



CANDLE WICKS

water content determination

Although it seems simple, candle production is a relatively complicated process. To make sure the candle is of a suitable quality, it is necessary to focus on the composition of the wax (materials mix) used to make it as well as the quality and type of the wick. The candle wick has a substantial impact on the candle while it is burning out, especially with regard to combustion products (particulates, soot). There are many types of candle wicks, yet the most common variant is composed of woven cotton threads, enriched with non-organic arrangements. A fibrous cotton structure of the candle wick is responsible for capillary pull of the combustible, which eventually assures a long burning time of the candle. A high-quality wick allows monitoring melting, absorption, evaporation and burning of the candle fuel. Burning depends on numerous parameters, such as type of fuel, amount of supply air, waste gas volume, as well as wick moisture. These factors determine final products of the candle combustion, which is essential to the user's safety too. A quick and precise examination of the candle wick moisture is therefore required, particularly when this information is used for engineering purposes.



The application note includes basic information for validation of the cotton candle wicks 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.



Candle wicks – water content determination

The method with the use of IR radiation

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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. As for candle wicks, the sample collected for testing must be cut into pieces, ca. 4 cm long.

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 sample at the temperature of 80°C for 2 hours. After this period, remove vessels and put into the desiccator to let them cool down and then weigh. 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	COTTON CANDLE WICKS		
	HTP 73 T/G	WWS 25PN	WWS
Water content (%)	5.28	5.27	4.94
Standard deviation (%)	0.08	0.06	0.04

CANDLE WICKS – 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. As for candle wicks, the sample collected for drying must be cut into pieces, ca. 4 cm long.

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 g and distribute its thin layer throughout the weighing pan. Lock the drying chamber manually or automatically.

DRYING PARAMETERS / RESULTS

	COTTON CANDLE WICKS		
Type	HTP 73 T/G	WWS 25PN	WWS
Drying profile	Standard		
Drying temperature	90°C	100°C	80°C
Sample mass (g)	~ 2		
End of analysis	Auto 3		
Water content (%)	5.19	5.29	4.90
Standard deviation (%)	0.06	0.07	0.12
Analysis time \bar{x} (min)	5		

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

	COTTON CANDLE WICK		
Type	HTP 73 T/G	WWS 25PN	WWS
Water content (%) – Ref.	5.28 ± 0.08	5.27 ± 0.06	4.94 ± 0.04
Water content (%) – MA	5.19 ± 0.06	5.29 ± 0.07	4.90 ± 0.12
Analysis accuracy (%)	0.09	0.02	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.

