MAYONNAISE

water content determination

Mayonnaise is a durable emulsion that emerges in the emulsification process, that is combination of two non-mixable substances, be it water and vegetable oil together with chicken eggs in this case. The mayonnaise becomes durable when the applied shearing force causes dispersion of the oil phase in the form of drops in the water phase. A typical mayonnaise contains ca. 70 ÷ 80% of fat but still remains the oil-in-water emulsion. To produce the mayonnaise, you can use a rapeseed oil, sesame oil, sunflower oil, cotton oil, soybean oil or corn oil. The surplus of water in the mayonnaise results in disintegration of the emulsion, so the information on real water content must be precise and quickly supplied. Obtaining such information allows affecting the production while it is taking place. Testing water content in the mayonnaise may be conducted in various ways, but validated methods prove crucial, and this applies to Radwag moisture analyzers.

The application note includes basic information for validation of the mayonnaise 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. 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. Semi-fluid samples must be mixed.

ACCESSORIES

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

METHOD DESCRIPTION

Weigh glass vessels with a glass rod and pre-dried quartz sand in the amount of ca. 15 g. Mix the sample with a mass of ca. 5 g and place in glass weighing vessels on pre-dried quartz sand. Mix the sample with sand by means of the glass rod that must be left in the vessels. The application of sand as a foundation is aimed at eliminating creation of the shell on the surface of the sample in question. Weigh vessels again 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°C for 3 hours. After this period, remove vessels, put 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 process until you obtain a stable sample mass or record the sample mass growth after drying.

RESULTS

Sample name	SALAD MAYONNAISE	NAPOLEON MAYONNAISE
Water content (%)	37.57	22.52
Standard deviation (%)	0.12	0.05

MAYONNAISE – 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, the sample must be stored in a tightly sealed container. Semi-fluid samples must be mixed.

ACCESSORIES

MA/R or MA/X2 moisture analyzer, laboratory spoon, disposable aluminum weighing pans.

METHOD DESCRIPTION

Set drying parameters presented below. Distribute a thin layer of the sample with a mass of 2 g throughout the moisture analyzer weighing pan. Lock the drying chamber manually or automatically.

DRYING PARAMETERS / RESULTS

Sample name	SALAD MAYONNAISE	NAPOLEON MAYONNAISE
Drying profile	Standard	
Drying temperature	120°C	
Sample mass (g)	~ 2	
End of analysis	Auto 2	
Water content (%)	37.53	22.53
Standard deviation (%)	0.06	0.15
Analysis time $\acute{x}$ (min)	10	7

ACCURACY OF THE MA/R ÷ MA/X2 METHOD

Sample name	SALAD MAYONNAISE	NAPOLEON MAYONNAISE
Water content (%) – Ref.	37.57 ± 0.12	22.52 ± 0.05
Water content (%) – %MA R/X2	37.53 ± 0.06	22.53 ± 0.15
Analysis accuracy (%)	|0.04|	|0.01|

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.