REMOVAL OF WAXY SUBSTANCES FROM FIBROUS WASTE FOR THE PREPARATION OF PAPER FURNISH FROM LOCAL RAW MATERIALS

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ABSTRACT
The article presents the results of research on the separation of printing ink from MS-3 waste paper, its removal from the cellulose suspension, discoloration of the recycled fiber and increasing the degree of whiteness. The necessary conditions for the removal of waxy substances from waste paper have been recommended.

Keywords: waste paper, paper, SAA (surface active substances).

INTRODUCTION

Paper is one of the greatest inventions of mankind. Although the first information about paper dates back to the 12th century AD, it is mentioned that books were printed on it by 76 AD. The first countries to publish newspapers were Egypt and China. As is known from history, due to the fact that our cities are located on the uniting road of East and West, paper production has developed. In this issue, Samarkand has always occupied a historically important place [1].

The rapid development of industries, as well as the growing demand for the efficient use of natural resources, contributes to the development of new technologies and the improvement of existing technological processes. Currently, there is a significant shortage of fibrous semi-finished products for the pulp and paper industry of the republic. The use of imported semi-finished products leads to an increase in the cost of the finished product and, as a consequence, to a decrease in the competitiveness of this product, as well as the profitability of production.

Worldwide, newsprint is made from 68% of secondary raw materials. At the same time, 68% of all paper produced worldwide is a packaging paper, and its composition consists of 50% recycled paper, i.e. waste paper. However, waste paper is almost never used in the production of printing and writing paper. Even in the US, only 6% of waste paper is used for this purpose. This means that almost 90% of the primary fiber in the production of printing and writing paper, i.e. cellulose from wood, is used. And that in turn signifies that the forest will be cut down again. MS-1, MS-2 or MS-3 sort waste paper can be used in the production of printed paper. Although there is no problem in using MS-1 and MS-2 waste paper, the presence of printing ink in MS-3 waste paper limits its use for the above purposes. In particular, the problem of maximum separation of dye on the fiber surface during the processing of waste paper, its removal from the cellulose suspension, decolorization of dyed fiber and raising the whiteness of secondary fiber is currently being studied in all developed countries.

It is urgent to deepen structural changes, increase its competitiveness through modernization and diversification of the leading sectors of the national economy, including the rapid development of high-tech manufacturing industries, the development of finished goods with high added value based on deep processing of local raw materials.

Humanity found material for writing long before the invention of paper. The ancient Egyptians flattened the bark of the papyrus stem 4,000 years ago, then laid them on top of each other in the form of a cross and pressed them together. The dried material was used as a writing instrument. But it wasn't paper yet. The discovery of the paper was made in 105 by the Chinese researcher Tsai Lun, taking into account his previous research. As a raw material, he used the inner fibrous part of the bark of a mulberry tree. Later, they began to use lubricant, hemp, bamboo and other natural plant stems. Paper products, created by nature and by human hands, thanks to their wonderful properties, still serve as invaluable materials.

During the period of independence, the production of paper in our country has reached new heights. Paper mills have been established, and work is underway to further improve technology in order to expand the production of high-quality paper products.

Globally, 68% of newsprint is produced from recycled materials. At the same time, 68% of all paper produced in the world is wrapping paper, and 50% of it contains recycled paper, that is, waste paper. However, waste paper is almost never used in the production of printing and writing paper. Even in the USA, only 6% of the waste paper is used in this area. This means that almost 90% of the virgin fiber, i.e. wood pulp, is used in the production of paper for printing and writing. Consequently, the forest is cut down again [1].

Waste paper MS-1, MS-2 or MS-3 can be used in the production of printing paper. Although there are no problems with the use of MS-1 and MS-2 waste paper, the presence of ink in MS-3 waste paper limits its use for the above purposes. In particular, the problem of the maximum separation of the dye on the fiber surface during processing of waste paper, its removal from the cellulose suspension, discoloration of the dyed fiber and increasing the whiteness of the recycled fiber is currently being studied in all developed countries [2].

Using recycled paper means saving the main raw material containing cellulose. Having processed two tons of waste paper, you can save 6-8 m3 of wood. Recycling waste paper means not only saving valuable raw materials, but also protecting the environment. Although paper in a landfill does not pose a direct threat to living organisms, paper waste is easily incinerated, which leads to the incineration of other waste in the environment, which pollutes the environment.

