

## 16-O-Methylcafestol in green and roasted coffee

*How do you know that your product contains exclusively 100% Arabica?*

Classical methods to detect Robusta in Arabica coffee, for example by visual differentiation of the shape of the unground coffee beans, cannot be applied at low amounts of Robusta beans or for ground samples. Sensory analysis will only detect Robusta at high amounts, especially treated Robusta beans (e.g. by vaporization). Moreover, sensory analysis might be subjectively biased.

A substance of the lipid fraction of coffee, 16-O-Methylcafestol (16-OMC), is known to be a specific marker for Robusta coffee. After a comprehensive scientific discussion in the past suitability as unambiguous marker for Robusta was eventually proved. The substance does not occur free and unbound in coffee. It is rather bound to complex fatty acid esters, which complicates the analysis.

The original method was described in 2011 in DIN10779. The downsides of this method are a long analysis time of 3 days as well as very high consumption of solvents. For each analysis almost half a liter of ether is used, which is neither economically, nor ecologically reasonable and dissatisfactory for coffee industry and service laboratories alike.

These severe disadvantages of the classical method for the highly specific marker 16-OMC were overcome by development of two new methods at QSI.

### 1) Analysis using H-NMR

This method uses H-NMR to detect 16-OMC in the lipid fraction of coffee by recording a fingerprint of all organic substances in the sample. The signal used for quantification is located at 3.33 ppm (chemical shift, see fig. 1-3). As this is a direct way to analyze 16-OMC fatty acid esters, this method is very efficient, quick and very well suited for screening of a large number of samples.

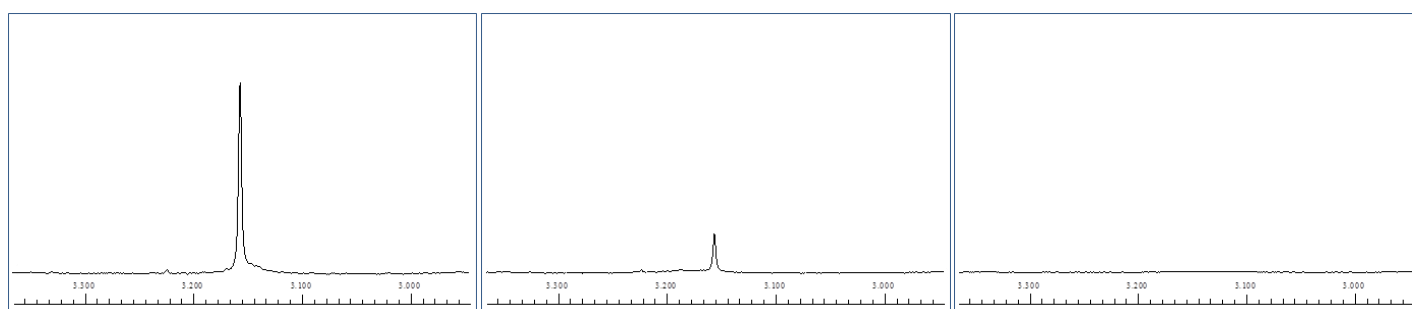


Fig.1: 100% Robusta

Fig.2: Blend of ca. 80% Arabica/20% Robusta

Fig.3: 100% Arabica

This method is validated and accredited for the analysis of green and roasted coffee at QSI.

## 2) Analysis using LC-MS/MS

This method is a major improvement to the DIN10779, as work steps were combined and scaled down in order to reduce solvent consumption and increase turn-around time.

Extraction and cleavage of 16-OMC occurs in the same work step. By using MS/MS detection selectivity considerably increased compared to the official method (HPLC-UV), which is especially important for such a complex matrix as coffee. Identification as well as quantification are far more reliable, as can be seen in the chromatograms (fig. 4-6). Though the coffee matrix is highly complex no interfering compounds are observable.

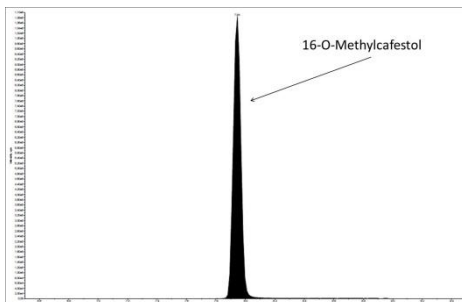


Fig.4: 100% Robusta

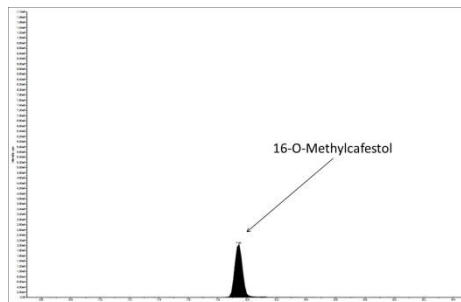


Fig.5: Blend of ca. 80% Arabica/20% Robusta

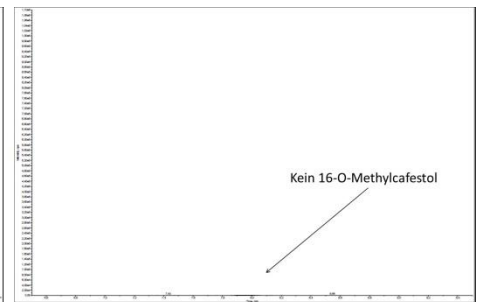


Fig.6: 100% Arabica

This method is validated and accredited for the analysis of green, roasted and soluble coffee at QSI.

## 3) Interpretation of Results

The actual portion of Robusta in a blend is estimated on the basis of the average 16-OMC content of pure Robusta (130 mg/kg 16-OMC corresponds to about 10% Robusta). A 16-OMC content of 50 mg/kg or less could be due to a technically unavoidable admixture of residual Robusta, which would not preclude the statement 100% Arabica.

Both newly developed methods allow us to provide a scientifically sound statement for your product in less than 3 working days and for very favorable conditions.

*We'll be delighted to send you a quote!*