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OBTAINING WRAPPING PAPER USED IN FURNITURE WRAPPING AND QUALITY DELIVERY AND DETERMINING ITS QUALITY INDICATORS

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Abstract: *Composite materials samples have been obtained from cellulose and bazalt fibers based on cellulose-containing plants. The properties of paper samples have been studied: the amound of cellulose, the amound of ash, water absorption and breaking load. Gained results show that the composite material with the addition of basalt fibers is more durable. Half-finished cellulose fibers obtained from basalt, straw and wastepaper are more prouse than ones obtained from cotton plant.*

Keywords: *Basalt fiber, composite material, high-strenght-paper, Helianthus tuberosus, packaging material, thermal insulating material, paper and cardboard samples.*

INTRODUCTION. Nowadays, the increasing demand for paper and paper products has prompted us to acquire other types of paper products. For this purpose, a number of studies were conducted.

Compositions with different properties can be obtained by adding cellulose-containing waste, annual plant cellulose, and other ingredients. Among such ingredients, basalt fiber, which is a local raw material in our Republic, has heat-resistant and strong properties. Basalt fiber tends to crystallize more easily than other glass fibers. It is extremely resistant to heat, chemical effects and burning and has high durability. That is why composite plastics are used instead of asbestos, which is a preservative. For the experiment, we took basalt fiber, that is, the fiber mined in Asmosoy of our Republic. Its melting temperature is 1250^0C, which is much lower than those obtained from other places.

MATERIAL AND METHODS. We took paper samples based on composite materials with different compositions based on annual plant cellulose and basalt fibers and studied their properties. The main purpose of the work is to increase the strength of paper, reduce burning and moisture absorption.

We obtained five different composite materials containing cellulose and basalt fiber. The following were used as raw materials for the preparation of the composite material containing cellulose: Basalt, Helianthus tuberosus, cotton wool, cellulose obtained from hemp.The composite material was prepared in laboratory conditions by mixing basalt fiber with celluloses obtained from annual plants in equal amounts and different amounts from each of them separately.

The prepared mass was diluted by 1-1.5%, and a paper sample was cast on the paper casting machine. When the cylinder of the apparatus is slowly raised together with the mesh part, the water at the tip passes through the mesh to form a wet cellulose layer. The resulting cellulosic layer together with the mesh is dehydrated in a drying cabinet at 105-110^0C to 75-80% moisture. Then it is pressed in a press until the required thickness is formed and kept in the press for 30 minutes. The sample is dried again to a moisture content of 5-6%. 6x6 cm is cut from it and its mass is determined on an analytical scale. The thickness of the sample is measured using a caliper. All sampling was done in this manner.

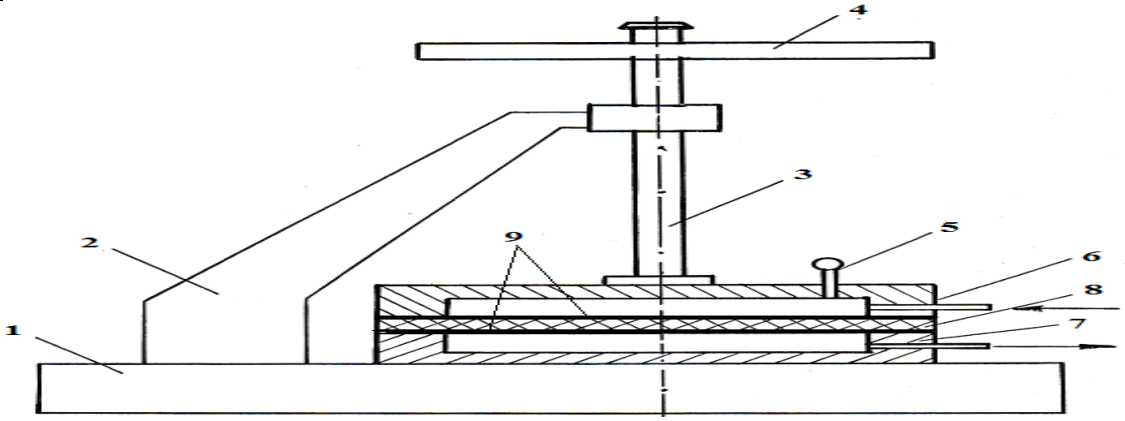

Fig. 1. Laboratory filter press: 1 – base; 2 – bracket; 3 – screw; 4 – turner; 5 – monometer; 6 – movable plate; 7 – non-moving plate; 8 – wet cardboard; 9 – metal plate.

