

## **Rapid Measurement of the Degradation of Frying Oils**

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The degradation of frying oils during usage is affected by various parameters. It depends, first of all, on the nature of the oil and its chemical composition. The use of shelf life prolonging components like antioxidants and anti-foaming agents has also an influence on degradation. The fried product, finally, has also a very important effect on the stability of the frying medium.

Several criteria for assessing the degree of degradation of frying oils exist. One of these is the amount of so-called total polar material (TPM) which has been formed at the high temperatures used for frying.

The reference method for the determination of these polar compounds is DGF C-III 3b [2003]. The oil is separated into a “polar” and a “non-polar” fraction by column chromatography. This method needs a high amount of chemicals and is very time-consuming (several hours). It is very sensitive to small changes in the composition of the eluent. The result is the mass of all polar compounds contained in the oil, regardless of their individual degree of polarity.

An alternative method is the measurement of the dielectricity constant of the frying oil by a probe. It increases with the amount of polar material contained in the oil. This method is rapid and does not require any chemicals. As the complete oil is analyzed, all the compounds in the oil contribute to the result with their specific polarity. To compare the results with the chromatographic method, a calibration is therefore necessary.

Experiments were performed to degrade different oils under different frying conditions and frying various foods. The polar compounds were determined by the reference method and the results were compared to the values obtained by the dielectric measurement technique. It was found that the physical method is principally more precise and could be suggested as alternative to the extremely time-consuming chromatographic method. Beside the enormous gain of time it has the advantage of taking the different degree of polarity of the compounds in the TPM into account.