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Development of Technology for Producing Cotton Cellulose

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Annotation:

Today, the current problem of the pulp and paper industry (PPI) in the Republic of Uzbekistan is the development of technology for the production of cotton cellulose from low-grade lint, the use of which provides a severe shortage of cellulose and paper. Environmental protection, reduction of energy consumption, reduction of water and chemical consumption, as well as rational use of available raw materials. At the same time, it is necessary to create and introduce new technological processes that reduce the amount and toxicity of wastewater, reduce gaseous waste, closed cycles of water use and recycling of chemicals. Important directions of scientific and technical development.

The object of the study was the cooking liquor, spent liquor, industrial water after cooking and washing cellulose, the sanitary characteristics of the waste water, and the quality indicators of the products obtained.

Discoloration of waste water, a decrease in the residual amount of sodium hydroxide, pH medium and such sanitary indicators as chemical oxygen demand (COD5) and biochemical oxygen demand (BOD5) of waste liquor and wash water have been experimentally studied.

Keywords: Low-grade cotton fiber, cotton cellulose, baking, waste liqueur, cooking liquid, sanitary properties, alkali, COD5, BOD5,

Introduction: In our country, special attention is paid to the problem of environmental protection. In recent years, this issue is deeply reflected in the Constitution of the Republic of Uzbekistan and

the basic laws on land, its subsoil, water, forests, atmospheric air and wildlife, as well as special decrees on nature protection. The Oliy Majlis and the Cabinet of Ministers of the Republic of Uzbekistan [1, 2].

The strategy is based on the results of a comprehensive study of issues relevant to the population and entrepreneurs, analysis of legislation, law enforcement practices and foreign experience. The document was published on global Internet networks and was widely discussed with the participation of experts and the public. [2]

At present, the pulp and paper industry (PPI) of the Republic of Uzbekistan requires the creation and introduction of new technological processes that reduce the amount and toxicity of wastewater, gas emissions, which allows organizing closed cycles of water use and the recovery of chemicals, which is one of the most important directions scientific and technical.

Based on the above, the purpose of this work is to study the methods of production of cotton cellulose by alkaline cooking and oxygen-alkaline cooking, as well as the study of clean water consumption and their sanitary properties in these methods. Quality of the obtained cellulose, comparison of the obtained results and selection of a method suitable for the working conditions of Central Asia.

The object of research is cotton fiber, type B, average weed type, cooking liquid, waste drinks, industrial water after cooking and washing of cellulose, their sanitary properties and quality indicators of the formed cellulose.

The study also presents the results of research on the possibility of reusing industrial water in the production of cotton cellulose [3,4,5].

Waste bleaching was studied experimentally, the residual amount of sodium hydroxide, the pH of the medium, as well as the chemical oxygen demand (COD_5) and biochemical oxygen demand (BOD_5) of the liquid and wash water used were determined.

The main influencing factors of oxygen-alkali cooking were studied, for example, from the level of 2 B of the average weed in terms of quality indicators of cotton cellulose obtained from sodium hydroxide concentration, oxygen pressure, processing temperature and cooking time.

Based on the research, the following optimal OAK regime was determined for cotton lint grade 2 B, which is the average weed type: mass concentration - 8%, NaOH consumption - 1.5%, oxygen pressure -1 MPa, processing temperature - 130^0C; duration -120 minutes.

Comparing the sanitary properties, the beverage consumed after ACS was found to be much purer than alkaline boiled liquid, in particular, the optical density of alkaline liquid was 4-5 times lower, and COD_5 and BOD_5 were three times lower than classical alkaline cooking.

Figure 1 shows the results of the reduction of NaOH remaining in the solution after each wash frequency, which means that after the first washing of cotton cellulose, the amount of sodium hydroxide in the solution decreases immediately.