After drying, the technical parameters of the sample are determined, and other physico-chemical and thermal conductivity and thermal parameters are determined. In this article, we will mainly consider the areas of use of the obtained composite paper and pay attention to the quality indicators of the obtained paper.

RESULTS AND DISCUSSION. Usually we have seen wrapping paper only in brown condition. We studied the effect of the chemical on the color intensity of the obtained paper, and the analysis of the results is given below. Optimum conditions were achieved using H2O2, NaOH and Na2SiO3 doses, and the three optimal parameters were determined by the final brightness of the paper. In this experiment, single factor analysis was used to study the optimal conditions.

To study the effect of NaOH content on varnish removal, the remaining two factors were at optimal conditions (10% Na_2SiO_3 and H_2O_2). The effect of H_2O_2, Na_2SiO_3 and NaOH dosages on the brightness of pulp-refining paper is presented in Figure2. The brightness of the quenched papers increased slowly at first and then stabilized with the increase in the dose of H_2O_2, Na_2SiO_3, NaOH. The results showed that the highest gloss was obtained for papers made from refined cellulose when the content of H_2O_2, NaOH and Na_2SiO_3 was 10%, 5% and 10%, respectively. Brightness was increased to 32.3% ISO, 30.3% ISO, and 28.2% ISO with 10% H_2O_2, 10% Na_2SiO_3, and 5% NaOH, respectively.

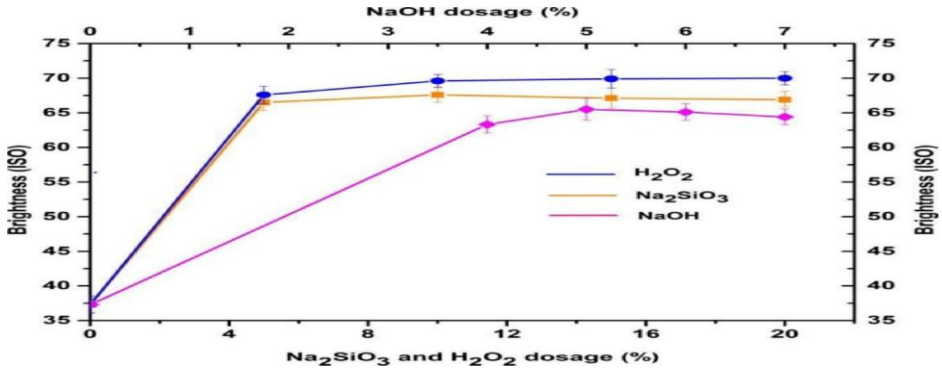

Fig. 2. Effects of H_2O_2, NaOH and Na_2SiO_3 on the color intensity of paper made from annual plant cellulose and basalt fiber

As we know, the role of cellulose crystallization and amorphous sections is important in the formation of paper. Below, we have determined the increase in bond formation and crystallinity sites as a result of gyrolysis with the help of a diffractogram. During hydrolysis, the amorphous region of cellulose was removed, which contributed to the low yield

(35.54%) and high crystallinity of CNC. Thus, CNC had high crystallinity, and this property could be important for paper production.

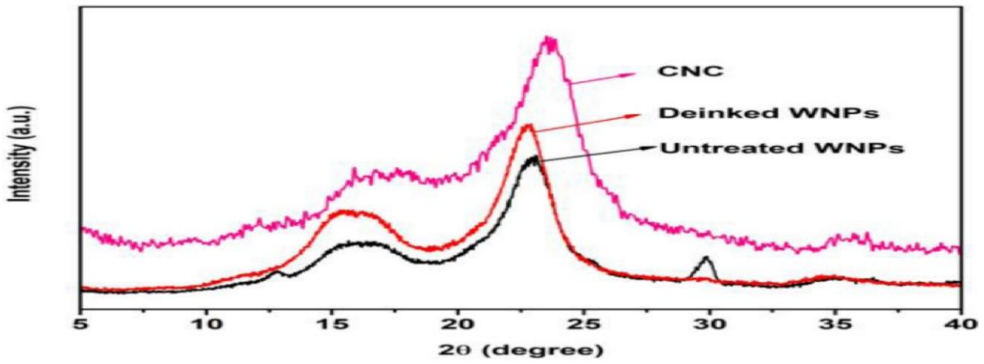

Fig. 3. Diffraction patterns of an annual plant used to obtain paper.

