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STUDYING THE INFLUENCE OF TIME, TEMPERATURE, CONCENTRATION ON THE QUALITY INDICATORS OF CELLULOSE

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Annotation
This technology of processing fibrous products involves the creation of a device that allows the separation of fibers suitable for industrial use from fibrous waste, and as a result improve the quality and quantity of the product. As far as we know, cotton fiber is 95% cellulose and additives.

Keywords: Cellulose, cotton, textiles, waste, ethers, raw materials, food, pharmaceuticals, construction, lacquer paint.

Introduction

There is a lot of research on the production of high-quality cellulose and by-products based on chemical and mechanical processing of fibrous waste. Cellulose and a number of brands of polyaniontellulose required for various industries, including light and textile, construction, pharmaceutical, food, perfumery, paper and paper products, oil and gas industries. It provides an opportunity to create the necessary raw materials for a number of industrial enterprises in the country by cleaning cellulose-containing cotton and obtaining cellulose and its ethers on the basis of textile industry waste. We know that cellulose and its simple esters play an important role in the food, pharmaceutical, construction and varnish industries. The creation of innovative technologies for increasing the productivity of cotton and textile enterprises through waste recycling and reducing their impact on the environment is one of the current problems of the industry. One of the current problems of the industry is the creation of innovative technologies to increase the productivity of processing, cotton and textile enterprises and improve its impact on the environment.

The Purpose of the Study

In contrast to existing technologies, it is planned to develop high-quality cellulose on the basis of fibrous waste, as well as more than 20 brands of polyanioncellulose, which are widely used for various industries, in a simplified way and, of course, high-quality, low-cost, export-oriented.

The advantage of the process of obtaining polyaniontellulose synthesized on the basis of cellulose from fibrous waste over existing technologies is characterized by high quality due to the reduction of several processes during its synthesis, as well as the physicochemical and mechanical properties of the product obtained by existing technology [2].

Scientific and Practical Significance of Research Results

Despite efforts to improve the process of fiber separation from waste recycling, the full results of this process have not been achieved. The technology of extracting high-quality fiber from the gin and lint, which are wastes of ginneries, and their production for spinning, non-woven fabrics, production of cotton wool for medical purposes, as well as cellulose for the chemical industry is not fully implemented in our country.

This technology of processing fibrous products involves the creation of a device that allows the separation of fibers suitable for industrial use from fibrous waste, and as a result improve the quality and quantity of the product. As far as we know, cotton fiber is 95% cellulose and additives. Cellulose is the most common natural polymer in nature. It forms the main part of all plant cells. 40-60% of trees and plants are composed of cellulose. Cotton, wool and hemp fibers are mainly cellulose. They contain 7-10% of other substances besides cellulose. In industry, cellulose is mainly obtained from several species of wood and is called wood cellulose. Cotton wool contains up to 96% cellulose. To obtain cellulose from wool, a 1.5% solution of alkali is boiled for 3 to 6 hours at a pressure of 0.3-1 MPa. The resulting cellulose is bleached with hypochlorite solution or hydrogen peroxide. The purity of the cellulose obtained as a result of this process is 98-99%.

For quality paper products as well as for chemical processing purposes, the purity of cellulose should not be less than 94%. The physical, chemical, mechanical and similar properties of cellulose, its degree of polymerization, depend on the interaction of macromolecules and the relative position of the elemental rings in the macromolecule [2].

Etherification of cellulose with alcohol or carbonic acids leads, on the one hand, to the porous structure of the macromolecule and, on the other hand, to a decrease in the amount of hydroxyl groups that can interact with hydrogen bonds. Therefore,

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cellulose derivatives are readily soluble in most liquids and gradually soften as the temperature rises, becoming at first highly elastic and then viscous. The decrease in the hydrogen bonds of macromolecules also depends on the amount of displaced hydroxyl groups and the size of the new functional groups formed. An increase in the volume of functional groups reduces the number of hydrogen bonds and weakens the interaction force of the molecules. The molecular mass and degree of polymerization of cellulose have different values depending on the growth conditions and type of plant, and Table 1.1 shows the molecular masses of different celluloses.

