

## STUDYING THE OPPORTUNITIES OF PAPER PRODUCTION ON THE BASIS OF LOCAL RAW MATERIALS

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### ABSTRACT:

**This article is devoted to the study of paper with high strength on the basis of domestic raw materials, the article studied the effect of the concentration of filler in the composite composition containing a cotton cellulose paper of high quality and hydrolyzed acrylic copolymer, and the pH of the pulp to the paper breaking length cast. It was established a reduction in paper strength with increasing amounts of filler, and weakly acidic medium to increase this figure. The composite structure based on domestic raw materials will reduce the cost of paper production.**

**Keywords: cotton cellulose, high quality waste paper, hydrolyzed acrylic copolymer, filler, paper mass, functional group, local raw materials, composition.**

### INTRODUCTION:

The peculiarity of the investment policy pursued in Uzbekistan is reflected in the priority given to investment projects aimed at the establishment of new high-tech industries that provide deep processing of local raw materials. The main task is to constantly update the production technically and technologically, to constantly search for domestic opportunities and resources, to carry out profound structural changes in the economy, to continue the modernization and diversification of industry.

Particular attention is paid to the introduction of innovative technologies based

on the need for natural and energy resources in various industries to boost the economy.

In particular, the separation of local annual non-wood plants grown in the regions of the country, improving its quality and the production of paper products for various purposes.

### THEORETICAL STUDIES:

In paper production, paper is made from plant fibers that are strong enough, elastic, long and thin, and can form a strong bond with each other. It is known that the quality of paper largely depends on the nature of the adhesive and filler added to the paper mass. The suitability of paper for writing is assessed by the degree of adhesion. The degree of adhesion is determined in accordance with GOST 8049-62 in accordance with local regulations. The degree of adhesion of writing paper for notebook production (according to GOST 18510-87) should not be less than 1.2-1.4 mm. Adhesives are usually added in the amount of 0.5-5% of the paper mass.

The composition for surface bonding of paper and thick paper [1] consists of 30-70% arabinogalactan, 70-30% hydrolysis-cold storage waste, which can be applied to paper or thick paper. In the form of another 2-3% solution is pushed in the pressing section of the paper machine. The proposed composition allows to increase the hydrophobicity of the finished product and the adhesion in the mass.

The bonding process with synthetic reagents (AKD and ASA) by scientists [2] was carried out in a neutral and weakly alkaline

environment. Gluing in a neutral environment helps to use chalk as a filler, reduce glue and coagulant consumption, increase paper life, reduce equipment corrosion, and improve economic and environmental performance in production.

Calcium carbonate has been developed as a filler for the production of printing paper [3]. The 2-acetanone sheet in the glue increases the hydrophobic properties. The resulting paper provides high-quality printing with black and white inks.

For the surface bonding of cellulose-containing materials [4] proposed 3 compositions consisting of modified urea formaldehyde, sodium salt of oligomer and carboxymethyl cellulose, the above components and melamine, the first component of the composition and cat ionic starch. The use of these ingredients helps to increase the strength of cellulose-based materials.

Research is currently underway to obtain low-cost, high-quality paper based on local raw materials. The possibility of using a hydrolyzed acrylic copolymer solution instead of rosin glue, which is commonly used as an adhesive in printing paper, has been studied [5].

#### EXPERIMENTAL RESEARCHES:

For research, the degree of whiteness is 83-85% of cotton cellulose (№1), 70% of MS-1 waste paper (№2) and the composition based on them: cotton cellulose: waste paper MS-1 95: 5, (№3), cotton cellulose: waste paper MS-1 - 90:10 (№4), cotton cellulose: waste paper MS-1 - 85:15 (№5) was selected. Cotton cellulose produced at Global Komsco Daewoo was mixed with MS-1, a laboratory device - rolled to 60-65 OSHR. From the mass of paper with hydrolyzed acrylic copolymer and kaolin, sheets of paper with a mass of 80 g / m<sup>2</sup> were poured using an automatic RAPID-KETEN

device. The strength of paper samples mixed with hydrolyzed acrylic copolymer in various compositions in the range of 0-3.5% in 0.5 steps was tested on a FRANK F 435 cutting machine (Figure 1).

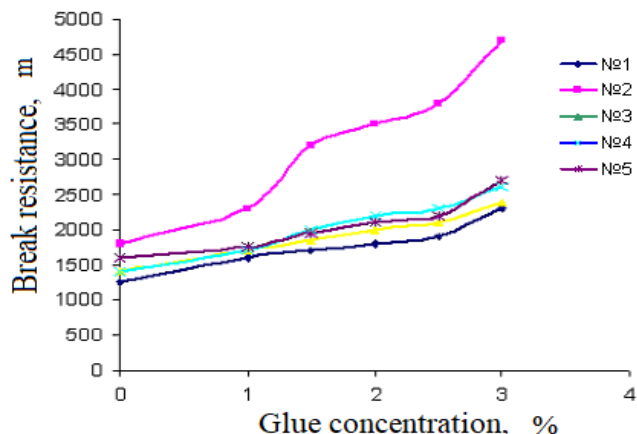


Figure 1. Effect of hydrolyzed acrylic copolymer concentration on paper tear strength: №1 - cotton cellulose (100%); №2 - MS-brand waste paper (100%); №3 - cotton cellulose: waste paper MS-1 (95: 5), №4 - cotton cellulose: waste paper MS-1 (90:10); №5 - cotton cellulose: waste paper MS-1 (85:15)

