



## DRIED FRUITS

### water content determination

The target water content in dried fruits is obtained as a result of its industrial dehydration with the use of various technologies. A quick water content check based on the moisture analyzer allows verifying capacity and efficiency of engineering processes that assure high quality of the final product. The parameters of the method and configuration of the moisture analyzer can serve as guidelines for elaborating own dried fruits drying method that must be optimized with special regard to distinctive features of the sample in question as well as expected analysis accuracy.



The application note includes basic information for validation of the dried fruits (apple, strawberry, raspberry, chokeberry and black currant) drying method with the use of MA R, MA X2, MA X7 and MA 5Y 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.



## Water content determination in the apple, strawberry, raspberry, chokeberry, black currant dried fruits.

The method with the use of IR radiation

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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 of a soft structure, for example dried fruits, freeze-dried products.

### SAMPLE PREPARATION

If dried fruits take a form of large pieces, fragment the sample.

### 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 80°C for 2 hours. After this period, remove vessels and 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 procedure until you obtain a stable sample mass or record the sample mass growth after drying.

### RESULTS

Sample name	DRIED FRUITS				
Type	Apple	Strawberry	Raspberry	Chokeberry	Black currant
Water content (%)	7.78	7.14	4.26	10.40	6.27
Standard deviation (%)	0.10	0.04	0.05	0.06	0.08

## 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

Fragment the sample.

### ACCESSORIES

MA R, MA X2, MA X7 or 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.  $3 \div 4$  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	DRIED FRUITS				
Type	Apple	Strawberry	Raspberry	Chokeberry	Black currant
Drying profile	Standard				
Drying temperature	90°C	80°C	85°C	85°C	
Sample mass (g)	2 ÷ 3				
End of analysis	Auto 3	Auto 2	Auto 3		
Water content (%)	7.76	7.02	4.34	10.34	6.33
Standard deviation (%)	0.13	0.09	0.09	0.22	0.11
Analysis time $\bar{x}$ (min)	16	7	10	16	16

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

Sample name	DRIED FRUITS				
Type	Apple	Strawberry	Raspberry	Chokeberry	Black currant
Water content Ref. (%)	7.78 ± 0.10	7.14 ± 0.04	4.26 ± 0.05	10.40 ± 0.06	6.27 ± 0.08
Water content MA (%)	7.76 ± 0.13	7.02 ± 0.09	4.34 ± 0.09	10.34 ± 0.22	6.33 ± 0.11
Analysis accuracy (%)	0.02	0.12	0.08	0.06	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.

