



EXPANDED WAFERS

water content determination

Food expanding is a physical process during which gas included in the product structure is released as a result of the temperature and pressure differences. The expanded product increases its volume while its structure is “puffed”; it maintains its physicochemical properties by raising its crumbliness, for example wafers. Sensory qualities (flavor) of such products are strictly dependent upon the final water content. The surplus of water in the product structure is unfavorable because it initiates hydrolytical changes that result in substantial drop of the quality and sensory qualities of the product, for example flavor, aroma, hardness, etc. For this reason the water content inspection is essential at all stages of the production. On the other hand a precisely measured and limited amount of water guarantees long lifespan of the product, which is one of every manufacturer’s pro-consumer steps. The method of measuring the water or dry matter content to be used in testing must assure accuracy and highly precise measurements, which can be achieved with the use of MA/R and MA/X2 moisture analyzers by Radwag.



The application note includes basic information for validation of the expanded wafers drying method with the use of MA/R and MA/X2 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.



Expanded wafers – water content determination

The method with the use of IR radiation

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

The reference method parameters are usually specified in standards or other discipline-specific documents as the so-called guides. If such documents are unavailable, the drying temperature that does not cause the sample to change colors is used. Such an approach applies to previously dehydrated products and raw products.

SAMPLE PREPARATION

Before testing, samples must be stored in sealed packaging. Mechanically fragment wafers into small pieces or powder.

ACCESSORIES

Laboratory dryer, weighing vessels, AS 220.X2 analytical balance, laboratory spoon.

METHOD DESCRIPTION

Place the sample with a mass of ca. 3 g in pre-dried glass weighing vessels. 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 105°C for 3 hours. After this period, remove vessels and put into 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.

RESULTS

Sample name	EXPANDED WAFERS	EXPANDED CAKE WAFERS
Water content (%)	7.05	1.97
Standard deviation (%)	0.03	0.02

EXPANDED WAFERS – 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. Mechanically fragment wafers into small pieces or powder.

ACCESSORIES

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

METHOD DESCRIPTION

Set drying parameters presented below. Collect the sample with a mass of ca. 1 ÷ 1.5 g and distribute a thin layer of the sample throughout the weighing pan. Lock the drying chamber manually or automatically.

DRYING PARAMETERS / RESULTS

Sample name	EXPANDED WAFERS	EXPANDED CAKE WAFERS
Drying profile	Standard	
Drying temperature	90°C	
Sample mass (g)	~ 1	
End of analysis	Auto 3	Auto 2
Water content (%)	7.10	2.00
Standard deviation (%)	0.10	0.12
Analysis time \bar{x} (min)	~ 4	~ 1

ACCURACY OF THE MA/R ÷ MA/X2 METHOD

Sample name	EXPANDED WAFERS	EXPANDED CAKE WAFERS
Water content (%) - Ref.	7.05 ± 0.03	1.97 ± 0.02
Water content (%) - MA R/X2	7.10 ± 0.10	2.00 ± 0.12
Accuracy analysis (%)	0.05	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.