The positive effect of hydrolyzed acrylic copolymer (2%) solution on paper strength, which is currently being studied in various fields as TYOM, is that when the glue concentration is increased by 3%, the tear strength of №2 assortment paper increases by 4700 m compared to the original paper sample, № In the 5-assortment sample, it was clearly visible at an altitude of 2,700 m. This is due to the fact that alkaline hydrolyzed acrylic copolymer is effective for cellulose fibers, ie increases the hydration of cellulose in alkaline media, the formation of new hydrogen bonds, as well as the introduction of high molecular weight compounds into the cellulose structure, dissociation of sodium salts of itaconic acid. can be explained by the fact that it allows fiber ions to come closer to each other. The lack of adhesion of the paper samples is due to the fact that the hydrolyzed acrylic copolymer is a

natural binder, mainly used to bind the fibers in the paper mass to each other, so the compositions in which it participates can be interpreted as giving the opportunity to get few.

Type №1 paper should retain  $5 \pm 1.0\%$  humidity according to GOST. Cotton cellulose: waste paper MS-1 (85:15) in paper samples with the addition of various adhesives (carboxymethylcellulose-KMTC, hydrolyzed acrylic copolymer, sodium silicate, rosin) moisture content of hydrolyzed acrylic copolymer meeting the requirements of GOST 1.5 %, and at a high-strength 3% adhesive concentration, the moisture content was  $6.0 \pm 1.2\%$  (Diagram 1).

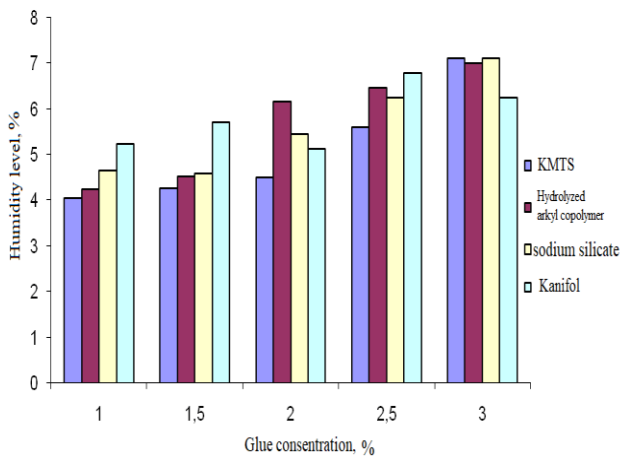


Diagram 1. The effect of glue concentration on paper moisture level

The paper is 80-100% white if it is obtained with OOM, and 60-83% if it is obtained without OOM. In the composition of the studied cotton cellulose: waste paper MS-1 (85:15) among the high-whiteness adhesives showed only rosin glue, ie in its 1% solution the paper whiteness was 79%, but as the concentration increased, the whiteness decreased observed. At a rate of 3% of the hydrolyzed acrylic copolymer, the whiteness was 71% (Diagram 2).

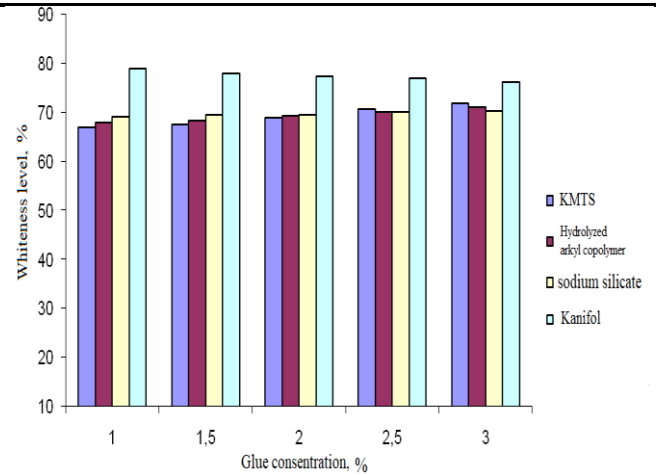
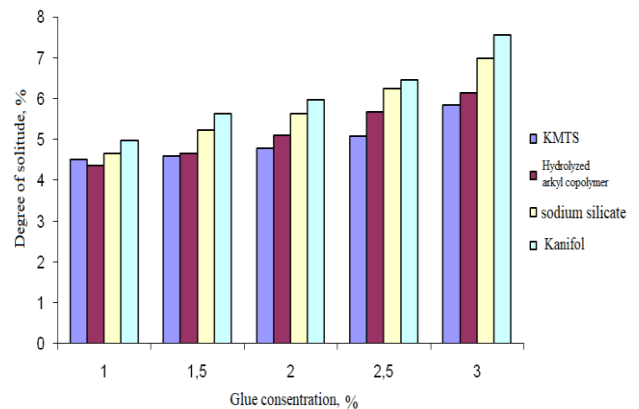


Diagram 2. Effect of glue concentration on paper whiteness

The high solubility of the paper samples was observed in rosin glue (7.5%), and the solubility was 6% when 3% hydrolyzed acrylic copolymer was added to the composition (Diagram 3).



