

Crude fat determination in hemp seeds *FatExtractor E-500: Crude fat determination in hemp seeds by Soxhlet extraction*

Hemp seeds are rich in protein, fiber and fatty acids, including omega-3 and omega-6 fatty acids. Beside the rich nutritional profile, hemp seeds provide a range of health benefits. They have antioxidant effects and may reduce symptoms of numerous ailments, improving the health of the heart, skin and joints. Therefore, hemp seeds are often called “superfood”.

Hemp seeds are also used as feed, in the cosmetic industry as well as to produce biofuel.

Hemp seeds come from the plant *Cannabis sativa*, but they do not have a mind-altering effect [1].

1. Introduction

A simple procedure for the crude fat determination in hemp seeds is introduced. The samples are extracted with Soxhlet extraction using the FatExtractor E-500 (Figure 1).



Figure 1: FatExtractor E-500 SOX.

The crude fat content is determined gravimetrically after the extract is dried to a constant weight.

2. Experimental

Equipment: FatExtractor E-500 Soxhlet Extraction, Recirculation chiller F-308.

Samples: Hemp seeds, sample no. 1, expected fat content: 25 - 30 %; hemp seeds, sample no. 2, expected fat content: 25 - 30 %. The hemp seed samples were purchased at a local supermarket.

Determination: 10 g of sodium sulfate and 2 g of homogenized sample were weighed into a cellulose thimble. The accurate weight of the sample was noted. The

extraction was performed using the E-500 SOX applying the parameters specified in Table 1.

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

Step	Value	Heating level
Solvent	Petroleum ether	
Extraction	25 cycles	6
Rinse	5 min	6
SmartDrying	on ¹	-
Solvent volume [mL]	120	

The samples were extracted in triplicate. The extracts were dried to a constant weight in a drying oven at 102 °C, cooled down to ambient temperature in a desiccator, weighed and the crude fat content was calculated.

3. Results

The determined fat contents of the hemp seed samples are in good correlation to the expected values. The results are shown in Table 2.

Table 2: Fat content of hemp seed samples, determined with FatExtractor E-500 SOX, n = 3.

Sample	Fat content sample 1 [%]	Fat content sample 2 [%]
1	26.07	29.80
2	26.48	29.08
3	25.79	29.11
Mean value [%]	26.11	29.33
rsd [%]	1.32	1.39

4. Remarks

The total fat contents of the hemp seed samples were determined as well. Prior to the Soxhlet extraction the samples were hydrolyzed using the HydrolEx H-506. The results were comparable to those obtained for the crude fat determination but with a larger relatively standard deviation (rsd). Therefore, a hydrolysis is not mandatory to determine the fat content of hemp seeds.

5. Conclusion

The determination of the fat content in hemp seed samples using the FatExtractor E-500 SOX provides reliable and reproducible results. The determined fat contents of the samples correspond well to the declared value with low relatively standard deviations.

6. References

[1] <https://www.medicalnewstoday.com/articles/323037.php>

For more detailed information and safety considerations please refer to the Application Note No. 388/2020.

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