

Slip Melting Point Determination of Palm Stearin

Palm stearin, the solid fraction of palm oil, is a natural source of hard fat. The melting characteristic of palm stearin is an important quality parameter and depends on its content of different fats. The melting temperature of palm stearin is usually determined by the slip melting point (SMP). We report a SMP of 50.7 ± 0.1 °C for a palm stearin sample provided by New Britain Oils Ltd. Obtained results confirm that the M-565 is a reliable tool to measure the SMP for palm stearin samples. The melting process was recorded and analysed without modification of the instrument.

Introduction

Palm stearin is a mixture of fats, fractionated from palm oil. It is a mixture of different fully natural ingredients [1] and mainly used as an edible, trans-fat free and thus healthy alternative to partially hydrogenated plant oils [2].

The melting point of fats is described using empirical methods, usually by the slip melting point (SMP). The SMP is defined as the temperature at which a sample rises in an open capillary upon heating under defined conditions as illustrated in Figure 1 [3].

A facile, quick, and reproducible method to measure the slip melting point (SMP) of palm stearin using the M-565 is reported.

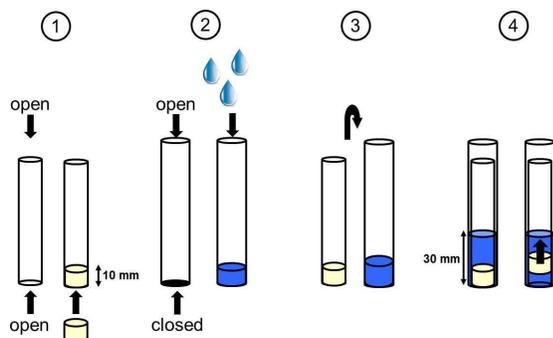


Figure 1. Illustration of the palm stearin sample preparation (steps 1-3) and the rising sample (step 4).

Experimental

About 1 g of palm stearin sample was carefully melted at 60 °C in a glass beaker using a heating plate. When completely melted the liquid sample was filled into a capillary that is open on both ends, by dipping the capillary into the solution. The height of the palm stearin sample in the capillary was 9 to 10 mm. To harden the sample it was cooled overnight at 4 °C.

Then, the sample capillary was immersed in a boiling point tube containing water (Figure 1). When inserted, the water level in the boiling point tube was 20 mm above the upper edge of the sample. The total height of the water was 30 mm (Figure 1).

The palm stearin sample was placed in the M-565 (boiling point sample place) and heated applying a temperature gradient of 1.0 °C/min. The melting process was recorded from 45–55 °C using the Melting Point Monitor software. Data were recorded without supervision and analysed after each run.

Results

Six measurements of the palm stearin sample were performed as described. An average SMP of 50.7 ± 0.1 °C was measured. Observed SMP is well comparable to the SMP of palm stearin found in literature, ranging from 44.8–53.4 °C, and measured following the ISO 6321 or the AOCS CC 3-25 protocols [4].

A typical melting progress is shown in Figure 2. During heating the sample plug changed its appearance from white to semi-transparent. The slip melting point temperature was recorded when the complete sample started to move upwards in the capillary (Figure 2 middle).

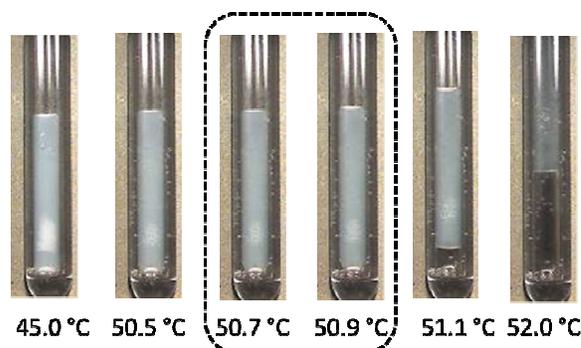


Figure 2. Snapshots of the palm stearin sample during the melting process. The SMP determined for six samples was 50.7 ± 0.1 °C.

Conclusion

It was demonstrated that the SMP of palm stearin can be determined using the M-565. Reproduction of the measurements was performed with a standard deviation of only 0.1 °C.

Clearly, found results confirm that the M-565 can be applied to perform the SMP measurements, in addition to its conventional use for the determination of melting- and boiling points. No modifications of the instrument are necessary rendering the M-565 an economic and versatile instrument for the quality control in the palm oil industry.

References

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- [3] J. Beare-Rogers et al, *Pure Appl. Chem.*, Vol. 73, No. 4, p. 685–744, 2001.
- [4] International Standard, ISO 6321, Animal and vegetable fats and oils – Determination of melting point in open capillary tubes (slip point), second edition, 2002-2-15.