

Crude fat determination in feed samples using the FatExtractor E-500 SOX and E-500 HE

FatExtractor E-500 Soxhlet and FatExtractor E-500 Hot Extraction: Crude fat extraction in different feed samples

A simple procedure for a direct fat determination in samples in which fat is not strongly bound to the matrix is introduced below. The samples are extracted according to the Soxhlet and Hot extraction method with the FatExtractor E-500 without prior acid hydrolyzation. The total fat content is determined gravimetrically after the extract is dried to a constant weight.

1. Introduction

Fat determination is one of the key analysis performed in the food industry. The samples are extracted with a suitable solvent according to Soxhlet and Hot Extraction. After the extract has been dried to a constant weight the total fat content is determined gravimetrically.

2. Experimental

Equipment: FatExtractor E-500 Soxhlet, FatExtractor E-500 Hot Extraction

Samples: Cat feed with an estimated fat content of 10 %, Pig feed with an estimated fat content of 5 %, Fish feed with an estimated fat content of 15 %.

Determination: 10 g of sodium sulfate was added to a cellulose thimble and the samples was weighed on top. The accurate weight of the sample was noted. The sample and sodium sulfate was mixed with a spatula. The spatula was cleaned with a small piece of tissue which was placed into the thimble, too. The extractions were performed using the E-500 SOX and E-500 HE applying the parameters specified in Tables 1 and 2.

Table 1: Parameters for the Soxhlet Extraction with the FatExtractor E-500

Step	Time [min] / No. of cycles [-]	Heating level [-]
Solvent	Diethyl ether / Petroleum ether / Hexane	
Extraction	20 cycles	5 - 9
Rinse	5 min	5 - 9
SmartDrying	on ¹	5-7
Solvent volume [mL]	120	

Table 2: Parameters for the Hot Extraction with the FatExtractor E-500

Step	Time [min]	Heating level [-]
Solvent	Diethyl ether / Petroleum ether / Hexane	
Extraction	5 min	4 – 8
Rinse	30 min	5 - 8
Drain	3	
Drying	3 min	3 - 5
Solvent volume [mL]	50	

¹ Instead of using SmartDrying it is possible to use the following drying parameters. Then, SmartDrying is switched off:

3. Results

The determined fat contents for different feed samples are in line with the estimated values. The results for Soxhlet and Hot Extraction are summarized in Table 3.

Table 3: Determined fat content in feed samples, fat in % (relative standard deviation in brackets), n=2

Feed sample	Cat	Pig	Fish
Soxhlet Extraction	11.98	3.22	18.45
Diethylether	(1.41)	(0.19)	(1.06)
Hot Extraction	11.89	3.27	18.06
Diethyl ether	(1.94)	(0.11)	(0.63)
Soxhlet Extraction	11.99	2.35	17.89
Petroleum ether	(0.41)	(0.99)	(0.1)
Hot Extraction	11.86	2.41	17.81
Petroleum ether	(0.58)	(0.78)	(1.75)
Soxhlet Extraction	12.05	2.77	18.45
Hexane	(0.27)	(0.25)	(0.02)
Hot Extraction	12.14	2.74	17.94
Hexane	(0.06)	(4.18)	(0.87)

The comparison of the fat contents for different feed samples determined with Soxhlet and Hot Extraction using different solvent shows comparable results. With Soxhlet the extraction process is very gentle because the sample is extracted with freshly distilled solvent at low temperature. Hot Extraction is a fast extraction method where elevated temperatures of sample leads to increased exchange between the solvent and sample.

4. Conclusion

The determination of fat in different feed samples using the FatExtractor E-500 SOX and E-500 HE provides reliable and reproducible results. These results correspond well to the estimated values of the feed samples.

With the FatExtractor E-500 SOX the extraction process is gentle, rugged and compliant to Soxhlet. With the FatExtractor E-500 HE the extraction process profit of unvalued short extraction times and low solvent consumption. Both configurations of the FatExtractor E-500 are perfectly suited for the crude fat determination of feed samples.

5. References

- [1] Commission Regulation (EC) No 152/2009 of January 2009 laying down the methods of sampling and analysis for the official control of feed

For more detailed information and safety considerations please refer to the Application Note No. 365/2019.

Diethyl ether: 10 min; Hexane: 12 min; Petroleum ether: 12 min