Fat content in plant-based dairy alternatives
HydrolEx H-506, FatExtractor E-500: Total fat determination in plant-based dairy alternatives according to Weibull-Stoldt

A simple and reliable procedure for determination of fat content in different plant-based dairy products according to Weibull-Stoldt is introduced. Vegan nutrition and sustainable plant-based protein sources are increasingly demanded by consumers. Together with the short note SN 414/2020 – Fat content in plant-based milk alternatives, this SN complements the large portfolio of today's dairy alternatives. The samples are hydrolyzed using the HydrolEx H-506. The extraction is performed with the FatExtractor E-500 Soxhlet. This application complies with official methods (AOAC 963.15, EN98/64/EG). The presented application gives reliable and highly reproducible results. The total extraction time is less than 90 min for six samples.
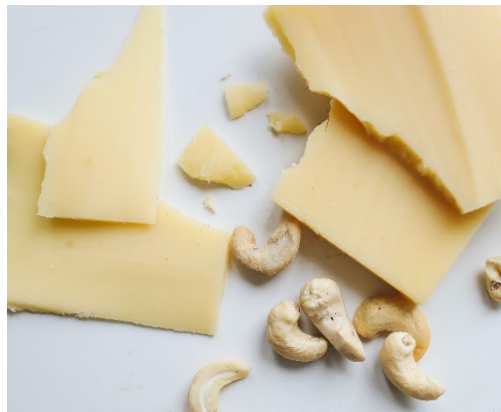
1. Introduction

Fat determination is one of the key analysis performed in the food industry. The samples require a hydrolysis step with hydrochloric acid to break the chemically bound and naturally encased fat from the matrix. Afterwards, the fat is extracted with a suitable solvent according to Soxhlet. After the extract has been dried to a constant weight the total fat content is determined gravimetrically.

2. Experimental

Equipment: HydrolEx H-506, FatExtractor E-500 Soxhlet

Samples (labelled fat content): Soy yoghurt (2.9%), Coconut yoghurt (7.7%), Soy cream (16%), Oat cream (7.5%), Rice cream (7.9%), Soy fresh cheese (31.7%), Coconut ice cream (13%), Chickpeas aged hard cheese (23%), Rice curd cheese (16%), Coconut grill cheese (15%)

Determination: 20 g of quartz sand was added to a glass sample tube and 2 g Celite® 545 was placed on top. The samples were weighed into a hydrolysis vessel containing 2 g of Celite®. After adding 100 mL hydrochloric acid (4 M) into each vessel the samples were hydrolyzed for 30 min using the H-506. The hydrolyzate was transferred and the vessels washed with warm (50 °C) deionized water, until a neutral pH was obtained. The glass sample tubes were dried in a microwave oven. After cooling down in a desiccator another layer of quartz sand (20 g) was added to the sample tube. The extraction was performed using the E-500 (Figure 1) applying the parameters specified in Table 1.

Table 1: Parameters for the extraction with the FatExtractor E-500 SOX

Method parameters

Solvent	Petroleum ether
Extraction step	20 cycles (heating level 6)
Rinse step	5 min (heating level 6)
Drying step	SmartDrying
Solvent volume	100 mL

The samples were extracted in duplicate. The extracts were dried to a constant weight in a drying oven at 102 °C and the total fat content was calculated.

Figure 1: Plant-based dairy alternatives

3. Results

The determined fat contents are presented in Table 2. The results correspond to the labelled values of the samples. The determinations show low relative standard deviations.

Table 2: Determined fat content in plant-based dairy products, fat in g/100 g (relative standard deviation in brackets), n=2

	Fat content (g/100g)
Soy yoghurt	**2.78** (1.42%)
Coconut yoghurt	**7.22** (0.08%)
Soy cream	**15.64** (0.53%)
Oat cream	**7.29** (1.08%)
Rice cream	**7.96** (0.38%)
Soy fresh cheese	**31.09** (0.03%)
Coconut ice cream	**10.25** (0.47%)
Chickpeas aged hard cheese	**24.13** (0.77%)
Rice curd cheese	**16.79** (0.47%)
Coconut grill cheese	**14.80** (0.03%)

4. Conclusion

The determination of fat in different plant-based dairy products using the HydrolEx H-506 and the FatExtractor E-500 provides reliable and reproducible results.

With the FatExtractor E-500 Soxhlet, the time per cycles is reduced significantly. The total extraction time is less than 90 min.

5. References

Short Note 414/2020 – Fat content in plant-based milk alternatives
EN 98/64/EG Commission Directive 98/64/EC Fat in feeding stuffs
AOAC 963.15 Fat in Cacao Products
Application note 348/2019 – Fat determination in dairy products. See www.buchi.com/application

For more detailed information and safety considerations please refer to the Application Note No. 387/2020.