COFFEE

water content determination

Coffee moisture is one of the most important parameters that influences sensory properties of coffee, and thus the quality of the final product. In this respect such sensory descriptors of coffee as flavor and aroma are crucial, which has a significant impact on whether specific coffee is accepted by the customer or not. On the other hand a properly determined coffee moisture limit allows defining engineering process parameters that guarantee the most optimal production of a specific portion of coffee for economic reasons. With regard to freshly picked coffee beans, the information on coffee beans moisture allows qualifying it and planning further processing stages. The fastest method of specifying the coffee moisture content is specification of its loss on drying, the so-called LOD. The method that adopts IR radiation (moisture analyzer) is the most common way of testing water content in coffee.



The application note includes basic information for validation of the coffee 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 a 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

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

Grain products (green coffee) must be mechanically ground to reach fine pieces. Ground coffee, instant coffee and freeze-dried coffees do not require initial preparation.

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^{o}C for 2 hours (green coffee, ground coffee, instant coffee), 90 ^{o}C – freeze-dried coffee. After this period, remove vessels and put them 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 or you record the sample mass growth after drying.

RESULTS

Sample name	**COFFEE**			
Type	**green**	**ground**	**instant**	**freeze-drier**
Water content (%)	10.84	2.71	3.29	3.85
Standard deviation (%)	0.08	0.06	0.04	0.03

COFFEE – 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. Too high drying temperature may lead to surface burning of the sample, which may be hard to diagnose when the sample color is dark.

SAMPLE PREPARATION

Fragment coffee beans, mix the sample. Before analyzing samples, store them in sealed containers in view of their hygroscopic nature.

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. 3 g and distribute a thin layer of the sample throughout the weighing pan. Lock the drying chamber manually or automatically.

DRYING PARAMETERS / RESULTS

	COFFEE			
Type	**green**	**ground**	**instant**	**freeze-dried**
Drying profile	Standard			
Drying temperature	110°C	110°C	100°C	90°C
Sample mass (g)	~ 3		~ 1 ÷ 2	
End of analysis	Auto 2	Auto 1	Auto 2	Auto 2
Water content (%)	10.86	2.67	3.13	3.82
Standard deviation (%)	0.10			
Analysis time $\acute{x}$ (min)	23	2		

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

Sample name	COFFEE			
Type	**green**	**ground**	**instant**	**freeze-dried**
Water content (%) – Ref.	10.84 ± 0.08	2.71 ± 0.06	3.29 ± 0.04	3.85 ± 0.03
Water content (%) – MA	10.86 ± 0.10	2.67 ± 0.10	3.13 ± 0.10	3.82 ± 0.10
Analysis accuracy (%)	|0.02|	|0.04|	|0.16|	|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.