FLOUR

water content determination

Flour is a mixture of organic and non-organic compounds. Its composition is diverse and depends on the quality of grain. The group of non-organic compounds includes carbohydrates, proteins, fats, enzymes, vitamins, organic acids and colorants. The group of non-organic compounds is formed by water, microelements and mineral salts. The water content in the flour must range from 13.5 % to 15 %. The lower the content, the lower the baking value and worse sensory qualities. Too high water content in the flour means increased activity of enzymes, growth of microorganisms and lumping phenomenon during processing. The amount of water in the flour is therefore important for engineering and quality-related reasons. A quick check of the water content with the use of the moisture analyzer seems to be a smart solution for engineers, Quality Control departments and technological supervisors.

The application note includes basic information for validation of the flour drying method with the use of MA/R and MA/X2 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.

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. With regard to the sample in question, guidelines specified in the EN ISO 712 standard have been used. Grains and cereal preserves. Moisture determination. Appeal method.

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 in the temperature-controlled laboratory dryer. Dry samples at the temperature of 130^{o}C for 1.5 hours. After this period, remove vessels and put into the desiccator until they 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	FLOUR
Water content (%)	14.35
Standard deviation (%)	0.04

FLOUR – 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 or MA/X2 moisture analyzers, laboratory spoon, disposable aluminum weighing pans.

METHOD DESCRIPTION

Set drying parameters presented below. Collect the sample with a mass of ca. 5 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	**FLOUR**
Drying profile	Standard
Drying temperature	105°C
Sample mass (g)	~ 5
End of analysis	Auto 3
Water content (%)	14.37
Standard deviation (%)	0.07
Analysis time $\acute{x}$ (min)	~ 12

ACCURACY OF THE MA/R ÷ MA/X2 METHOD

Sample name	**Flour**
Water content (%) – Ref.	14.35 ± 0.04
Water content (%) – MA R/X2	14.37 ± 0.07
Analysis accuracy (%)	|0.02|

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.