



# CRISPS

## water content determination

The material used to produce crisps is raw potato pieces that are deep-fried in a vegetable oil. The taste of crisps comes from suitable spices added. Durability and consistency of crisps is dependent upon water content, but its surplus causes fats in the product to deteriorate. Crisps consistency and crunchiness depend on the content of fat, starch and dry matter in the material, as well as frying time and thickness. It is therefore necessary to examine dry matter / water content in crisps to make sure the engineering process is correct and to confirm the quality of the production batch. Speed and precision of the analysis can be guaranteed by moisture analyzers series MA/R or MA/X2 by Radwag.



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



## Crisps – water content determination

The method with the use of IR radiation

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](mailto:office@radwag.com), [www.radwag.com](http://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. Before testing, grind the sample down (with a grinder).

### ACCESSORIES

Laboratory dryer, glass weighing vessels with a lid, analytical balance AS 220.X2, laboratory spoon. Electric grinder.

### 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). Place 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 and place them in the desiccator to let them cool down and then weigh. Put samples into 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 solid sample or you can record the sample mass growth after drying.

### RESULTS

Sample name	CRISPS
Water content (%)	7.72
Standard deviation (%)	0.01

## CRISPS – 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. Too high drying temperature may lead to surface burning of the sample, which may be hard to diagnose when the sample color is dark.

### SAMPLE PREPARATION

Before testing, the sample must be stored in a tightly sealed container. Before testing, grind the sample down (with a grinder).

### ACCESSORIES

Moisture analyzer MA/R or MA/X2, laboratory spoon, disposable aluminum weighing pans, electric grinder.

### METHOD DESCRIPTION

Set drying parameters below. Collect the sample with a mass of ca. 3 g and distribute a thin layer of the sample throughout the surface of the weighing pan. Lock the drying chamber manually or automatically.

### DRYING PARAMETERS / RESULTS

Sample name	CRISPS
Drying profile	Standard
Drying temperature	110°C
Sample mass (g)	~ 2.5 ÷ 3
End of analysis	Auto 1
Water content (%)	7.66
Standard deviation (%)	0.02
Analysis time $\bar{x}$ (min)	5

### ACCURACY OF THE METHOD MA/R ÷ MA/X2

Sample name	CRISPS
Water content (%) - Ref.	7.72 ± 0.01
Water content (%) - MA R/X2	7.66 ± 0.02
Analysis accuracy (%)	0.06

### 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.

