Sodium, calcium, acid caseinate

water content determination

Caseinates are protein products obtained through neutralization of acid casein with alkaline agents, such as hydroxides or sodium carbonates, potassium carbonates, magnesium carbonates, ammonium carbonates. The purpose of this process is to obtain a well-soluble product that can be used in the meat industry, bakery, dairy industry, in grain preserve production, drink and food concentrate production. Essential functional features of caseinates that influence the quality of the final product are solubility, water absorption, viscosity, gelation, fat binding, emulsification. The surplus of water in the caseinate structure that takes a form of a hygroscopic powder is unfavorable for economic and quality-related reasons. For this reason caseinate moisture must be monitored and kept unchanged. To do so, an ergonomic method of testing water content in caseinates that adopts IR radiation has been elaborated. It can be used in the laboratory and at any stage of the engineering process.



The application note includes basic information for validation of the sodium, calcium and acid caseinate 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 a 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

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 into the temperature-controlled laboratory dryer. Dry samples at the temperature of 102°C for 2 hours. After this period, remove vessels, put them 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 procedure until you obtain a stable sample or record the sample mass growth after drying.

RESULTS

Sample name	**CASEINATE**		
Type	**Sodium**	**Calcium**	**Acid**
Water content (%)	5.95	5.82	11.71
Standard deviation (%)	0.01	0.01	0.01

CASEINATE – THE 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, MA X2, MA X7 and 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. 5 g and distribute its thin layer throughout the weighing pan. Lock the drying chamber manually or automatically.

DRYING PARAMETERS / RESULTS

Sample name	**CASEINATE**		
Type	**Sodium**	**Calcium**	**Acid**
Drying profile	Standard		
Drying temperature	102°C		
Sample mass (g)	~ 5		
End of analysis	Auto 2		Auto 3
Water content (%)	6.07	5.93	11.73
Standard deviation (%)	0.05	0.05	0.03
Analysis time $\acute{x}$ (min)	7	7	16

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

Sample name	**CASEINATE**		
Type	**Sodium**	**Calcium**	**Acid**
Water content (%) – Ref.	5.95 ± 0.01	5.82 ± 0.01	11.71 ± 0.01
Water content (%) – MA	6.07 ± 0.05	5.93 ± 0.05	11.73 ± 0.03
Analysis accuracy (%)	|0.12|	|0.11|	|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.