

DEVELOPMENT OF TECHNOLOGY FOR THE PRODUCTION OF CELLULOSE AND CARBOXYMETHYL COMPOSITIONS FROM DOMESTIC RAW MATERIALS

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Annotation: This article is devoted to development of innovative technology for obtaining cellulose from cotton linn and obtaining cellulose from cotton lint and on the basis of the development of chemical industry in the Republic of Uzbekistan. The study elaborates the optimal technological parameters for cellulose removal, analyzes its quality indicators and physicochemical properties. He also developed technology for production of carboxymethyl compositions, which are used as a stabilizing agent of drilling mixtures for oil and gas industry. The research results serve to increase cost efficiency, provide the local market with import-substituting products and create new jobs.

Keywords: Cellulose, carboxymethyl compositions, "California" poplar, cotton linn, chemical processing, innovative technology, oil and gas industry, drilling mixes, cost-effectiveness, secondary raw materials, physicochemical analysis.

The chemical industry is currently intensively developing as one of the most important sectors of the economy on a world scale. Ensuring competitiveness in the global market by increasing the number of products, improving quality and reducing cost is one of the important tasks in this industry. Especially cellulose and its organic materials are widely used in such industries as chemical, medical, pharmaceutical, paint and varnish, oil and gas and construction. Therefore, the urgent task is to improve the processes for pulp extraction from industrial waste and to create technologies for the production of high-quality products.

Important measures are being taken to develop the chemical industry in the Republic of Uzbekistan. In particular, the "Development Strategy of New Uzbekistan for 2022-2026" pays special attention to the production of high value-added products based on deep processing of local raw materials and the introduction of new technologies. Within this strategy, it is important to obtain cellulose from local raw materials, e.g. fertilizer industry waste and secondary resources such as cotton linte, and to develop technology for the synthesis of carboxymethyl compounds on its basis.

The purpose of identification of optimal technological parameters for obtaining cellulose suitable for chemical processing from the secondary raw material of the "California" variety poplar tree with the creation of innovative technology for synthesis of cellulose, cotton cellulose and carboxymethyl starch-based compositions. Establishment of the process of cellulose extraction by chemical processing of the secondary raw material of the "Californian" variety poplar.

The Effect of Different Parameters of Poplar Wood in the Natron Boiling Period on the Quality Indicators of Cellulose

1-jadval

		Phase I	Phase II	Sellyulozaning sifat ko'rsatkichlari
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№	NaOH, g/l	yanchish τ , minutes, 80-100 ⁰ S	Boilin g teeth τ , minute s	Boiling tooth, t ⁰ C	sel-za unumi, %	namlik %	kul miq- ri, %	α – sel- a, %	PD
1	10	20	20	100	-	-	-	-	-
2	20	40	40	120	-	-	-	-	-
3	30	60	60	140	47,4	3,3	1,6	93,2	1150
4	40	80	80	160	54,6	3,4	0,93	94,8	1050
5	50	100	100	180	46,1	3,3	0,72	95,1	720

The table shows that alkaline boiling at different temperatures was carried out, with mechanical milling at intervals of 60 min at the first stage and alkaline processing at 1600C at the second stage for 80 min with the participation of 40 g/l alkali solution, chosen as the optimal mode.

It has a pulp yield of 54.6%, ash content of 0.93%, α -cellulose 94.8%, and a polymerization rate of 1050.

From Table 2, it can be observed that the water vapor absorption of samples at different specific moistures is different, i.e., the rate of water vapor sorption of poplar cellulose is higher than cellulose, or the hydrophilicity of tapinambur cellulose samples is higher compared to poplar cellulose. From such indicators it is possible to conclude that the reactivity of celluloses obtained from the variety "Fayz-Baraka" of the Tapinambur plant is high.

Water vapor sorption of cellulose samples at 250C

2-jadval

Samples	Cotton Cellulose	*TTCH sel- za	Terak daraxti sel- si	Tapinambur «Fayz Baraka» sel-si
Solishtirma namlik, %	Shimuvchanlik darajasi, %.			
10	0,20	0,30	0,40	0,50
20	0,40	0,50	0,90	1,00
30	0,60	0,60	1,10	1,40
40	0,70	0,80	1,40	1,70

50	0,90	1,00	1,50	3,00
60	1,30	1,40	2,00	6,60
70	2,00	2,20	3,40	8,10
80	2,40	2,90	3,60	9,00
90	3,70	4,60	8,80	9,50
100	8,00	8,40	9,10	9,90

* TTCH - Fiber Waste of a Textile Enterprise

Table 3 below shows the capillary porosity characteristics of cellulose samples.

Characteristics of capillary porosity of cellulose samples
3-jadval

Namunalar	Paxta sellyulozasi	TTCH sellyulozasi	Terak daraxti sellyulozasi	Tapinambur «Fayz Baraka» sellyuloza
$X_m, g/g$	0,0143	0,0137	0,0125	0,0052
Solishtirma sirt, $S_{ud} * m^2/g$	49,876	47,790	44,008	24,905
Poralar-ning umumiy xajmi * $W_o, sm^3/g$	0,095	0,089	0,074	0,215
kapillary radiusi $R_k,$ A^0	38,8	49,2	76,3	112

From Table 3, we can see that the relative surface and relative absorption properties of cotton and TTCH cellulose are high compared to other cellulose samples, while the Judicial index of poplar cellulose sample is also higher than Sud of cellulose based on varieties of Tapinambur plant. However, the W_o and R_k ratios of celluloses obtained on the basis of the Tapinambur plant "Fayz Baraka" are higher than those of cotton, TTCH and poplar celluloses, indicating a capillary radius of 105-112 A0.