The next step will be to determine the level of sorption of the obtained compositions.

Methods for determining the degree of sorption of samples:

1. Take a 1 g sample and soak it for 30 min. After boiling in water for a period of time, and then turning the centrifuge 5000 times per minute, the excess water is expelled and the mass is determined.

2. Samples 30 min. kept in water and then placed between two pieces of cellulose plate, excess water 2 kg. Determining the mass of the load.

3. Determining the mass after storing in a desiccator for 24 hours in an environment of concentrated table salt with a relative humidity of 70%.

Table-1

Degree of swelling of composite paper samples in water

№	Name and composition	Mass, g		The degree of suffocation in water, %
		dry	wet	
1	Paper obtained on the basis of Helianthus tuberosus stem cellulose	1.0	1.70	70
2	Paper obtained on the basis of basalt fiber and Helianthus tuberosus cellulose	1.0	1.40	40
3	Paper made from poplar wood pulp	1.0	1.76	76
4	Paper obtained on the basis of basalt fiber and poplar tree cellulose	1.0	1.40	40
5	Paper obtained on the basis of cotton wool cellulose	1.0	2.15	115
6	Paper obtained on the basis of basalt fiber and cotton wool cellulose	1.0	1.60	60
7	Paper obtained on the basis of wheat straw cellulose	1.0	2.40	140
8	Paper obtained on the basis of basalt fiber and wheat straw cellulose	1.0	1.71	71
9	Paper obtained on the basis of hemp cellulose	1.0	2.11	111
10	Paper obtained on the basis of basalt fiber and jute cellulose	1.0	1.70	71
11	Basalt fiber paper	1.0	1.16	16

We studied the sorption properties of the obtained materials. This work was carried out based on the methodological instructions given above. To do this, we soaked the samples in water and determined the amount of water absorbed, the degree of suffocation in water and the degree of absorption of 70% relative humidity. The absorption rate of the samples is given in the table below.

As can be seen from the table, the composite paper sample obtained on the basis of Helianthus tuberosus and cotton wool cellulose and basalt fiber has a water absorption rate of 40-60%, which is definitely a positive result. Because our goal is to take moisture-resistant composite paper and apply it to various industries. In the next stage of our experiments, the degree of moisture sorption of composite paper samples from air with a relative humidity of 70% was studied.

Table-2

Moisture sorption rate of composite paper samples from air with 70% relative humidity

№	Name and composition	Mass, g		The degree of suffocation in water, %
		dry	wet	
1	Paper obtained on the basis of Helianthus tuberosus stem cellulose	1.0	1.6	160
2	Paper obtained on the basis of basalt fiber and Helianthus tuberosus cellulose	1.0	1.03	103
3	Paper made from poplar wood pulp	1.0	1.5	150
4	Paper obtained on the basis of basalt fiber and poplar tree cellulose	1.0	1.04	104
5	Paper obtained on the basis of cotton wool cellulose	1.0	1.6	160
6	Paper obtained on the basis of basalt fiber and cotton wool cellulose	1.0	1.03	103
7	Paper obtained on the basis of wheat straw cellulose	1.0	1.7	170
8	Paper obtained on the basis of basalt fiber and wheat straw cellulose	1.0	1.04	104
9	Paper obtained on the basis of hemp cellulose	1.0	1.6	160
10	Paper obtained on the basis of basalt fiber and jute cellulose	1.0	1.04	104
11	Basalt fiber paper	1.0	1.01	101

As can be seen from the table, the absorption of moisture in the air depends on the types of samples.

In this table, the composite paper sample obtained on the basis of Jerusalem artichoke and cotton wool cellulose and basalt fiber has a moisture absorption of about 3%. These indicators characterize the structure of the obtained composite paper samples.The more moisture the sample absorbs, the more porous the cellulose fibers of the composite paper sample will be. So, paper samples based on poplar wood, straw and jute stem cellulose and basalt fiber are more porous than paper samples based on cotton wool and Jerusalem

artichoke cellulose. In the next step, we made paper samples by mixing annual plant cellulose and basalt fibers in different compositions and studied their properties. We presented the results in the form of a table below.