Optical density was determined using a КФК.2.УХЛ4.2, № 913580

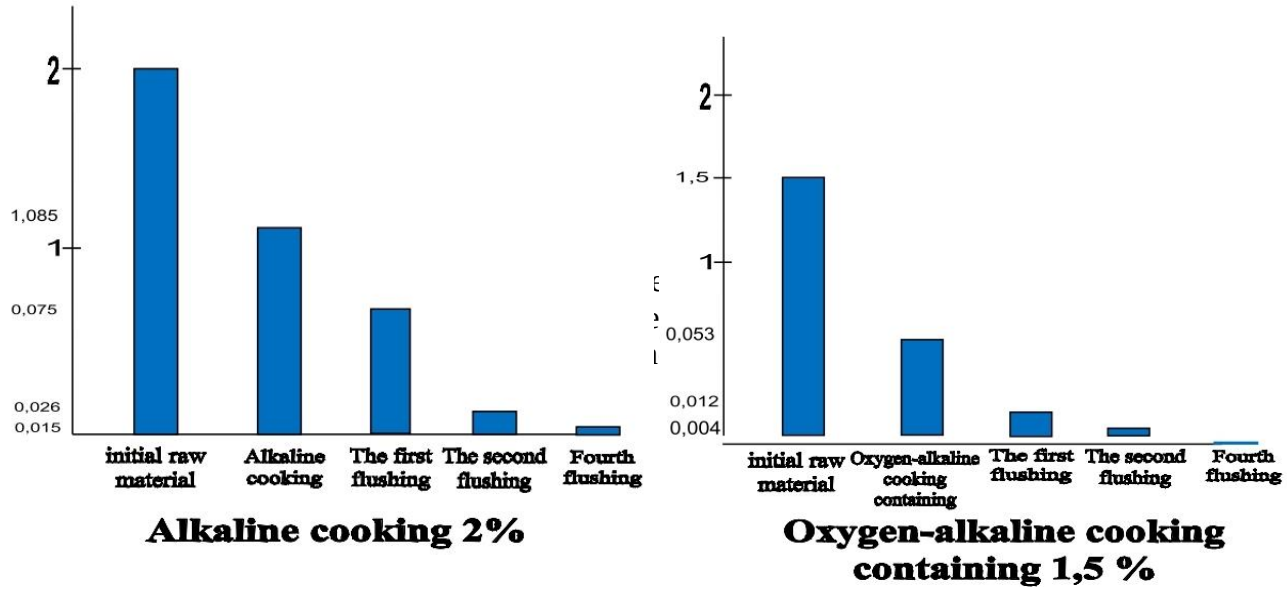

Table 1.Reduction of optical density from the frequency of washing

№	Washing cotton pulp after alkaline cooking	Optical density value, Б*
1	Waste liquor initial value	1,05
Optical density after washing with cotton cotton		
2	1 flushing	0,3
3	2 flushing	0,06
4	3 flushing	0,101
5	4 flushing	0,03
6	5 flushing	0,002

* -Белла, unit of measurement of optical density;

Table 2 Methods for cooking cotton linters, quality indicators of the resulting cellulose

№	The ways boiling cotton linters	Quality indicators of the received cotton cellulose				
		α-cellulose, %	DP	White, %	ash content, %	Fat-wax substances, %
1	Alkaline cooking	93	1930	85	0,218	0,16
2	Oxygen-alkaline cooking	96,2	1750	90	0,052	0,064

Table 2 shows the methods of cooking cotton lint and the quality indicators of the resulting cotton cellulose. The data in Table 2 show the superiority of OAC over alkaline cooking. Implementation of the HAC will significantly increase the key indicators of cotton cellulose quality. This effect is

seen due to the oxidizing ability of flax's organic satellites to oxygen, such as lignin, oil wax, and others.

Table 3 shows the comparative performance of the alkaline cooking fluids used and the developed cooking sanitary performance.These results indicate that the sanitary performance in the acid-base concentration of the liquid used has improved compared to classical alkaline cooking.

Cellulose obtained by oxygen-alkaline cooking is washed to neutral at a lower water consumption than conventional alkaline cooking cellulose [6,7].

Table 3.Comparison of the sanitary characteristics of used liquors alkaline cooking and developed cooking

№	Sanitary indicators of lye	Cooking conditions	
		Alkaline cooking	Oxygen-alkaline cooking
1.	Optical density, turbidity,%	80	15
2.	COD_5 mg. O_2 / l	832	200
3.	BOD_5 mg. O_2 / l	401	115
4.	Organic hydrocarbon content	299	109

Also, based on Table 3, the analysis of the cooking liquid shows that the optical density of OAK liqueur is 70% lower than the optical density of ordinary alkaline lint liquid, requiring biochemical oxygen, in particular BOD_5 - 66.5 ha. % and chemical oxygen demand - 60%. These advantages were a necessary condition for the reuse of waste liquid during the cooking of cotton lint.

Based on the calculations of laboratory data, it has been shown that waste drinks can be reused without compromising the quality of the resulting product. With five uses of waste liquid, water consumption is reduced from 45 m^3 / t to 13.5 m^3 / t, and sodium hydroxide is reduced from 675 kg / t to 127 kg / t. This allows rinsing water and chemicals to be returned and used in the preparation of cooking liqueurs, thereby reducing their spread to nature.

Conclusions.

In comparison with the classical alkaline method, the advantages of obtaining cotton cellulose from 2 types of lint of medium type B weeds according to the developed technology were studied.

- Comparing the sanitary properties of the developed liquid with the spent liquid of alkaline cooking, it was found that the optical density of the proposed liquid is 3 - 5 times lower than the alkaline index of cooking, as well as COD_5 and BOD_5 2-3 times lower.
- Based on the calculations of laboratory data, the possibility of reusing the consumed liqueur without reducing the quality of the product obtained was determined. This allowed the washed water to be returned to prepare the cooking solutions. With five uses of waste liquid, water consumption is reduced from 45 m^3 / t to 13.5 m^3 / t, and sodium hydroxide is reduced from 675 kg / t to 127 kg / t.
- The technology of production of cotton pulp with the recycling of waste liquid contributes to the saving of material resources, as well as the reduction of harmful emissions into the environment.

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