T6G 2P5

Abstract

Epoxidized oils are useful starting materials for producing a wide range of renewable materials. In order to study the formation of reaction intermediates during the epoxidation of canola oil, a method using non-aqueous reversed phase liquid chromatography coupled to electrospray mass spectrometry was developed. By monitoring the formation and disappearance of partially epoxidized components, this rapid method has been used to elucidate reaction kinetics and to aid in process development. Furthermore, it was found that the end point of the reaction can be readily found by monitoring the ratio of fully to partially oxidized products in the mass spectra. Thus by comparing various epoxidation reactions that occur in a natural oil mixture we have been able to establish simple and reliable criteria to aid in producing epoxidized oils profiles.