GARLIC

water content determination

In view of its nutritional and nutraceutical properties, garlic can be widely used in the food and pharmaceutical industries. A fresh garlic contains much water, around 60%, due to which its use-by date is short. Using dehydration based on technological methods (convectional drying, hybrid drying), the garlic use-by date can be substantially extended, which also allows transforming garlic into other forms, such as powder, granules. The amount of water in dehydrated garlic should on the one hand assure essential nutritional and nutraceutical properties but on the other does not lead to microbiological transformations arising from water impact. The garlic moisture control is therefore necessary to obtain a stable product that can be available for a long time. The garlic drying parameters as well as methods and settings of the moisture analyzer can serve as guidelines for elaborating own drying method which must be optimized with special regard to distinctive features of the sample in question and expected analysis accuracy.



The application note includes basic information for validation of the powdered garlic drying method with the use of MA R, MA X2, MA X7 and MA 5Y moisture analyzers 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. For samples in question, the drying temperature was 105°C. This temperature causes the sample to release the so-called gravitational water.

SAMPLE PREPARATION

Not applicable.

ACCESSORIES

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

METHOD DESCRIPTION

Place the sample with a mass of ca. 5 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 into 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 to let them 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 or record the sample mass growth after drying.

RESULTS

Sample name	GARLIC
Water content (%)	7.86
Standard deviation (%)	0.04

GARLIC – 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

Not applicable.

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. 2 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	**GARLIC**
Drying profile	Standard
Drying temperature	105°C
Sample mass (g)	~ 2
End of analysis	Auto 3
Water content (%)	7.82
Standard deviation (%)	0.16
Analysis time $\acute{x}$ (min)	~ 12

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

Sample name	**GARLIC**
Water content (%) - Ref.	7.86 ± 0.04
Water content (%) - MA	7.82 ± 0.16
Analysis accuracy (%)	|0.04|

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.