BUTTER

water content determination

The amount of water in food products, especially in dairy produce, is limited for technological reasons (expected product quality) and legal reasons, for example with regard to butter. Butter is a mixture of milk fats (80-90%), including saturated and unsaturated fatty acids and water. Water is the cheapest ingredient of this mixture so in high-volume production even a small deviation from the water content norm assures conspicuous, yet “sham” savings. It must be noted that the surplus of water in the butter contributes to oxidation of fat (fat goes rancid), which is very unfavorable. It is therefore important to test water content in the butter as part of every engineering process which confirms that legal requirements have been met. The butter water content analysis method must be precise and quick because the test information is often used to control the production. Speed and precision of the analysis are assured by MA R, MA X2, MA X7 and MA 5Y moisture analyzers, manufactured by Radwag, that are also used during final evaluation of butter quality in the KJ Laboratory.



The application note includes basic information for validation of the butter drying method with the use of MA R, MA X2, MA X7 and MA 5Y moisture analyzers series by Radwag Wagi Elektroniczne. The application note may be the basis for elaborating own drying method with special regard to distinctive features of the product in question.

Metrology, Research and Certification Center, Radwag Wagi Elektroniczne, Poland
Toruńska 5, 26-600 Radom, Poland +48 48 386 60 00, e-mail: office@radwag.com, www.radwag.com

TERMS

ACCURACY of determining water / dry matter content is the difference between the result of the water / dry matter content received in the moisture analyzer method and the result of the water /dry matter content received while drying the same sample through a reference method.

PRECISION is a degree of compliance between independent results of the test, received in specific conditions. The measure of precision is a standard deviation from a series of several measurements.

REFERENCE METHOD

ISO 3727-1. Butter — Determination of moisture, non-fat solids and fat contents — Part 1: Determination of moisture content (Reference method).

SAMPLE PREPARATION

Before testing, samples must be stored in sealed packaging at the temperature of 2°C ÷ 14°C. Heat the sample dedicated for testing to the temperature between 24°C and 30°C.

ACCESSORIES

Dryer, pumice, weighing vessels with a lid, AS 220.X2 balance, laboratory spoon.

METHOD DESCRIPTION

Weigh glass vessels with a pre-dried pumice in the amount of ca. 10 g. Place the sample with a mass of ca. 5 g on the pumice and specify the real mass of the sample in question with the use of the balance whose weighing accuracy is 0.1 mg (AS 220.X2). Place weighing vessels with the sample and lids in the temperature-controlled laboratory dryer. Dry samples at the temperature of 102°C for 2 hours. After this period, remove vessels and place in the desiccator until they cool down and weigh afterwards. Place samples in the laboratory dryer again and keep on drying them for 30 minutes. Cool them down and weigh again. Repeat the procedure until you obtain a stable sample mass or record the sample mass growth after drying. At the same time conduct the so-called “blind” test with the use of the same procedure, yet without the test sample.

RESULTS

Sample name	BUTTER
Water content (%)	19.83
Standard deviation (%)	0.15

BUTTER – WATER CONTENT ANALYSIS WITH THE MOISTURE ANALYZER

The water content testing with the use of the moisture analyzer (IR radiation) entails two phenomena: convection and radiation. The sample temperature rises from outer layers to the bottom of the sample. The temperature gradient in the sample structure minimizes through optimization of the thickness of the dried sample and drying temperature.

SAMPLE PREPARATION

Before testing, samples must be stored in sealed packaging at the temperature of 2°C ÷ 14°C. Heat the sample dedicated for testing to the temperature between 24°C and 30°C.

ACCESSORIES

MA R, MA X2, MA X7 or MA 5Y moisture analyzer, quartz sand, weighing vessels with a lid, AS 220.X2 balance, laboratory spoon.

METHOD DESCRIPTION

Set drying parameters presented below. Place the sample with a mass of ca. 1.5 ÷ 2 g on pre-dried quartz sand in several spots of the weighing pan. Lock the drying chamber manually or automatically.

DRYING PARAMETERS / RESULTS

Sample name	**BUTTER**
Drying profile	Standard
Drying temperature	105°C
Sample mass (g)	~ 5
End of analysis	Auto 3
Water content (%)	19.30
Standard deviation (%)	0.25
Analysis time $\acute{x}$ (min)	~ 17

ACCURACY OF THE MA R, MA X2, MA X7, MA 5Y METHOD

Sample name	**BUTTER**
Water content (%) – Ref.	19.30 ± 0.15
Water content (%) – MA	19.30 ± 0.17
Analysis accuracy (%)	|0.03|

RESERVATION

The method in question has been verified by the Research Laboratory, yet the results do not include factors arising from diversity of tested samples, operators' personal skills as well as measuring capability used by moisture analyzer users. For this reason Radwag shall not be held responsible for drying parameters but they can be used to elaborate own drying method.