Cellulose fibers are exposed to intense water, pressure and temperature during the papermaking process on paper casting equipment, which leads to physicochemical and structural changes in them. Because of this, these fibers lose their paper-forming properties to some extent. However, modern technologies for processing waste paper and making paper pulp make it possible to literally "reanimate" them. The lost paper-forming properties of reanimated fibers are restored as a result of the addition of high-performance binders to the paper. In world practice, the principle of obtaining high-quality paper products, containing a significant amount of waste paper, in particular, types of printed paper, has proven itself.

Waste is divided into a certain class depending on wetting: hydrophilic, hydrophobic and wastes wetted in a neutral environment. In accordance with the wetting environment of the waste, the method of their removal from the waste paper mass and the corresponding chemical and auxiliary reagents are selected. In addition to the above, wastes are also known to adhere to metal parts of equipment at high temperatures, such as paraffin wax, wax and latex [3].

MAIN PART

In view of the above, it was decided that a surfactant (SAA) should be added to the treatment solution. SAAs facilitate wetting of the cellulose as well as the penetration of the solution into the paper. During alkaline processing, soluble fats and oils are removed from the waste paper stock by emulsification using SAA. Under the influence of SAA, the wax substances gradually soften into a spherical microtome, detach from the fiber and dissolve around the SAA molecules (Fig. 1).

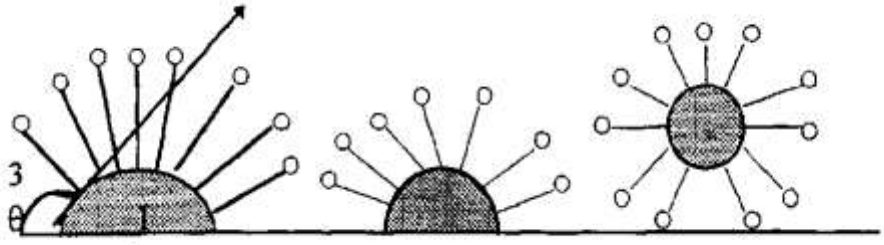

Figure 1. Scheme for the removal of waxy substances from the surface of waste paper under the action of SAA

For this, treatment in an alkaline solution was carried out at different concentrations of SAA. The results are shown in Table 1. At a concentration of 0.8% SAA, an increase in the capillary capacity of the samples was observed, ie, from this concentration, SAA began to promote the separation of pigments in printing products from fibrous products, as well as emulsification of oily-wax substances on the surface of the fiber. Therefore, it was considered appropriate to add 0.8% SAA to the process.

Table 1 An effect of SAA (surface active agent) concentration on waste paper quality indicators

#	SAA concentration, %	Polymerization level	Capillary capacity of paper castings, mm
1	0.4	780	8
2	0.6	780	10
3	0.8	780	12
4	1.0	780	12
5	1.2	780	12

Commentary: t= 90^0C; τ = 50, C_{NaOH}=2,0%

It goes without saying that when SAA is added to the boiling process, the temperature and duration regimes also change. Therefore, the temperature and time regimes of the process with the participation of SAA were revised. The results are shown in Figures 2 and 3.

Table 2 An effect of SAA (surface active agent) concentration on waste paper quality indicators

#	SAA concentration, %	Polymerization level	Capillary capacity of paper castings, mm
1	0.4	780	8
2	0.6	780	10
3	0.8	780	12
4	1.0	780	12
5	1.2	780	12

Commentary: t= 90^0C; τ = 50, C_{NaOH}=2,0%

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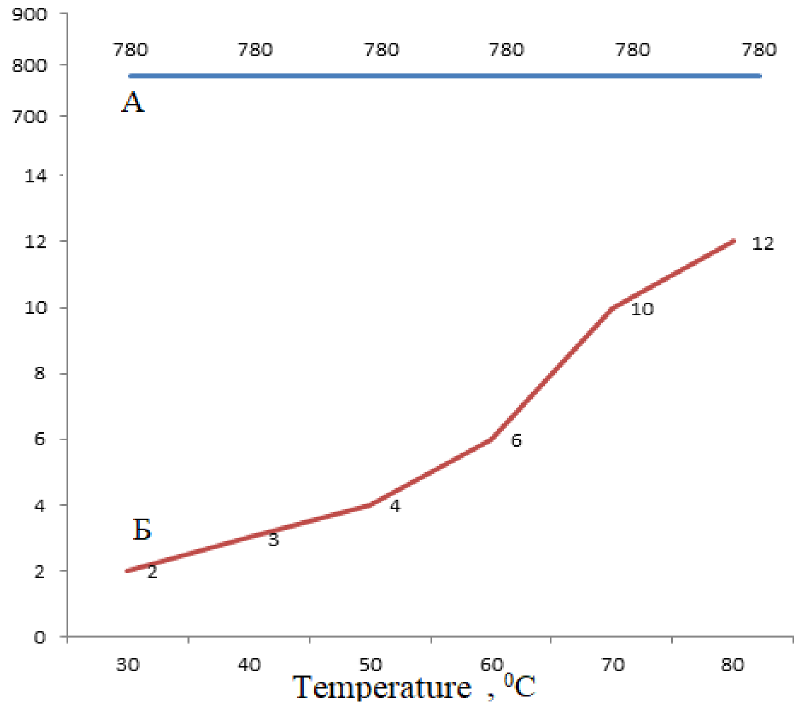

