Ministry of Education and Science of Ukraine

National University of Food Technologies

87
International scientific conference of young scientist and students

"Youth scientific achievements to the 21st century nutrition problem solution"

April 15–16, 2021

Part 2

Kyiv, NUFT, 2021

Міністерство освіти і науки України

Національний університет харчових технологій

87
Міжнародна наукова конференція молодих учених, аспірантів і студентів

"Наукові здобутки молоді – вирішенню проблем харчування людства у XXI столітті"

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Частина 2

Київ НУХТ 2021

87 International scientific conference of young scientist and students "Youth scientific achievements to the 21st century nutrition problem solution", April 15–16, 2021. Book of abstract. Part 2. NUFT, Kyiv.

The publication contains materials of 87 International scientific conference of young scientists and students "Youth scientific achievements to the 21st century Nutrition problem solution".

It was considered the problems of improving existing and creating new energy and resource saving technologies for food production based on modern physical and chemical methods, the use of unconventional raw materials, modern technological and energy saving equipment, improve of efficiency of the enterprises, and also the students research work results for improve quality training of future professionals of the food industry.

The publication is intended for young scientists and researchers who are engaged in definite problems in the food science and industry.

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Матеріали 87 Міжнародної наукової конференції молодих учених, аспірантів і студентів "Наукові здобутки молоді – вирішенню проблем харчування людства у XXI столітті", 15–16 квітня 2021 р. – К.: НУХТ, 2021 р. – Ч.2. – 394 с.

Видання містить матеріали 87 Міжнародної наукової конференції молодих учених, аспірантів і студентів "Наукові здобутки молоді – вирішенню проблем харчування людства у XXI столітті".

Розглянуто проблеми удосконалення існуючих та створення нових енерго- та ресурсоощадних технологій для виробництва харчових продуктів на основі сучасних фізико-хімічних методів, використання нетрадиційної сировини, новітнього технологічного та енергозберігаючого обладнання, підвищення ефективності діяльності підприємств, а також результати науково-дослідних робіт студентів з метою підвищення якості підготовки майбутніх фахівців харчової промисловості.

Розраховано на молодих науковців і дослідників, які займаються означеними проблемами у харчовій науці та промисловості.

Рекомендовано вченою радою Національного університету харчових технологій. Протокол № 8 від 25 березня 2021 р.

4. Determination of the mass fraction of moisture of gum arabic

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Abstract. The main purpose of this study is to determine the mass fraction of moisture in the sample of gum arabic to confirm the data specified in the certificate of quality of the food additive.

Materials. Sample of spray-dried gum arabic (thin, white powder with a neutral odor, packaged in a small jar).

Methods. Methods for determining the mass fraction of moisture by drying belong to thermogravity methods (thermogravimetry from the Latin *thermo* - heat, *gravi* - weight, *metry* - method). These methods are the most common and universal. In this experiment, the method of drying by infrared rays were used. Infrared rays are electromagnetic radiation emitted by heated bodies, so infrared rays are called thermal rays.

Results. Water is able to almost completely absorb all the heat rays (95-96 %) that fall on it, quickly heating up and evaporating. The method is based on the high ability of wet materials to absorb the powerful heat flux of infrared radiation; the drying time is significantly reduced (25 minutes). The method is used in moisture meters - a drying chamber that is connected to the scales. The scale of scales is calibrated so that shows a decrease in the mass of the sample due to evaporated water.

Equipment: determination of moisture conducted by drying the sample to constant weight (< 0.01 %) with gear Shimadzu Moisture Balance MOC-120H - electronic moisture [1].

The main advantages of the device: a large vessel for samples (diameter 130 mm) allows you to evenly place a large number of samples in a thin layer; durable heater - infrared medium-wave quartz heater provides efficient drying without interference for samples; unibloc sensor - internal weighing. The mechanism provides excellent stability and long service life at repeated differences of temperature that allows to measure easily to 0,001 g; monitoring of moisture evaporation - the rate of moisture evaporation is controlled (it can be seen visually on the graph), so it is clear that the measurement is nearing completion. Updates occur every 30 seconds; automatic calibration mechanism; measurement data can be easily sent to a program such as Excel. After importing into Excel, you can process the data as you wish, using common functions such as statistical calculations and graphical charts [1].

The course of the analysis: first you need to set the level of the device, calibrate (internal / external calibration). The next step: weighing a sample of gum arabic m_i = 0.992 g for temperatures of 21 °C. Then there is a gradual heating to a temperature of 105 °C. On the display you can see the dynamics of mass changes in %, monitoring of moisture evaporation, which is updated automatically every 30 seconds (using the automatic calibration function). Record data changes within 25-30 minutes, and enter in table. Using Excel, we build a graph (fig.) of the dynamics of mass change over time and draw conclusions about the amount of evaporated moisture in the sample of gum arabic, comparing with the quality certificate of this food additive.

Table

τ, min	0	0,5	1	1,5	2	2,5	3	3,5	4	4,5
Δm, %	**0,06**	**0,76**	**1,64**	**3,07**	**4,86**	**6,39**	**7,6**	**8,62**	**9,45**	**10,13**
τ, min	9,5	10	10,5	11	11,5	12	12,5	13	13,5	14
Δm, %	**13,25**	**13,38**	**13,48**	**13,55**	**13,64**	**13,71**	**13,81**	**13,94**	**14,01**	**14,08**

Table

τ, min	5	5,5	6	6,5	7	7,5	8	8,5	9
Δm, %	**10,71**	**11,19**	**11,59**	**11,95**	**12,25**	**12,53**	**12,75**	**12,93**	**13,1**
τ, min	14,5	15	15,5	16	16,5	17	17,5	18	-
Δm, %	**14,11**	**14,13**	**14,18**	**14,23**	**14,28**	**14,31**	**14,33**	**14,34**	-

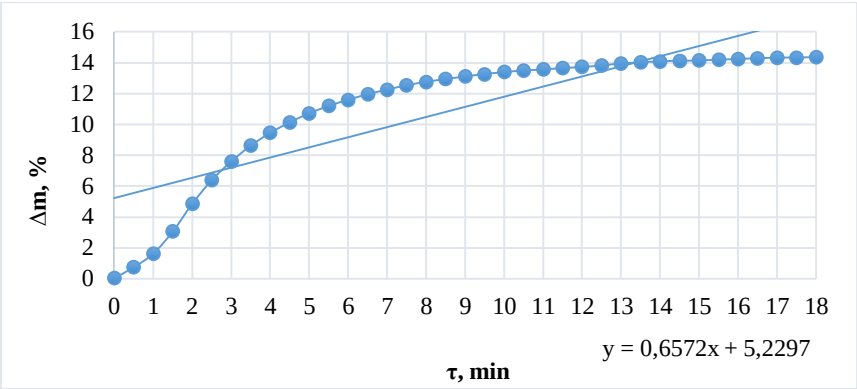

Fig. The dependence of the dynamics of mass change on time

Summary. According to the quality certificate, the drying losses of gum arabic (for spray-dried material) should not exceed 10 %. In our case, the final humidity (loss on drying, the dynamics of change % of the mass) was 14.34 %. Therefore, according to this study, we can conclude that the food supplement exceeds the norms specified in the certificate. This may indicate that the food additive has not been stored properly for a long time, in different temperature conditions and at different humidity. Another factor of high humidity may be the tightness of the package - this product was purchased without a protective aluminum film.

References

1. Moisture Balance MOC-120H [Electronic resource] − https://www.ssi.shimadzu.com/products/balances/moc-120h-moisture-balance.html.