

## Fat Determination in Dairy Products by Hot Extraction *FatExtractor*

*E-500: Hot Extraction after hydrolysis with the HydrolEx H-506*

A simple and fast procedure for fat determination is introduced. The sample is hydrolyzed with the HydrolEx H-506, followed by an extraction with the FatExtractor E-500 Hot Extraction. The total fat content is determined gravimetrically, after the extract has been dried to a constant weight. This application follows official methods (ISO 1444:1996, ISO 11085:2016, AOAC 2003.05, AOAC 991.36).

### 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 Hot Extraction. 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 Hot Extraction

Samples: Milk powder LUV No. 17-4b with a certified fat content of 24.27 g/100 g (+/- 0.542 g/100 g), Yoghurt muva-jo-1422 with a certified fat content of 3.76 g/100 g (+/- 0.13 g/100 g).

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 (Picture 1) applying the parameters specified in Table 1.

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

#### Method parameters

Solvent	Petroleum ether / Hexane / Diethyl ether / Chloroform
Extraction step	5 min (heating level 4 - 8 <sup>1</sup> )
Rinse step	30 min (heating level 5 - 8 <sup>1</sup> )
Drain	3
Drying step	3 min (heating level 3 + 5 <sup>1</sup> )
Solvent volume	50 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.



Picture 1: FatExtractor E-500 HE

### 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 dairy products, fat in g/100 g (relative standard deviation in brackets), n=3

Solvent	Milk powder	Yoghurt
Petroleum ether	24.26 (0.33)	3.66 (0.33)
Hexane	24.27 (0.24)	3.64 (1.42)
Diethyl ether	24.39 (0.35)	3.77 (0.55)
Chloroform	24.68 (0.28)	3.73 (0.36)

### 4. Conclusion

The determination of fat in different dairy 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 1444:1996 Meat and meat products – determination of free fat content
- [2] ISO 11085:2016 Cereals, cereals-based products and animal feeding stuffs -- Determination of crude fat and total fat content by the Randall extraction method
- [3] AOAC 2003.05 Crude Fat in Feeds, Cereal Grains, and Forages
- [4] AOAC 991.36 Fat (Crude) in Meat and Meat Products

For more detailed information and safety considerations please refer to the Application Note No. 350/2019.

<sup>1</sup> Heating level proposed by the system depending on the selected solvent.