

Fat Determination in Meat Products by Economic Continuous Extraction

FatExtractor E-500: Economic Continuous Extraction after hydrolysis with the HydrolEx H-506

A simple and reliable procedure for fat determination of meat products by Economic Continuous Extraction (ECE) is introduced. The sample is hydrolyzed with the HydrolEx H-506. The Economic Continuous Extraction (ECE) is a continuous extraction where the sample is constantly kept in hot solvent vapor whilst efficiently rinsed with freshly distilled solvent. The total fat content is determined gravimetrically after the extract has been dried to a constant weight. This extraction method is also called Twisselmann and follows several standards, like ISO 22630:2015, ISO 6492:1999 and §64 LFGB L 17.00-4:1982-05.

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. 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 Economic Continuous Extraction

Samples: Cooked sausage LVU No. 16-01j with a certified fat content of 27.46 g/100 g (+/- 0.595 g/100 g); Cervelat sausage, declared fat content 20 g/100g, purchased at a local supermarket; Minced beef meat, declared fat content 13 g/100g, purchased at a local supermarket.

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 2 x 50 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) 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-500 (Figure 1) applying the parameters specified in Table 1.

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

Method parameters

Solvent	Petroleum ether / Diethyl ether ¹
Extraction step	60 min (heating level 5 - 6 ²)
Smart-Drying	on
Solvent volume	70 mL

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



Figure 1: FatExtractor E-500 ECE

3. Results

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

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

Solvent	Petroleum ether	Diethyl ether
Cooked sausage	27.15 (0.79)	27.21 (0.33)
Cervelat sausage	22.64 (0.19)	22.50 (0.81)
Minced beef meat	11.93 (0.95)	12.14 (0.64)

4. Conclusion

The determination of fat in different meat products using the HydrolEx H-506 and the FatExtractor E-500 provides reliable and reproducible results. These results correspond well to the labelled values, with low relative standard deviations (rsd).

5. References

- [1] ISO 22630:2015 Oilseed meals -- Determination of oil content -- Rapid extraction method
- [2] ISO 6492:1999 Animal feeding stuffs -- Determination of fat content
- [3] §64 LFGB L 17.00-4:1982-05 Bestimmung des Gesamtfettgehaltes in Brot einschliesslich Kleingebäck aus Brotteigen

For more detailed information and safety considerations please refer to the Application Note No. 381/2019.

¹ Please select the solvent used in the menu.

² Heating level proposed by the system depending on the selected solvent.