

Direct Fat Determination in Food Samples using Extraction Unit E-816 ECE

Extraction Unit E-816 ECE:

Direct fat determination in boiled sausage, chocolate, mayonnaise and potato chips samples using Twisselmann extraction

The determination of fat in food and feed samples is a routine procedure in quality assurance and labelling. Here, a simple and easy procedure for direct fat determination in boiled sausage, chocolate, mayonnaise and potato chips samples is presented. The sample is dried, followed by a Twisselmann extraction with the Extraction Unit E-816 ECE (Economic Continuous Extraction).

1. Introduction

Fat determination is one of the key analyses performed in the food and feed industry. Compared with hydrolysis before extraction, the direct fat determination can reduce process time [1] and save chemicals expenses.

2. Experimental

Instrumentation: Mixer B-400, Extraction Unit E-816 ECE, Drying oven

Samples: boiled sausage, chocolate, mayonnaise and potato chips (all purchased at a local supermarket). Labelled fat content: 22.6 %, 32.0 %, 71.5 % and 31.2 % (Figure 1).



Figure 1: Boiled sausage (1), chocolate (2), mayonnaise (3) and potato chips (4)

Sample drying and fat determination: The homogenized samples were weighed in paper thimbles and mixed with sodium sulfate. The thimbles containing the samples were dried in a drying oven for at least 60 min at 102 °C. The extraction was carried out with the Extraction Unit E-816 ECE (Fig. 2) by applying the parameters specified in Table 1.



Figure 2: Extraction Unit E-816 ECE (Economic Continuous Extraction).

Table 1: Extraction parameters (Extraction Unit E-816 ECE)

| Solvent | Petroleum ether |
|----------------|--|
| Extraction | 60 min (boiled sausage; chocolate; chips) 80 min (mayonnaise) (Heater 100 %) |
| Drying | 10 min (Heater 100 %) |
| Solvent volume | 70 ml |

The samples were extracted in triplicate. The extracts were dried to a constant weight (30 min) in a drying oven at 102 °C, cooled down in a desiccator for 1 h and the total fat content was calculated.

3. Results and Discussion

The determined fat contents are presented in Table 2. The fat content of the samples determined by direct extraction, i.e. without hydrolysis, is slightly lower than the value obtained when applying a hydrolysis step before the extraction. The determinations show low relative standard deviations.

Table 2: Results of the direct fat determination in food samples compared to hydrolysed sample results; fat content in g/100 g (relative standard deviation for the experimental results in brackets), n = 3

| Sample | With Hydrolysis | Without Hydrolysis |
|----------------|-----------------|--------------------|
| Boiled sausage | 22.28 (1.32%) | 21.47 (1.10%) |
| Chocolate | 31.95 (0.81%) | 30.11(1.30%) |
| Mayonnaise | 70.91 (0.94%) | 70.69 (0.69%) |
| Potato chips | 31.51 (0.54%) | 29.34 (0.56%) |

4. Conclusion

The fat content in four food samples determined by direct extraction, i.e. without hydrolysis, is slightly lower than when hydrolysed before extraction. By applying hydrolysis, the fat which is strongly bound to the matrix is also released, and thus extracted by petroleum ether. Importantly, the direct fat determination using the E-816 ECE provides reliable and reproducible results and the time to result is considerably reduced when compared to the combined hydrolysis and extraction procedure.

5. References

[1] Büchi Application Note: AN 055/2010

For more detailed information and safety considerations please refer to the Application Note No. 204 /2015.