CHOCOLATE

dry matter content determination

Chocolate is a confectionery product based on cocoa paste, cocoa butter and sugar or sweetener. The chocolate production consists of cocoa beans fermentation, drying, cleaning, roasting and grinding beans, crushing, rolling, conging and tempering. From the medical point of view, the number of flavonoids in the chocolate is crucial. These are strong anti-oxidants that counteract free radicals and therefore lower the so-called bad cholesterol level. As per the rules of law, the amount of dry cocoa paste in the chocolate must not be lower than 35%, while the total dry matter content in the chocolate is not specified, but it is assumed that it must not be lower than 97,5%. It is possible to quickly and precisely specify the total dry matter content with the use of MA R, MA X2, MA X7 or MA 5Y moisture analyzers by Radwag.



The application note includes basic information for validation of the chocolate 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. Such an approach applies to previously dehydrated products and raw products.

SAMPLE PREPARATION

Before testing, the sample must be stored in a tightly sealed container. Before testing, grate the sample (with a grater).

ACCESSORIES

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

METHOD DESCRIPTION

Weigh glass vessels with a glass rod and pre-dried quartz sand in the amount of ca. 15 g. Place the sample with a mass of ca. 5 g in glass weighing vessels on a pre-dried quartz sand. Mix the sample and sand with a glass rod that must be left in the vessel. The use of the sand as a foundation is to prevent creation of the shell on the surface of the dried sample. Re-weigh 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 105^{o}C for 3 hours. After this period, remove vessels and place in the desiccator until they cool down and weigh again. Put the 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	WHITE CHOCOLATE	DARK CHOCOLATE
Dry matter content (%)	99.01	99.63
Standard deviation (%)	0.06	0.03

CHOCOLATE – DRY MATTER CONTENT DETERMINATION

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

Before testing, the sample must be stored in a tightly sealed container. Before testing, grate the sample (with a grater).

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. 1,5 ÷ 2 g and distribute its pieces throughout the weighing pan. Lock the drying chamber manually or automatically.

DRYING PARAMETERS / RESULTS

Sample name	WHITE CHOCOLATE	DARK CHOCOLATE
Drying profile	Standard	
Drying temperature	80°C	70°C
Sample mass (g)	~1.5 ÷ 2.5	
End of analysis	Auto 2	Auto 3
Dry matter content (%)	98.88	99.66
Standard deviation (%)	0.03	0.01
Analysis time $\acute{x}$ (min)	3	2

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

Sample name	WHITE CHOCOLATE	DARK CHOCOLATE
Dry matter content (%) – Ref.	99.01 ± 0.06	99.63 ± 0.03
Dry matter content (%) – MA	98.88 ± 0.03	99.66 ± 0.01
Analysis accuracy (%)	|0.13|	|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.