

Volatile compounds formed during thermo-oxidation of sterols

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Volatile compounds, particularly off-flavour compounds are formed during oxidative degradation of unsaturated fatty acids and other oil components. Oxidation through free radical mechanism is forming variety of radicals which affects stability of oil. Further, intermediary radicals and non-radical compounds interact among themselves forming large variety of small molecular weight chemical compounds. During phytosterol oxidative degradation many low molecular compounds are formed which may affect stability and quality of oils. Data on volatile components formed from sterols provide an inside information into degradation pathways of these components. Processes of oxidative degradation are particularly important during frying where elevated temperature speed up them. Formed volatile compounds not only affect quality of fried products but also can contaminate working area in frying facility.

The goal of this work was identification of volatile compounds formed during thermo-oxidative degradation of phytosterols and cholesterol.

SPME technique connected with GC x GC-TOFMS was used for identification and quantification of volatile compounds isolated from sterol standards and edible fats heated at 60°C, 120°C and 180°C for 24 hours. During thermo-oxidative degradation of sterols, variety of volatile compounds was formed, and their amounts and type were affected by temperature, time and sterol. Hydrocarbons, ketones, aldehydes, alcohols, acids and variety of other compounds were identified. Many formed volatile compounds have chemical structure similar to typical off-flavour compounds formed during fatty acid oxidation, responsible for rancidity. Two compounds identified in this study, namely 6-methylheptan-2-one and 2-methylpentan-3-one, were specifically formed during degradation of cholesterol and phytosterol respectively, and may be used as indicators of sterols degradation during storage and food processing.