AN ACCELERATED METHOD FOR MOISTURE DETE[illegible]
MEAT PRODUCTS AND MEDICAL PREPARATI[illegible]

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AN ACCELERATED METHOD FOR MOISTURE DETERMINATION IN MEAT PRODUCTS AND MEDICAL PREPARATIONS

/Following is the translation of an article by N. Sukharev and O. Bulycheva, VNIMP, and P. Shibanova, Moscow Meat Combine, published in the Russian-language periodical Myasnaya industriya SSSR (Meat Industry of the USSR), 1960, No 5, pages 16--18. Translation performed by Sp/7 Charles T. Ostertag Jr./

The determination of the moisture content in meat products and medicinal preparations by drying up to a fixed weight (based on the standard method) requires much time. Thus, the dehydration of certain products continues for a day while using harmful substances as the drying agent.

For a control of the technological processes in the preparations of the above mentioned products, it is necessary to select a method which makes it possible to shorten the duration of dehydration.

Contact drying is an effective method for the removal of moisture. A significant intensification of the process here is caused by the presence of a gradient of overall pressure, under the action of which the speed of steam transfer is increased by several times /1/. A determining factor in the contact method is the temperature of the heating surface and the thickness of the layer of material.

In recent years in the plant control laboratories for the food industry wide use has been made of the VCh device for the rapid determination of the moisture content in various products: Bread, preserves, food concentrates, dried vegetables and fruits, and in fish products /2, 3, 4/.

Krasilshchikov and Cherny sheva developed the method and conditions for determining the moisture content with the VCh device for sausage products ("Meat Industry of the USSR", 1956, No 4, 1960, No 2).

The authors of the stated work investigated the feasibility of using this device for determining the moisture content in meat products and in medical preparations.*

* Laboratory worker, Ye. Yifimova assisted in this work.

The operation of the device is based on the rapid removal of moisture from a thin layer of the material under investigation which has been placed between two metallic plates. The plates are heated up to a specific temperature by electrical elements.

We additionally equipped one of the industrially serially produced VCh devices with an automatic temperature control device, which consists of an electronic relay and a contact thermometer, installed in place of the mercury thermometer in the lower plate of the device. This makes it possible to obtain the necessary temperature for the dehydration of the products being investigated within limits of 120--160°, and to maintain the assigned temperature regimen with an accuracy of ± 1° (see drawing).

The procedure for determining the moisture content in the meat products on the VCh device was the generally accepted one for the stated method.

For carrying out the tests we took an average sample of 100 grams of dehydrated meat product or medical preparation. All the samples taken were of a very fine particle size and therefore only random clots had to be additionally ground in a mortar up to an homogeneous mass. The sample was placed in a glass beaker with a ground-glass stopper or a screw type cover and stored for the entire duration of the work, which precluded the moistening of the products. Each time before taking a batch for an analysis of the moisture content, the prepared sample was thoroughly mixed with a glass rod.

For dehydrating the batches of the majority of the products we used monolayer packets made of rotary press (newspaper type) paper, 20 x 14 cm in size, which we folded in half after bending over the open edges by 1.5 cm. The prepared packets had the dimensions of 8 x 11 cm. For the drying of meatbone flour and serum pepsin we used four-layer inserts made of filter paper enclosed within the packet.

Before analysis the prepared packets or the packets with the inserts were thoroughly dried for three minutes in the device at a temperature which corresponded to the regimen for the dehydration of the stated type of product. After this they were placed for 2--3 minutes in a dryer for cooling.

Subsequently from the prepared sample we took a batch of 2--3 g of dry product and placed it in the dried packet, weighed commercial chemically with an accuracy up to 0.01 g (taking into consideration the hygroscopic nature of the paper and the dried product, all the weighings must be carried out rapidly). With a spatula the contents of the packet were distributed evenly over the entire area, the edges of the packet were closed, and the contents were carefully flattened out on the plexiglass plate with a cylindrical object up until a uniform surface was obtained. This ensured the complete, uniform drying throughout the thickness of a layer of the product.

The packet with the weighed portion was placed in the device and maintained at conditions which were optimum for the drying of the stated product. Then the packet was removed and after cooling in a dryer was weighed with the previous accuracy.

The moisture content, calculated in percentages, was determined by the formula:

$$X = \frac{a-c}{a-b} 100,$$

where: a -- weight of the packet with the batch before dehydration, in grams;
b -- weight of the packet alone, in grams;
c -- weight of the packet with the batch after dehydration, in grams.

