

### Extraction Unit E-816 ECE:

#### Fat Determination in Yogurt samples using Twisselmann and Soxhlet extraction

The determination of fat in food is a routine procedure used in quality assurance and for labelling. Below, a simple and easy procedure for fat determination in yogurt, according to §64 LFGB L 01.00-20 is introduced. The sample is hydrolyzed with hydrochloric acid using the Hydrolysis Unit E-416, followed by a Twisselmann extraction with the Extraction Unit E-816 ECE (Economic Continuous Extraction).

For comparison the samples were also extracted with a Soxhlet extraction method using the Extraction Unit E-816 SOX.

### 1. Introduction

Fat determination is one of the key analysis performed in the food industry. The samples are hydrolyzed 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 Twisselmann. With this extraction technique the sample is constantly kept in hot vapor whilst being efficiently rinsed with freshly distilled solvent. After the extract has been dried to a constant weight the total fat content is determined gravimetrically.

### 2. Experimental

Equipment: Hydrolysis Unit E-416, Extraction Units E-816 ECE and E-816 SOX

Samples: Yogurt samples with fat contents of 3.0-7.0 %.

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 mixed with a spatula and weighed into digestion vessels containing 2 g of Celite. After adding 2 x 50 mL hydrochloric acid (4 M) into each vessel the samples were hydrolyzed for 15 min using the E-416. The hydrolyzate was transferred and the vessels washed with warm (40-50 °C) deionised water, until a neutral pH was obtained. The glass sample tubes were dried in a vacuum oven, drying oven or 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-816 ECE (Figure 1) applying the parameters specified in Table 1.



Figure 1: Extraction Unit E-816 ECE (Economic Continuous Extraction)

Table 1: Parameters for the extraction using the Extraction Unit E-816 ECE

#### Method parameters

Solvent	Petroleum ether
Extraction step	50 min (Heater 100 %)
Drying step	10 min (Heater 100 %)
Solvent volume	70 mL

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

### 3. Results and Discussion

The determined fat contents are shown in Table 2. The results obtained with the Extraction Unit E-816 ECE correspond well with the results from the Soxhlet extraction method. The determinations show low relative standard deviations.

The results received are lower than the declared values, however they are within the guidelines of the laboratory from the Food control, Canton of Zug, Switzerland.

Table 2: Determined fat content in yogurt samples, fat in g/100g (relative standard deviation in brackets), n=3

	Mean value E-816 ECE (rsd in %)	Mean value E-816 SOX (rsd in %)
Mocha	2.36 (6.0)	2.48 (1.1)
Vanilla	2.74 (0.4)	3.01 (0.3)
Choco	3.23 (0.9)	3.32 (0.8)
Greek with honey	5.82 (1.1)	5.92 (1.0)
Fruits	2.16 (0.0)	2.26 (2.2)

### 4. Conclusion

The determination of fat content in yogurt samples using Twisselmann extraction on the E-816 ECE provide reliable and reproducible results that correspond well to the determined Soxhlet extraction values.

### 5. Acknowledgement

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### 6. References

§64 LFGB L 01.00-20 Bestimmung des Gesamtfettgehaltes in Milch und Milchprodukten

- Operation Manual of Hydrolysis Unit E-416
- Operation Manual of Extraction Unit E-816 ECE

For more detailed information and safety considerations please refer to the Application Note no. 184/2015.