New Chromatographic Methods to Detect Deterioration Products in Used Frying Fats and Oils

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Abstract

In practice some chemical and physical quick field tests are used, showing roughly the extent of fat deterioration by hydrolysis and/or oxidation during use for deep-frying. Because of their half-quantitative results they are of only restricted value in official food control. Here, besides the important sensorial test, the gravimetric determination of polar compounds after column-chromatographic fractionation (CC) and the determination of oligomerized triglycerides by gel permeation chromatography (GPC) are the standard methods.

The CC needs a lot of time, chemicals and space. We adapted the official method to ready for use SPE-cartridges and later to self filled pipet tips, which are cheaper and ensure the correct activity of silica gel. The resulting low solvent volume is evaporated in a stream of compressed air or nitrogen, which is especially time-saving, if carried out simultaneously to elution.

The GPC needs a special expensive column and an RI-detector. Both do not belong to the standard equipment of small laboratories. We developed an HPLC method using a standard RP-18 column and a UV-detector. The carbonyl groups are derivatized easily with 2,4-dinitrophenylhydrazine before separation. The DNP-hydrazones show a strong and characteristic absorption in UV. In used frying fats virtually only ‘higher carbonyls’, i.e. glycerides with at least one acid with an aldehyde or ketone group, are found, because the short chain carbonyls are removed during the frying process. The results from this method correlate poorly with the polar compounds but well with the oligomers. So the HPLC determination of meq of higher carbonyls/kg of fat is a useful alternative to GPC.