The duration and temperature of drying, corresponding to the optimum conditions for the dehydration of the products being investigated, were established on the VCh device over the period of 3--9 minutes with an interval of 1 minute during a temperature of 120--160° after each 10°.

During the work around 150 determinations were made of the moisture content in 10 various products.

The duration and optimum temperature for dehydration were established by means of comparing the results obtained with the moisture content in the same products when determined by the standard method.

The test data of determining the moisture content in various meat products and medical preparations, obtained on the VCh device under the appropriate optimum conditions, and the comparison with the results of the control determination by the standard method, are presented in the table.

As is seen from the table, the optimum temperature for drying the majority of products is 150° . This is with the exception of serum pepsin and meat-bone flour. The best results of dehydration for these were obtained at temperatures of 120 and 140°.

The data from the table demonstrate that with the selected optimum conditions for the dehydration of the packets with the batches of products being investigated the VCh device makes it possible to obtain results which are sufficiently close to those determined by the standard method. Deviations did not exceed $\pm$ 0.1 -- 0.4%.

All together 15--20 minutes is required for carrying out an analysis of the moisture content in dry products according to this method. This takes into consideration the time for preparing the average sample.

The developed method and the established optimum conditions for the dehydration of products which are presented in the table are used in daily practice by the chemical laboratory in the section for medical preparations at the Moscow Meat Combine.

Having experimentally established the temperature and duration for drying, the VCh device may also be used for determining the moisture content in other meat products and medical preparations.

The VCh device may be recommended to control plant laboratories in the production of dehydrated meat products and medical preparations as a device which makes it possible to rapidly and accurately control the quality of production being put out.

Literature

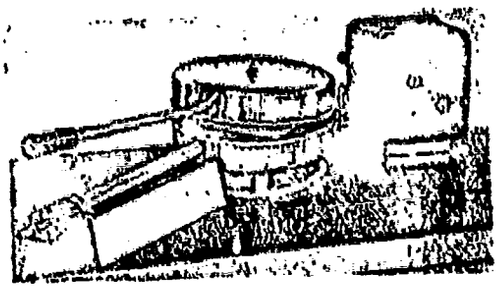
a. A. V. Lykov, Heat and Mass Transfer in the Processes of Drying, Gosenergoizdat Publishing House, 1956.

b. K. N. Chizhova, Device for the Rapid Determination of Moisture, Bulletin of Technical Information, MPP, USSR, 1953, No 2.

c. I. M. Marshak and S. N. Mizikin, Accelerated Method for Determining Moisture in Fish and Fish Products, "Rybnoye Khozyaystvo," 1956, No 3.

d. L. M. Kalashnikova and others, Application of the VCh device for the determination of moisture content in food concentrates and boiled barley, "Canned Food and Vegetable Drying Industry," 1958, No. 3.

GRAPHIC NOT REPRODUCIBLE



Product investigated	WCh Device				Standard Method			Deviation from standard method %	Remarks
	Time in minutes	Temperature in °C	Moisture content % in parallel samples	Moisture content % Average of two samples	Time in hours	Temperature in °C	Moisture content, %		
Meat Products									
Alimentary albumin	5	150	7.00 7.50	7.25	5—6	105	7.11	+0.14	Sample taken from industry
KS pickling regulator	6	150	14.00 14.50	14.25	1	120	14.35	-0.10	"
Bone flour	6	150	8.00 8.00	8.00	1	120	7.62	+0.38	"
Meat-bone flour	7	120	7.50 7.50	7.50	1	120	7.66	+0.16	"
Industrial albumin	6	150	7.50 8.00	7.75	3	105	7.59	+0.16	"
" "	6	150	10.00 10.50	10.25	3	105	10.25	0.00	Series No 708
" "	6	150	8.50 9.00	8.75	3	105	8.54	+0.21	Sample taken from storage
Med. Preparations									
Rhonidase	3	150	2.50 2.50	2.50	24 hours over conc. H_2SO_4		2.31	+0.19	Sample taken from industry
Serum pepsin	4	140	8.00	8.00	up to constant weight	100	7.90	+0.10	Same
Pancreatin	5	150	2.66 3.00	2.83	2	105	2.61	+0.22	Series No 66
Cholenzyme in powder	6	150	3.50 3.50	3.50	up to constant weight	105	3.32	+0.18	Series No 46
Cholenzyme in tablets	8	150	7.00 7.50	7.25	Same	105	6.86	+0.39	Same
Cholenzyme in powder	6	150	4.66 5.00	4.83	Same	105	4.87	-0.04	Series No 47
" in tablets	8	150	6.00 6.50	6.25	Same	105	5.92	+0.33	Same