Table 1.1 Molecular mass of cellulose isolated from various plants

Type of cellulose	**The degree of polymerization**	**Molecular mass**
Hemp fiber	3600	5 900 000
Rami fiber	12 400	2 000 000
Krapiva fiber	11 600	1 900 000
Cotton fiber	10 800	1 750 000
Unbleached cotton wool	9300	1 500 000
Bleached cotton wool	4 700	1 200 000
Spruce cellulose	4 700	1 200 000
Viscose fiber derived from spruce cellulose	460	75 000
Betta cellulose	170	27 000

All types of cellulose burn under the influence of flame. Cellulose is in a glassy state under normal conditions, and its transition to a highly elastic state is higher than the decomposition temperature. Therefore, when heated, it decomposes before it softens around 2000. Cellulose is insoluble in any of the organic solvents, only partially soluble in copper-ammonia solution and quaternary ammonium hydroxides. To increase the homogeneity of the obtained cellulose derivative products, it is necessary to reduce the difference between the chemical reaction rate R and the diffusion rate D of the reagents. This can be done either by reducing the reaction rate without changing the diffusion rate (which is very difficult to do in practice) or by increasing the diffusion rate without increasing the reaction rate.

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Scientific Novelty of the Research

Local raw materials, including wheat straw, rice straw, cotton lint, cotton stalks, are used in the development of innovative technologies for the production of some simple cellulose esters with high molecular weight and metabolic rate, as well as their introduction into industrial production. Practical work on the basis of tapinambur plant, poplar tree, wood waste of furniture manufacturers and fibrous waste of textile enterprises is the priority basis of the goals and objectives of the proposed project.

In order to obtain polyaniontellulose in accordance with the task, sunflower cellulose with some parameters that meet the requirements of GOST 3818.0-72 was used. The process of obtaining polyaniontellulose involves several stages: mercerization of cellulose at a certainconcentration of NaOH, esterification under the influence of CH_3COONa, and the processes of etilization and drying carried out as a result of an exothermic reaction.

From cellulose, its simple ether was found to prevent destructive events as a result of the addition of different standardized amounts of lignin, i.e., 0.5% to 3.0% as an inhibitor, in the sequence of existing steps in the production of polyaniontellulose. Effect of lignin on the polymer degradation used as an inhibitor to destructive conditions occurring during the stages of the polyanioncellulose extraction process.

Table 1.2

№	Lignin,%	Mercerization process			Etherification process		Maturation process	
		Mahsar cellulose						
		*IPRS	*PC	*L-BPC	PC	LBPC	PC	L-PC
1	0,5	850	640	680	530	700	500	580
2	1,0	850	640	710	530	720	500	600
3	1,5	850	640	730	530	740	500	610
4	2,0	850	640	770	530	760	500	630
5	2,5	850	640	790	530	770	500	650
6	3,0	850	640	820	530	800	500	700
Sunflower cellulose								
№	Lignin, %	*IPRS	*PC	*L-BPC	PC	*L-BPC	PC	L-PC
1	0,5	1100	810	910	750	860	720	790
2	1,0	1100	810	920	750	880	720	810
3	1,5	1100	810	940	750	900	720	850
4	2,0	1100	810	960	750	910	720	870
5	2,5	1100	810	990	750	950	720	910
6	3,0	1100	810	1020	750	970	720	980
TKTCH cellulose								
№	Lignin, %	*IPRS	*PC	*L-BPC	PC	*L-BPC	PC	L-PC
1	0,5	2340	1840	1960	1410	1880	890	1040
2	1,0	2340	1840	2090	1410	1910	890	1150
3	1,5	2340	1840	2120	1410	1930	890	1380
4	2,0	2340	1840	2170	1410	1940	890	1440
5	2,5	2340	1840	2190	1410	1960	890	1510
6	3,0	2340	1840	2240	1410	1990	890	1650

During the mercerization process, heat is released as a result of the strong concentration of alkali and the mechanical treatment of the fiber. It can be seen from the results that the radicals that cause destructive states as a result of exothermic reactions during esterification and ethylation significantly inhibit the decomposition of elemental links in the macromolecule of the natural polymer as a result of the attachment of several functional groups in the ligin structure.

As a result of the research, the Aqua Sell Mono method, which is several times more compact and more profitable than its existing analogues in the production of polyanioncellulose, was developed and introduced into industrial production.

Conclusion

The effect of time, temperature, concentration and optimal conditions on the quality indicators of cellulose was determined. Factors influencing the reactive activity of hydroxyl groups in the macromolecule of cellulose obtained on the basis of annual plant stems were identified. Recommendations have been developed for the use of polyanionic cellulose as a stabilizer in the drilling of oil wells, which is resistant to high molecular weight and thermal destruction on the basis of plant stems, textile industry wastes. Optimal conditions for the use of lignin structure as an inhibitor have been identified in order to prevent destructive processes occurring during the synthesis of polyanionic cellulose.

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