Oil determination in Peanuts by Twisselmann extraction

FatExtractor E-500 ECE: Determination of oil content in a peanut sample by Twisselmann extraction according to AOCS Ab 3-49

A simple and reliable procedure for the oil determination in peanut samples is introduced. This Short Note follows the official method AOCS Ab 3-49 by the American Oil Chemists` Society [1].

The standard method AOCS Ab 3-49 requires an extraction with a Butt-type extraction apparatus with an extraction time of twice 2 h. In between the two extractions there is a further homogenization step. The Butt-type extraction is equal to the Twisselmann extraction method used in the FatExtractor E-500 ECE.

Both, the Butt-type extractor as well as the Economic Continuous Extraction (ECE) are continuous extractions where the sample is constantly kept in hot solvent vapor whilst efficiently rinsed with freshly distilled solvent. The oil content is determined gravimetrically after the extract has been dried to a constant weight.

1. Introduction

This Short Note shows by means of a certified reference material sample that reliable and reproducible results will be received using the FatExtractor E-500 ECE.

2. Experimental

Equipment: FatExtractor E-500 Economic Continuous Extraction, Recirculating Chiller F-308.

Sample: Peanut seeds, AOCS reference material 08 peanut Seed 2018-2019, sample 8, expected oil content: 48.55 % (limit of tolerance: 46.62 – 50.48 %).

Determination: 50 g of a kernel peanut sample was dried in a drying oven to determine the moisture content. The sample was cut into small slices. 2 g of the sliced sample was weighed into a cellulose thimble. The accurate weight of the sample was noted. The sample in the cellulose thimble was covered with glass wool. The extraction was performed using the E-500 ECE (Figure 1) applying the parameters specified in Table 1.

Table 1: Parameters for the Twisselmann Extraction with E-500 ECE

Step	Value	Heating level
Solvent	Petroleum ether	
Extraction	120 min	6
SmartDrying	on[1]	-
Solvent volume [mL]	70	

After the extraction the sample amount was transferred into a mortal and the sample was grinded. The fine powder sample was filled into the cellulose thimble. The sample was placed back into the extraction chamber and extracted a second time using the parameters specified in Table 1. The extracts of both extractions were dried to a constant weight in a drying oven at 102 °C, cooled down to ambient temperature in a desiccator, weighed and the oil content was calculated.

Figure 1: FatExtractor E-500 ECE

3. Results

The determined oil content of a peanut sample is in good correlation to the certified reference value. The result was corrected by the moisture content of the kernel sample. The result is shown in Table 2.

Table 2: Oil content of a peanut sample, determined with FatExtractor E-500 ECE, n = 6.

	Oil content [%]
First extraction	**44.80**
Second extraction	**4.01**
Total oil content, Corrected by moisture content of kernel sample	**49.12**
rsd	**0.54**
Expected oil content	**48.55**
Limit of tolerance	**46.62 – 50.48**

4. Conclusion

The determination of the oil content in a peanut sample following AOCS Ab 3-49 using the FatExtractor E-500 ECE provides reliable and reproducible results. The determined oil content of the certified reference material sample correspond well to the declared value with low relatively standard deviation.

The AOCS standard method Ab 3-49 requires a first and a second Twisselmann extraction of each 2 h. This Short Note shows that it is required to perform a grinding of the sample after the first extraction and to perform a second extraction to receive a sufficient fat determination.

5. References

[1] AOCS Official Method Ab 3-49: Oil in Peanuts, Reapproved 2017.

For more detailed information and safety considerations please refer to the Application Note No. 390/2020.

[1] Instead of using SmartDrying it is possible to use the following drying parameters. Then, SmartDrying is switched off: Petroleum ether: 12 min