3- diagram. Effect of glue concentration on paper solubility

\* Note. The filler concentration is 4%.

The effect of filler concentration on paper quality was studied for a paper mass with a composition ratio of 85:15. The results obtained are presented in Table 1. The results showed that as the filler content increased, the whiteness of the paper increased by 14%, the solubility by 69%, the moisture content by 18%, and the tensile strength decreased by 83%. This means that the addition of a large amount of filler to the composition leads to a decrease in the mechanical strength and

solubility of the paper, so 4% of kaolin was chosen as the optimal concentration.

Table 1. Influence of filler concentration on paper quality indicators

Filling consumption,%	Glue consumption, %	Paper whiteness, %	Paper tyranny, %	Paper wet,%	Break length, m
2	3	70,04	5,82	6,45	2950
4	3	73,54	6,14	7,00	2700
6	3	74,65	7,14	7,05	2600
8	3	76,03	8,96	7,54	2550
10	3	80,26	9,87	7,61	2400

Typically, when rosin glue is used to make paper, the gluing medium is around pH = 4.3-5.5. The effect of pH environment on the composition in the presence of hydrolyzed acrylic copolymer was studied (Table 2).

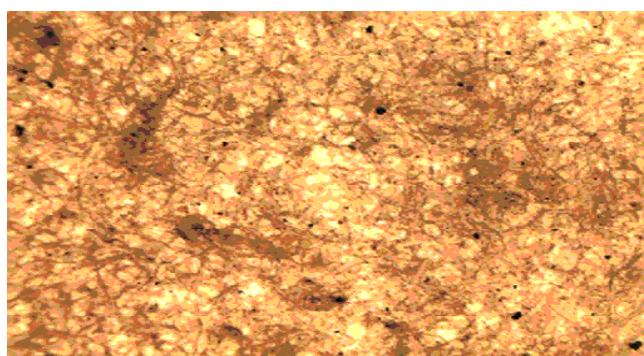
Table 2 The effect of the adhesive medium on the quality of the paper

pH condition	Glue consumption,%	Filling consumption, %	Paper wet, %	Break length, m
5	3	4	6,12	2900
6	3	4	5,98	2700
7	3	4	6,32	2650
8	3	4	5,9	2700
9	3	4	6,36	2600

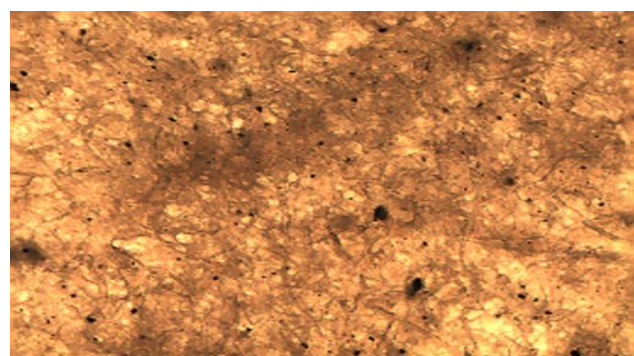
The results showed that the hydrolyzed acrylic copolymer, like rosin, exhibits high tensile strength in a weakly acidic environment (pH = 5).

Comparing microscopic photographs of hydrolyzed acrylic copolymer and paper made from traditional adhesive rosin-based

compositions, it was found that the sample with hydrolyzed acrylic copolymer had a more even distribution of fibers and less black spots (Figure1)



a)



b)

Figure 1. Microscopic views of paper samples x 200 μm: Adhesive: a) hydrolyzed acrylic copolymer; b) rosin

## RESULTS AND DISCUSSION:

The addition of hydrolyzed acrylic copolymer 3% as an adhesive and rosin 4% as a

filler to the 85:15 composition composition of cotton lint and high quality waste paper (MC-1) increased the strength of the cast paper.

Increasing the filler concentration increased the ash and moisture content of the paper, increasing its whiteness. The hydrolyzed acrylic copolymer increases the strength of the paper by binding the fibers in the paper mass. The relatively even distribution of fibers in the sample with the addition of hydrolyzed acrylic copolymer, the lack of black spots showed that the application of this adhesive is not only durable, but also possible to obtain paper with high surface properties.

#### CONCLUSIONS:

1. Effective use of local raw materials in the paper industry will help to expand the country's raw material reserves.
2. Adding 3% hydrolyzed acrylic copolymer and 4% rosin to the composition based on cotton lint and high-quality waste paper (MC-1) allows to increase the strength of the paper by 30%..

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