Table. 3

Sorption level of paper based on basalt fiber and Helianthus tuberosus cellulose

№	Name and composition	Mass, g		The degree of suffocation in water, %
		dry	wet	
1	Paper obtained on the basis of basalt fiber and Helianthus tuberosus cellulose, 25:75	1.0	1.69	69
2	Paper obtained on the basis of basalt fiber and Helianthus tuberosus cellulose, 50:50	1.0	1.40	40
3	Paper obtained on the basis of basalt fiber and Helianthus tuberosus cellulose, 75:25	1.0	1.29	29
4	Basalt fiber paper, 100	1.0	1.16	16

Table. 4

Sorption level of paper obtained on the basis of basalt fiber and wood cellulose

№	Name and composition	Mass, g		The degree of suffocation in water, %
		dry	wet	
1	Paper obtained on the basis of basalt fiber and wood cellulose, 25:75	1.0	1.71	71
2	Paper obtained on the basis of basalt fiber and wood cellulose, 50:50	1.0	1.40	40
3	Paper obtained on the basis of basalt fiber and wood cellulose, 75:25	1.0	1.33	33
4	Basalt fiber paper, 100	1.0	1.16	16

Table. 5

Sorption level of paper obtained on the basis of basalt fiber and cotton wool cellulose

№	Name and composition	Mass, g		The degree of suffocation in water, %
		dry	wet	
1	Paper obtained on the basis of basalt fiber and cotton wool cellulose, 25:75	1.0	1.87	87
2	Paper obtained on the basis of basalt fiber and cotton wool cellulose, 50:50	1.0	1.60	60
3	Paper obtained on the basis of basalt fiber and cotton wool cellulose, 75:25	1.0	1.41	41
4	Basalt fiber paper, 100	1.0	1.16	16

As can be seen from the above tables, an increase in the amount of basalt fiber in the composition leads to a decrease in the level of water absorption of the obtained composite paper. It should be emphasized that the paper obtained on the basis of basalt fiber and Jerusalem artichoke cellulose was considered the most optimal option in our experiments. Paper samples obtained during the research were recommended to be used in the furniture

industry. Below are the results of the test-experiment conducted at the "Qalbinur Fayz Mebel" LLC enterprise on the use of wrapping paper used for wrapping and quality delivery of furniture.

Table-6

Sorption level of paper obtained on the basis of basalt fiber and straw cellulose

№	Name and composition	Mass, g		The degree of suffocation in water, %
		dry	wet	
1	Paper obtained on the basis of basalt fiber and straw cellulose, 25:75	1.0	1.90	90
2	Paper obtained on the basis of basalt fiber and straw cellulose, 50:50	1.0	1.71	71
3	Paper obtained on the basis of basalt fiber and straw cellulose, 75:25	1.0	1.47	47
4	Basalt fiber paper, 100	1.0	1.16	16

Table-7

Sorption rate of paper based on basalt fiber and cotton stalk cellulose

№	Name and composition	Mass, g		The degree of suffocation in water, %
		dry	wet	
1	Paper obtained on the basis of basalt fiber and cotton stalk cellulose, 25:75	1.0	1.89	89
2	Paper obtained on the basis of basalt fiber and cotton stalk cellulose, 50:50	1.0	1.71	71
3	Paper obtained on the basis of basalt fiber and cotton stalk cellulose, 75:25	1.0	1.45	45
4	Basalt fiber paper, 100	1.0	1.16	16

Table-8

Analysis of experimental results

№	Quality indicators of wrapping paper	Wrapping paper used in the enterprise	Recommended wrapping paper	GOST requirement
1.	1 m^2, mass, g	120	120	120
2.	Break length, m	2850	3000	2500-3000
3.	Breaking strength, N	29	36,5	30-36
4.	The number of bends to both sides	32	36	32-36

CONCLUSION. Based on the results of this study, it was proven that the wrapping paper fully meets the requirements of GOST 8273-75. Taking into account that the wrapping paper is obtained from local raw materials, it is three times cheaper than composite paper materials brought from abroad for a high currency, and it has the advantage of being twice as long as it can be reused. One of the quality indicators to be highlighted is that the resulting wrapping

paper contains basalt fiber, which is better than all other wrapping papers due to its waterproof, acid and alkali resistance, and non-flammability properties. It was recommended to use this wrapping paper for all furniture industries.

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