KETCHUP
water content determination

Ketchup is a concentrated mixture of substances that do not dissolve in water. The main ingredient of the ketchup is a tomato paste and thickeners that enrich the composition or determine the product durability. The quality of ketchup can be assessed through rheological properties, e.g. its ability to flow or through sensory descriptors, such as flavor, aroma, color. Water in ketchup is structurally retained in fibrous tomato strips, thus boosting the mixture viscosity so that the optimal flowing effect is achieved, which is crucial for the customer. The method of testing water or dry matter content used in studies must guarantee reliable and highly precise values – it can be assured with the use of MA R, MA X2, MA X7 and MA 5Y moisture analyzers by Radwag under the interoperational inspection and final product check.



The application note includes basic information for validation of the ketchup 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, store samples in a sealed packaging. Semi-fluid samples must be stirred before testing.

ACCESSORIES

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

METHOD DESCRIPTION

Weigh glass vessels together with a glass rod and pre-dried quartz sand in the amount of ca. 15 g. Mix the sample and then put ca. 5 g of the sample in glass weighing vessels on a pre-dried quartz sand. Mix the sample with the sand by means of the glass rod which must be left in the vessel. The use of the sand as a foundation is to eliminate creation of shell on the surface of the dried sample. Specify the real mass of samples 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 a temperature-controlled laboratory drier. Dry samples at the temperature of 105°C for 3 hours. After this period, remove vessels and put them 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	KETCHUP
Water content (%)	56.38
Standard deviation (%)	0.11

KETCHUP – 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, store samples in a sealed packaging. Semi-fluid samples must be stirred before testing.

ACCESSORIES

MA R, MA X2, MA X7 or MA 5Y moisture analyzer laboratory spoon, disposable aluminum weighing pans, glass fiber filters.

METHOD DESCRIPTION

Set drying parameters presented below. Put the glass fiber filter on the weighing pan and tare the reading. Collect the sample with a mass of ca. 1.5 ÷ 2 g and distribute a thin layer of the sample throughout the filter. Lock the drying chamber manually or automatically to start drying.

DRYING PARAMETERS / RESULTS

Sample name	**KETCHUP**
Drying profile	Standard
Drying temperature	105°C
Sample mass (g)	~ 1.5 ÷ 2
End of analysis	Auto 2
Water content (%)	56.59
Standard deviation (%)	0.31
Analysis time $\acute{x}$ (min)	~ 8

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

Sample name	**KETCHUP**
Water content (%) – Ref.	56.38 ± 0.11
Water content (%) – MA	56.59 ± 0.31
Analysis accuracy (%)	|0.21|

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.