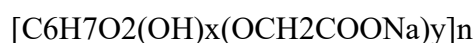
The study of various technological methods for pulp extraction and the determination of their optimal parameters. Determination of quality indicators: Analysis of quality indicators of the obtained cellulose. Synthesis of carboxymethyl compositions: development of innovative technology for synthesis of carboxymethyl compositions based on poplar and cotton cellulose and starch. Physicochemical analysis: The study of the properties of the obtained compositions

by physicochemical methods and the definition of their application. Implementation into production: Implementation of the created technology on an industrial scale.

The secondary raw materials of the "California" variety poplar, cotton linter, starch and cellulose brands obtained by chemical processing were chosen as an object for the research. Research subjects include the process of baking in alkaline solution, synthesis of technical carboxymethyl compositions based on the obtained cellulose and starch and their application in oil and gas industry as stabilizing mixtures.

In the experiment, physicochemical methods such as viscosimetry, titrometry, ash determination of samples, sorption, nabuxometry and determination of water permeability were used. These methods played an important role in determining the qualitative indicators of cellulose and carboxymethyl compositions and their characteristics analysis. Possibility of extracting cellulose from California poplar: The possibility of extracting cellulose from waste from the manufacturing industry has been investigated for the first time.

To produce carboxymethylcellulose (CMS), sodium salt of monochloroacetic acid and cellulose are used as raw materials. In order to obtain in industry by the mechanochemical method of CMS, cellulose in a monoapparatus is mersed (in a volume sufficient to moisten the cellulose mass) in an 18-probe alkali solution at normal temperature, ground and separated into fibers. Then at 35-400C a sodium salt of dry monochloroacetic acid, in a mixed state, is gradually boiled to form CMS.



The level of CMS metabolism is mainly controlled by the ratio of taking of cellulose and sodium monochloroacetate, with the exception of the concentration of water and alkali in the alkaline cellulose.

The dependence of the ratio of reagents on the level of exchange of CMS (cellulose : NaOH : water = 1:2:12 mol ratio)

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Sellyuloza: ClCH ₂ COONa mol nisbatda	1:0,1	1:0,25	1:0,5	1:0,7	1:1,0	1:1,2	1:1,4	1:1,7	1:2	1:3
KMS almashinish darajasi	7,1	12,6	25,2	32	44	55	62	72	87	102

Below are the physicochemical parameters of PATS obtained from cellulose of the "California" variety, as well as of CMS produced in industry on the basis of Tsh-88.2-12-2005 and Tsh-2231-001-5353-5770-01.

As can be seen from the table, several grades of PATS obtained from the "California" cultivar poplar tree cellulose that meet the requirements of all quality indicators Tsh-88.2-12-2005 and

Tsh-2231-001-5353-5770-01 have been obtained. They are like 105/1000, 100/950, 105/750, 95/850.

Physicochemical parameters of PATS obtained from poplar cellulose of the "California" variety, as well as PATS produced in industry on the basis of Tsh-88.2-12-2005 and Tsh-2231-001-5353-5770-01

5-jadval

No	Ko'rsatkichlar	"*K-PATS"	1Tsh	"*K-PATS"	2Tsh	"*K-PATS"	2Tsh	"*K-PATS"	2Tsh
					75/400		70/300		85/500
1	Polimerlanish darajasi, kam emas	1050	500	950	400	750	250-350	850	500-550
2	Karboksil gruxlari bilan o'rin almashish darajasi	105	80-100	100	65-85	105	65-75	95	80-90
3	Asosiy modda miqdori, %	65	50	67	48	63	48	65	50
4	2% li suvli eritmaning dinamik qovushqoqligi, mPas	138,8	100	105	60	80	40	147,0	100
5	Suvda eruvchanligi, %	99,2	97	98,8	98	98,4	98	98,8	98
6	Muxit, rN	10	8-12	9	8-12	9	8-11	11	8-12

*K-PATS-PATS derived from the cellulose of the "California" variety poplar tree

*1Tsh-88.2-12-2005

*2Tsh-2231-001-5353-5770-01

It was determined that the polymerization rate of the obtained PATS, the degree of substitution with carboxyl grues, the amount of the basic substance, dynamic viscosity of the 2% aqueous solution, water solubility and various similar indicators were found to meet the requirements of the specified specification.

Determination of optimal parameters: Determination of optimal parameters for cellulose extraction processes (NaOH concentration 40 g/l, grinding time 80 min, baking time 160 min, temperature 160°C) have been determined. A new technology was developed to synthesize carboxymethyl compositions based on poplar, pastoral cellulose and starch. The physicochemical properties of the resulting compositions were studied, and the sphere of their application was determined. From the secondary raw material of "California" platform cellulose grades with different quality parameters (yield 54.6%, α -cellulose 94.8%, polymerization rate 1050) were obtained.

Based on the resulting cellulose and starch, thermally stable carboxymethyl compositions that stabilize drilling mixes for oil and gas industry were synthesized and put into production.

In conclusion, this study made an important contribution to the development of the chemical industry, creating an innovative technology for the production of cellulose and carboxymethyl compositions from local raw materials. The obtained results have significant not only scientific, but also practical value and contribute to providing the local market with import-substituting products, creating new jobs and increasing economic efficiency.

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