NUTS AND ALMONDS

water content determination

The amount of water in food products is one of quality parameters that determine the product flavor and its use-by date. The surplus of water in the product structure is unfavorable because it activates hydrolytic transformations that result in considerable drop of quality and product sensory qualities, such as flavor, aroma, hardness, etc. For this reason the water content check is significant at all stages of the production. On the other hand a precisely measured and limited amount of water is a guarantee of long life of the product, which is one of pro-consumer steps taken by every manufacturer. The method of checking the water content to be used in testing must be accurate and assure highly precise values. This can be achieved in case of using MA R, MA X2, MA X7 and MA 5Y moisture analyzers by Radwag.



The application note includes basic information for validation of the nuts and almonds 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.

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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 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. The samples that take a form of grains (almonds, nuts) must be mechanically fragmented into small pieces. Paste-like samples must be mixed.

ACCESSORIES

Laboratory dryer, glass weighing vessels with a lid, quartz sand, glass rod, AS 220.X2 analytical balance, laboratory spoon.

METHOD DESCRIPTION

Place samples of grains with a mass of ca. 5 in pre-dried glass weighing vessels. Mix the semi-fluid (paste) sample with a mass of ca. 3 g and then put into glass weighing vessels on pre-dried quartz sand. Mix the sample with sand by means of a glass rod that must be left in the vessel. The use of sand as a foundation is aimed at eliminating creation of the shell on the surface of the sample in question. Specify the real mass of samples 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 into the temperature-controlled laboratory dryer. Dry samples at the temperature of 105°C for 3 hours. After this time, 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	Almonds	Roasted nuts			Caramelized nuts		Peanut paste
		Cashew	Walnut	Peanut	Peanut	Walnut	
Water content (%)	2.80	2.08	1.54	1.45	1.65	0.90	2.05
Standard deviation (%)	0.01	0.02	0.04	0.01	0.01	0.01	0.02

ALMONDS AND NUTS – 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. Samples that take a form of grains (almonds, nuts) must be mechanically fragmented into small pieces. Paste-like samples must be mixed.

ACCESSORIES

MA R, MA X2, MA X7 or MA 5Y moisture analyzer, laboratory spoon, disposable aluminum weighing pans.

METHOD DESCRIPTION

Set drying parameters presented below. Collect the sample with a mass of ca. 4 ÷ 5 g and distribute a thin layer of the sample throughout the weighing pan. A thin layer of pastes must be distributed throughout the weighing pan. Lock the drying chamber manually or automatically.

DRYING PARAMETERS / RESULTS

Sample name	Almonds	Roasted nuts			Caramelized nuts		Peanut paste
		Cashew	Walnuts	Peanuts	Peanuts	Walnuts	
Drying profile	Standard						
Temperature	115°C						
Sample mass (g)	~ 4 ÷ 5						
End	Auto 3						
Water content (%)	2.85	1.98	1.55	1.55	1.78	0.86	2.04
Standard deviation (%)	0.10	0.03	0.03	0.07	0.03	0.04	0.02
Analysis time $\acute{x}$	13	9	7	11	12	11	27

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

Sample name	Almonds	Roasted nuts			Caramelized nuts		Peanut paste
		Cashew	Walnuts	Peanuts	Peanuts	Walnuts	
Water content (%) Ref.	2.80 ± 0.01	2.08 ± 0.02	1.54 ± 0.04	1.45 ± 0.01	1.65 ± 0.01	0.90 ± 0.01	2.05 ± 0.02
Water content (%) MA	2.85 ± 0.10	1.98 ± 0.03	1.55 ± 0.03	1.55 ± 0.07	1.78 ± 0.03	0.86 ± 0.04	2.04 ± 0.02
Accuracy (%)	|0.05|	|0.10|	|0.01|	|0.10|	|0.13|	|0.04|	|0.01|

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.

