Application Note AN-R-032

香肠冷提取后的氧化稳定性

Specific and accurate determination of the cold-extracted fat

Meat products, especially sausages, consist of many components. Aside from fat, water, protein, salts, and spices, sausages also contain stabilizers and antioxidants.

In order to measure the sausage oxidation stability of the fat contained and therefore draw conclusions about its shelf life, the fat must be extracted beforehand. This extraction must not be carried out at high temperatures, as this would falsify the oxidation stability results. Solvents must also be used that do not change the chemical properties of the fat and that can be easily removed after extraction.

By using petroleum ether, the fat from sausages can be extracted easily. Analyzing these extracted fats gives some information about the lipid oxidation.

This Application Note describes the determination of the oxidation stability of different sausages with the recommended cold extraction method from Metrohm with an 892 Professional Rancimat.

SAMPLE AND SAMPLE PREPARATION

This application is demonstrated on cervelat and bratwurst sausages.

First, the sausage skin is removed, and the sausage is cut into smaller pieces. These pieces are put into a 250 mL round bottom flask.

Afterwards, about three times the amount (by weight) of low-boiling petroleum ether is added (boiling point 30–40 °C). A stir bar is carefully added, and the extraction is performed by moderate stirring for at least one hour (Figure 1). In order to shorten the extraction time and increase the fat yield, the sausage can be more finely ground using a suitable polytron.

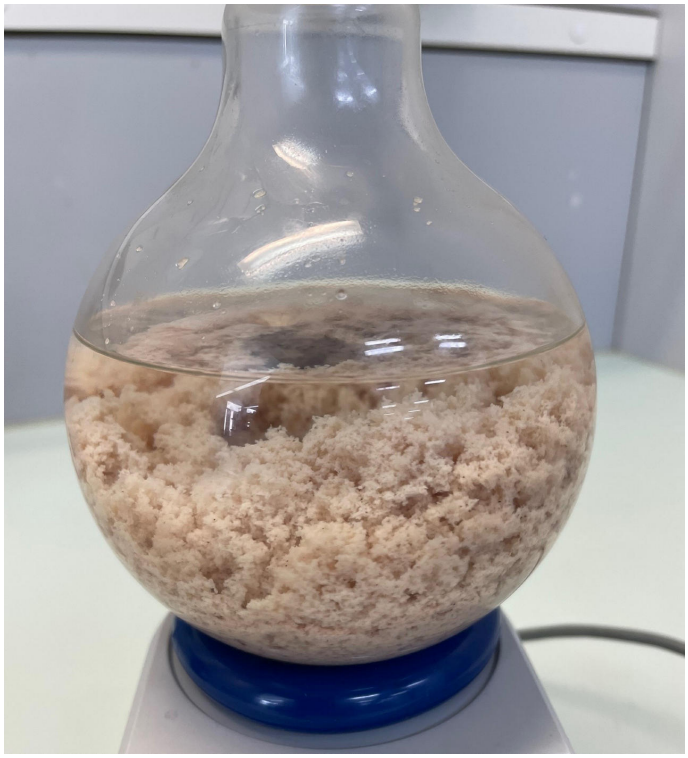

Figure 1. Chopped sausage sample in a 250 mL round bottom flask filled with low-boiling petroleum ether (boiling point 30–40 °C) and a small magnetic stir bar.

After extraction, the ether phase is poured through a pleated paper filter into a separate 250 mL round bottom flask. The petroleum ether is then distilled, e.g., using a rotavapor. The vacuum is gradually reduced until all solvent is removed at 15 mbar.

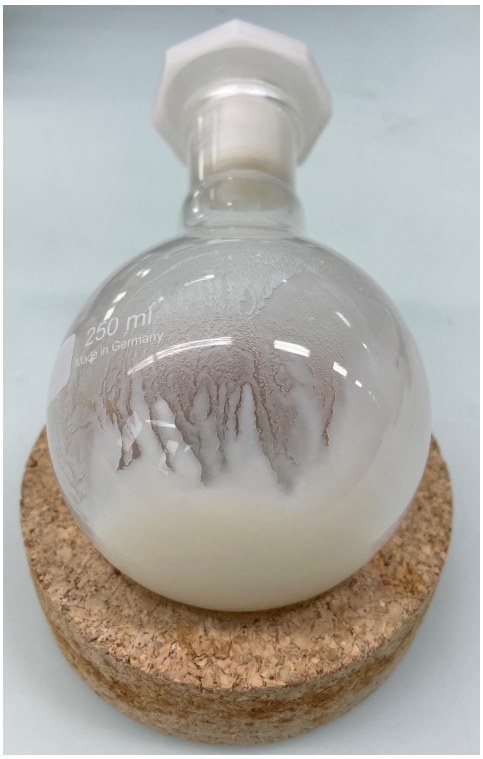

Figure 2. Cold-extracted fat from ground sausages. The petroleum ether was removed at 15 mbar at room temperature.

