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OBTAINING A PAC FROM THE CELLULOSE OF PLANTS OF SUNFLOWER, SAFFLOWER AND WASTE FROM THE TEXTILE INDUSTRY

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Abstract:

Cellulose ethers are now of great practical importance. The advantages of cellulose ethers include: resistance to chemical reagents, water resistance, frost resistance, lightfastness, low flammability, the ability to dissolve in common organic solvents, good film-forming and thermoplastic properties, etc. Some cellulose ethers with a certain degree of substitution can dissolve not only in organic solvents, but also in dilute aqueous solutions of alkalis and even in cold water, which is of great importance for their practical application.

Keywords: Carboxymethyl cellulose, cellulose, cellulose ethers, degree of polymerization, degree of substitution, ash content, temperature, humidity, mercerization, natural polymer material, non-woody

Cellulose esters are now of great practical importance. The advantages of cellulose esters include: resistance to chemical agents, water resistance, frost resistance, light resistance, low flammability, ability to dissolve in common organic solvents, good film-forming and thermoplastic properties, etc. Some cellulose esters, with a certain degree of substitution, can be dissolved not only in organic solvents, but also in dilute aqueous solutions of alkalis and even in cold water, which is of great importance for their practical application.

The process is carried out at an elevated temperature under pressure. The alkylation reaction is irreversible. The degree of substitution(SZ) of cellulose ether will depend on the excess of the reagent, the amount of alkali and the reaction conditions.

The treatment of cellulose fibers with concentrated solutions of alkalis is one of the oldest industrial processes. Currently, treatment with aqueous solutions of sodium hydroxide is used in the textile industry, in the refinement of cellulose for chemical processing in cellulose production, as well as as an intermediate stage of cellulose activation in the production of viscose fibers and films and in the production of cellulose esters.

Mercer first studied the treatment of cellulose with 16-18% NaOH solutions in 1844. Cotton cellulose fibers are shortened by 15-25% at room temperature and swell strongly in the transverse direction. The diameter of the fiber increases by 60-70%. After stretching treatment, washing of alkali, drying in the stretched state, the cotton fabric acquires a better gloss, increased tensile strength and the ability to be better colored with dyes. In honor of Mercer, the process of processing cotton fabrics and other cellulose materials with concentrated solutions of alkalis (12-18% solutions of NaOH) was called mercerization.

Cellulose treated with alkali, is called alkali cellulose (alkalizers). Cellulose after washing the alkali with water is called mercerized cellulose. "Preparation of ethers from cellulose suitable for chemical processing obtained from annual plants and fibrous waste of textile enterprises (tktch)" the development of technology for obtaining ethers of Na-CMC, PAC from cellulose obtained from sunflower stalks, safflower, as well as fibrous waste of textile enterprises, research and analysis of the features of anionization of natural polymer during the process, identification of physical and chemical laws of chemical processes at the main stages of obtaining polyanion cellulose from cellulose obtained from the stems of annual plants, research and analysis of the characteristics experimental anions.

Based on the conducted experiments and studies, it is scientifically proved for the first time that the technological modes of the main stages of the PAC are not inferior in quality anionization to cellulose based on sunflower, safflower, tktch. Polyanion cellulose is produced in several countries with a developed chemical industry. Among them are such Russian companies as NORDEN, "Cellulose Esters", its distribution companies "Ashland Specialties Ingredients", "Momentive", "Pinova Ine", "MAS ALBION", the Turkish company "BAERAKLER" produces the brand "PAC-LV TECH 2A-100" in incomparable quality.

Until now, cotton or wood pulp has been used as raw materials for the production of PAC. In accordance with the task, sunflower was used to obtain the PAC, some of the requirements of which meet GOST 3818.0-72. The process of producing PAC includes several stages of processes, such as; mercerization of cellulose in a known concentration of NaOH. The resulting alkaline cellulose undergoes an etherification reaction by exposure to sodium monochloroacetate-CH3COON and is sent to the maturation process.

At the end of the ripening process, carried out as a result of an exothermic reaction, the finished product is dried in special drying chambers and passed through crushers-mills and packed with different weights and sent to the warehouse, to the pantry. Table 1 below shows the effect on the destruction of polymers of lignin, which is used as an inhibitor in the process of producing PAC at the stages of destruction. As a result of the dissertation research, measures for waste water disposal were considered separately. plant species such as flax, cotton stalks (cottonwood).

Effect on the destruction of polymers of lignin used as an inhibitor in the process of producing PAC at the stages of destruction.

Таблица 1

№	Lignin , %	Mercer process			Esterification process		Maturation process	
		Safflower pulp						
		*CDPD	*ATM	*L-ATM	ATM	L-ATM	PAC	L-PAC
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 pulp								
№	Lignin , %	*CDPD	*ATM	*L-ATM	ATM	*L-ATM	PAC	L-PAC
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 pulp								
№	Lignin , %	*CDPD	*ATM	*L-ATM	ATM	*L-ATM	PAC	L-PAC
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

CDPD - the initial degree of polymerization of the cellulose ;

*** YATM**-polyanion cellulose;

*** L-YATM**-lignin-based polyanion cellulose:

At the end of cellulose synthesis, the sedimentary NaOH contains lignin, which contains various functional groups such as phenol, benzene, hydroxide, carbonyl, and functional groups that have the ability to absorb heat. These functional groups in the composition of lignin were used as an inhibitor in the preparation of PAC ester and positive results were obtained. Here is the sequential addition of lignin in different consumable rates, i.e. from 0.5 to 3.0%, in the production of PAC ether from three cellulose objects. From Table 2. it can be observed that the heat released during the mercerization process as a result of strong concentration, as well as mechanical processing of the fiber, or as a result of an exothermic reaction during etherification, as well as maturation, the heat source leading to destructive consequences absorbs several functional groups of the lignin structure, and thereby significantly reduces the destruction of an elementary link in the macromolecule of a natural polymer. A comparative table of results is provided below.

Comparison of physico-chemical parameters of PAC samples obtained on the basis of experiments and tsh-39.3-268: 2010

Table 2

№	Indicators	Safflower PAC	Sunflower PAC	TKTCH PAC	*cotton PAC	TSh-39.3 –268: 2010
1	Degree of polymerization (PD)	870	680	1450	1050	500
2	Degree of exchange for carboxymethyl groups (AD)	0,99	0,101	0,102	115	0,8-1,0
3	Amout of basic substance, %	61	57	54	64	50

4	Viscosity of 2% aqueous solution of CMC	128	119	116	148	100
5	Water solubility,%	98,8	98,9	98,8	99,2	97
6	PH of the medium	10,8	10,9	10,7	11,2	8-12

*Cotton PAC-PAC obtained on the basis of cotton pulp

From Table 2. it can be seen that the quality indicators of pats obtained from local raw materials meet the requirements set out in regulatory documents. As a result of all the research, the "AQUA CELL MONO" method was developed and introduced into production with a high level of compactness and a high degree of profitability in relation to the current analogues of producing PAC.

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