

# **Determination of Total Polar Material in High-oleic Sunflower Oil and Palm Oil by Column Chromatography and by Measuring the Dielectricity Constant**

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During deep frying the fat used undergoes chemical changes by degradation reactions. The degradation is influenced by various parameters such as the nature of the oil and its chemical composition, the use of shelf life prolonging components as well as the fried product, which may increase the stability of the frying medium.

The amount or the concentration of total polar material (TPM) formed serves as criterion for the degradation of the oil. According to official regulation, the mass fraction of TPM is determined by column chromatography, which differentiates between two fractions: the “polar” and the “non-polar” material. Time consumption and laboratory expenditure of this method, DGF C-III 3b [2003], is very high. This method is also very sensitive to small changes in the composition of the eluent.

The result is the mass fraction of all polar compounds contained in the oil, regardless of their individual degree of polarity.

A new approach to determine the TPM is to measure the dielectricity constant of the frying oil by a probe. The dielectricity constant increases with the amount of polar material in the oil, but also with the individual polarity of the components. As the complete oil is analysed, all the compounds in the oil contribute to the result with their specific polarity. This explains a certain discrepancy of the “chromatographic” and the “dielectric” values. To compare the results of the dielectric measurement with the chromatographic method, a calibration is therefore necessary.

These differences are discussed for two frying oils. It was found that the physical method is principally more precise and could be suggested as alternative to the extremely time-consuming chromatographic method.

The „new” method is incomparably more rapid, needs no chemicals and no experimental experience and is therefore to be preferred and could even replace the chromatography method as reference.