Figure 2. The temperature effect on the boiling process in the presence of SAA
A – Polymerization level;
B – Capillary capacity of paper castings, mm

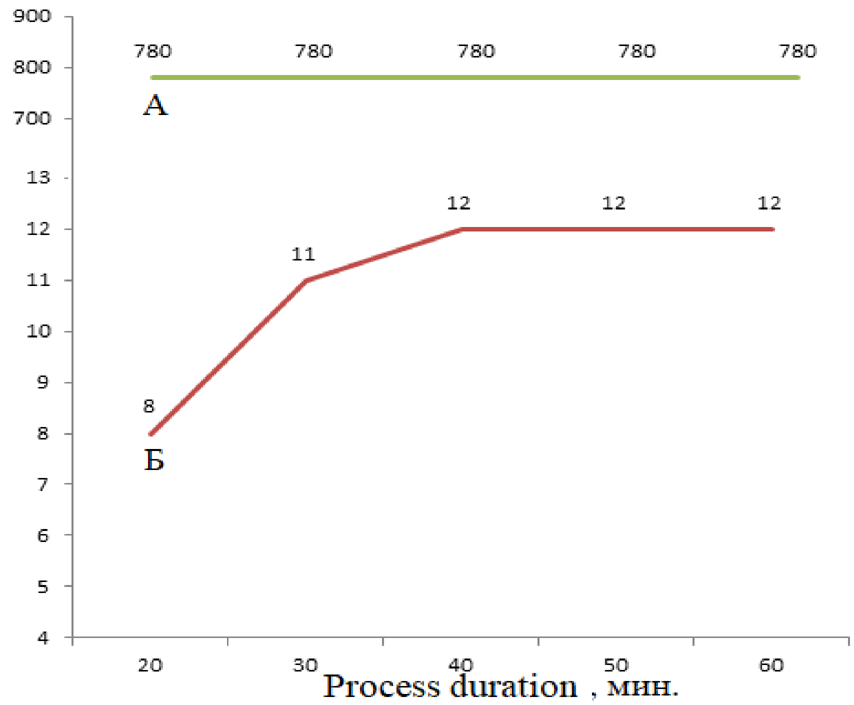

Figure 3. The temperature effect on the boiling process in the presence of SAA
A – Polymerization level; B – Capillary capacity of paper castings, mm

Figures 2 and 3 were analyzed and the optimal values for the process of alkaline treatment of paper waste MS-3 with the participation of SAA were taken to be a temperature of 80 ^{0}C and a process duration of 30 minutes.

On the surface of the samples, the formation of various spots was observed, which may be associated with the re-absorption of destructive substances included in the dye solution, due to the increased sorption properties of ingots from waste paper during alkaline treatment. In addition, since the color pigment did not deteriorate, the samples did not yet have the required whiteness. Therefore, the process of cleaning waste paper from printing ink is proposed to be carried out in 2 stages: first, the decomposition of components that negatively affect the capillaries of paper in the dye, and the second stage of discoloration of the colored pigment using oxidants [4].

Figure 4. The sequence of cleaning waste paper from printing ink.

CONCLUSION

According to the research results, the mass of waste paper of grade MS-3 was purified in an alkali solution (2% of total weight) and SAA (0.8% of total) for 50 minutes at a temperature of 80 ° C, then into a hypochlorite solution at a temperature of 300 ° C for 30 minutes , when the pH of the solution medium equals 10- a bleaching is recommended, that is, in a slightly alkaline environment.

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