SALTED, SMOKED, FREEZE-DRIED CHEESE

dry matter content determination

Cheese production is one of significant segments of the dairy industry that have been improving cheese production methods and formulas for years. At present cheese is produced on an industrial scale as a result of mixing and heating milk with numerous ingredients, separating, maturing, smoking and aging the ready-made cheese. The quality of such a product depends on the quality and number of ingredients as well as engineering parameters. One of the cheese quality indicators is dry matter content that can be quickly and precisely determined through an IR radiation-based moisture analyzer. The dry matter content testing method must allow effective interference into engineering parameters, which applies to MA/R and MA/X2 moisture analyzers by Radwag.

The application note includes basic information for validation of the cheese drying method in order to determine its dry matter content with the use of MA/R and MA/X2 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.

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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

The reference method parameters are usually specified in standards or other discipline-specific documents. For the sample in question, guidelines from PN-EN ISO 5534:2005 'Cheese and processed cheese - Determination of the total solids content (Reference method)' have been adopted.

SAMPLE PREPARATION

Before testing, store samples in sealed containers. Collect a small amount of the sample for testing. Fragment an analytical sample into smaller parts.

ACCESSORIES

Laboratory dryer, weighing vessels, AS 220.X2 balance, laboratory spoon, quartz sand, glass rods

METHOD DESCRIPTION

Weigh glass vessels with a glass rod and pre-dried quartz sand in the amount of ca. 20 g. Place the sample with a mass of ca. 3 g in glass weighing vessels on pre-dried quartz sand. Mix the sample and sand with a glass rod that must be left in the vessel. The use of sand as a foundation is to prevent creation of the shell on the surface of the dried sample. Reweigh vessels 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). Put weighing vessels with the sample and lids in the temperature-controlled laboratory dryer. Dry samples at the temperature of 102°C for 3 hours. After this period, remove vessels and place in the desiccator until they cool down and weigh again. Put samples in the laboratory dryer and keep on drying them for 60 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.

RESULTS

Sample name	EDAM BIRCK	FREEZE-DRIED CHEESE	SALTED CHEESE	STEAMED SMOKED
Dry matter content (%)	51.50	98.90	50.67	52.45
Standard deviation (%)	0.38	0.04	0.08	0.10

DRY MATTER CONTENT OF CHEESE DETERMINED 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 the 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, store samples in sealed containers. Collect a small amount of the sample for testing. Collect samples from various spots. Fragment the sample into small pieces with the use of an electric grinder as long as the cheese structure allows so.

ACCESSORIES

MA/R or MA/X2 moisture analyzer, laboratory spoon, disposable aluminum weighing pans, electric grinder.

METHOD DESCRIPTION

Set drying parameters presented below. Distribute a thin layer of the sample with a mass of ca. 3 g throughout the weighing pan. Lock the drying chamber manually or automatically to start drying.

DRYING PARAMETERS / RESULTS

Sample name	EDAM BIRCK	FREEZE-DRIED	SALTED	STEAMED - SMOKED
Drying profile	Standard			
Drying temperature	100°C	95°C	100°C	100°C
Sample mass (g)	~ 3			
End of analysis	Auto 2			
Dry matter content (%)	51.52	98.82	50.62	52.40
Standard deviation (%)	0.21	0.03	0.11	0.13
Analysis time $\bar{x}$ (min)	~ 51	2	25	19

ACCURACY OF THE MA/R ÷ MA/X2 METHOD

Sample name	EDAM BIRCK	FREEZE-DRIED	SALTED	STEAMED - SMOKED
Dry matter content Ref. (%)	51.50 ± 0.38	98.90 ± 0.04	50.67 ± 0.08	52.45 ± 0.10
Dry matter content MA R/X2 (%)	51.52 ± 0.21	98.82 ± 0.03	50.62 ± 0.11	52.40 ± 0.13
Analysis accuracy (%)	|0.02|	|0.08|	|0.05|	|0.05|

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.