EXPERIMENTAL

First, an appropriate amount of cold-extracted fat is weighed into the reaction vessel, and then the analysis is started.

The Rancimat method (**Figure 3**) is based on exposing the sample to an airflow at a constant temperature between 100–180 ° C. Highly volatile secondary oxidation products are transferred into the measuring vessel with the airflow where they are absorbed in the measuring solution. The conductivity is continuously registered here.

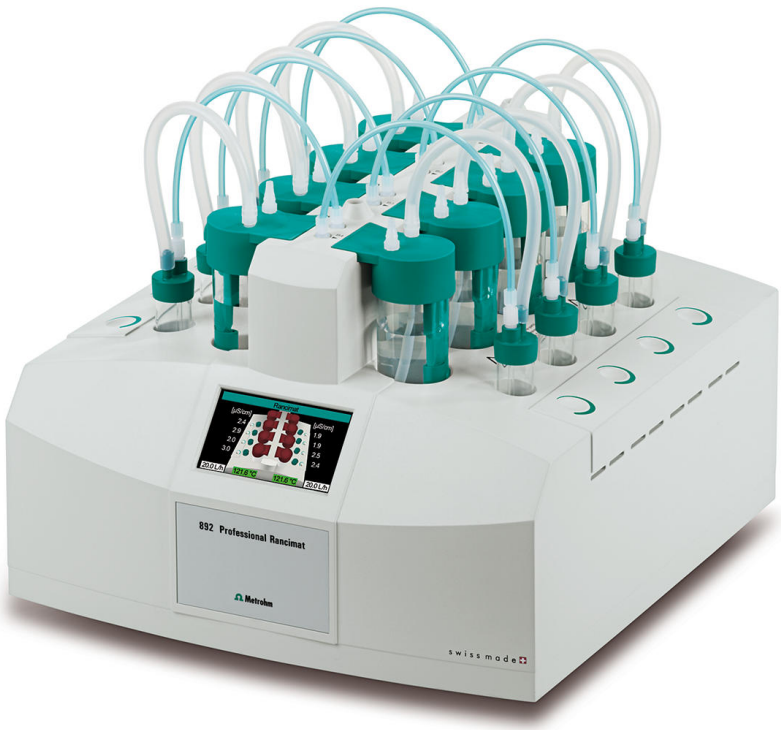

Figure 3. 892 Professional Rancimat equipped with measuring and reaction vessels for the determination of oxidation stability.

The formation of secondary oxidation products leads to an increase in the conductivity of the measuring solution. The time until occurrence of this marked conductivity increase is referred to as the «induction time». The induction time is a suitable indicator for the oxidation stability of the analyzed sample (**Figure 4**).

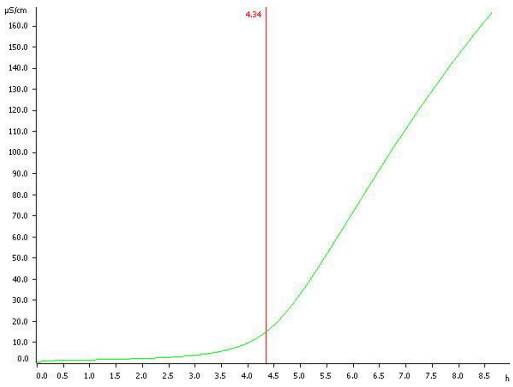

Figure 4. Determination of the oxidation stability of cold extracted fat from a bratwurst sausage. Induction time is determined at 4.34 h.

Table 1. Results of the oxidation stability of cold-extracted fat of sausages with the 892 Professional Rancimat at 120 ° C.

Sample (n=4)	Mean value (h)	SD(abs) in h	SD(rel) in %
Cervelat	5.69	0.04	0.6
Bratwurst	4.31	0.02	0.5

CONCLUSION

In order to make specific statements about the fat contained in sausage and other meat products, an extraction step is indispensable. For this purpose, very selective information can be collected and evaluated when measuring oxidation in sausages and similar products.

With the 892 Rancimat, reproducible and accurate determination of the oxidation stability of extracted fat can be easily and simultaneously determined in eight different samples at a time.

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CONFIGURATION

892 Professional Rancimat

892 Professional Rancimat 是用于通过已使用多年的 Rancimat 方法来测定天然油脂的氧化稳定性的分析系统,即简便又安全。2 个加热块中共有 8 个测量位置。内置显示屏可显示设备状态和每个测量位置。每个测量位置都有启动按钮,可在仪器上启动测量。采用实用的一次性反应管和可使用洗碗机清洗的附件可将清洗工作降至低。这即可节省时间和费用,并且也可显著提高。

执行测定所需的所有附件均已包括在标准配置内。需要使用 StabNet 软件来进行仪器控制、数据记录和评估以及数据保存。