American Journal of Interdisciplinary Research and Development
ISSN Online: 2771-8948
Website: www.ajird.journalspark.org
Volume 11, Dec., 2022

STUDY THE PHYSICO-CHEMICAL, MECHANICAL AND STRUCTURAL PROPERTIES OF CELLULOSE BASED ON WASTE FIBER

**Sandybaeva Zamira Hudayberdievna,
** Osh State University

*Murodov Muzaffar Murodovich,
*Tashkent Innovative Chemical-Technological
Scientific-Research Institute

*Siddikov Abdujalol.
*Tashkent Innovative Chemical-Technological
Scientific-Research Institute

***Siddikov Murodhodja Abdujalol ugli
***EM University

Abstract

The study examined the physical-chemical, mechanical and structural properties of the local raw material - reed plant and fiber waste from cotton ginning, textile and other industries, the cellular cellulose obtained on the basis of the map.

Keywords: reed stalk, poplar cellulose, textile fiber waste, Jerusalem artichoke cellulose, water vapor absorption rate, water resistance index, stabilizer, suffocation, base substance content, cotton lint, polymerization rate, pentosan, alkali sediment, ash content, moisture, concentration , parameter, optimal conditions, destruction.

Despite the common features, cellulose differs from another plant polysaccharide - starch. The cellulose molecule is a long, extremely unbranched chain of saccharides. Unlike starch, which consists of α-glucose residues, it includes many β-glucose residues linked together.

Cellulose, the most common natural polymer on earth, is a very important object of research, since its scope is expanding every year, and the available reserves, if used rationally, can be inexhaustible. The physicochemical properties of cellulose are due

American Journal of Interdisciplinary Research and Development
ISSN Online: 2771-8948
Website: www.ajird.journalspark.org
Volume 11, Dec., 2022

to the structure of its macromolecules, consisting of D-glucose residues, forming a linear topological structure; numerous hydrogen bonds between the hydroxyl groups of macromolecules, the degree of polymerization.

As a result of chemical reactions (destruction, reactions of functional groups, cross-linking of chains, intramolecular rearrangements), the structure of biopolymers is modified and they acquire new valuable properties that make it possible to find previously unknown areas of their use. Currently, cellulose materials are actively used to create various nanostructures: nanocrystals, nanofibers, and nanocomposites.

Nanocomposites can be completely formed from cellulose (in this case, longer fibers serve as a matrix, and cellulose nanocrystals serve as a filler), can contain nanoparticles of metals and semiconductors, and have an organic matrix of bacterial or chemically modified cellulose. In composite materials, cellulose is also combined with synthetic polymers. The collective monograph outlines the main issues related to the production of modified celluloses and composite materials based on cellulose, the study of the atomic and molecular structure and physicochemical properties of natural and modified cellulose-containing objects.

In this study, the physical-chemical, mechanical and structural properties of the cellular cellulose obtained on the basis of fibrous waste from local raw materials - reed plant and cotton ginning, textile and other industries were studied.

Below is the capillary porous structure of cellulose obtained from reeds, hemp and cotton lint S_{OH}, SK and a comparative study of the supramolecular (nonmolecular) structure of celluloses. Examination and analysis of cellulose samples were performed by the following methods: moisture absorption, IR-spectroscopic, roentgen, electron and light microscopy. Data on water vapor absorption of cellulose samples of different humidity are given in Table 1 below.

From the data in the table, it can be seen that the pill is characterized by the absorption of water vapor in the sample tube with a specific moisture content i.e., wood pulp and cotton lint cellulose have a higher rate of water vapor absorption when compared, or topinambup (Helianthus tuberosus) plant cellulose has a higher hydrophobicity when it is applied to the pulp of top wood.

1-TABLE Absorption of water vapor into cellulose at 25°C

Examples	Cotton lint cellulose	* TKTCh cellulose	Hill wood cellulose	Cellulose Topinambupa «Fayz-Bapaka»	Reed cellulose
In moisture, %	Degree of Absorption, %				
10	0,20	0,30	0,40	0,50	0,55
20	0,40	0,50	0,90	1,00	1,15
30	0,60	0,60	1,10	1,40	1,40
40	0,70	0,80	1,40	1,70	1,85
50	0,90	1,00	1,50	3,00	3,15
60	1,30	1,40	2,00	6,60	7,60
70	2,00	2,20	3,40	8,10	8,65
80	2,40	2,90	3,60	9,00	9,40
90	3,70	4,60	8,80	9,50	10,20
100	8,00	8,40	9,10	9,90	10,60

* TKTCH - *Fiber waste from the textile industry.*

Reed cellulose is much higher than topinambup (Helianthus tuberosus) cellulose. From this multiplication, it can be concluded that reed-based cellulose is distinguished by its high peak ability. The capillary porosity of the cellulose sample is given in the table below.
It can be seen from the table that the relative sieve area and relative absorbency of cotton lint cellulose TKTCh are relatively high when compared to other cellulose samples, while the $S_{уд}$ Index of cellulose samples obtained from lumber is higher than topinambup (Helianthus tuberosus) cellulose $S_{уд}$. The bulk of reed plant cellulose is higher than that of TKTCH and topsoil cellulose, and the radius of capillary flap is 105-112 A°.

2-TABLE Characteristics of capillary porosity of cellulose samples

Examples	Cotton lint cellulose	* TKTCh cellulose	Hill wood cellulose	Cellulose Topinambupa «Fayz-Bapaka»	Reed cellulose
X_m, g / g	0,0143	0,0137	0,0127	0,0098	0,0032
Relative surface, S_{salt}, *m^2/g	49,876	47,790	44,010	25,080	17,402
Total pore size, *Wo, ^{3}ms /g,	0,095	0,089	0,072	0,235	0,071
capillary radius $R_к$, A°	38,8	49,2	76,1	105	148

* TKTCH - *Fiber waste from the textile industry*

It can be seen from the table that the relative silt surface and relative absorbency of cotton lint cellulose TKTCH are relatively high when compared to other cellulose samples, the S_{salt} index of cellulose samples obtained from timber is higher than topinambup (Helianthus tuberosus) cellulose S_{salt}. The multiplicity of reed plant cellulose is TKTCh and the radius of the capillary valve is 105-112 A°, which is higher than that of the top cellulose. As can be seen from the table, the index of SK and S_{OH} differs slightly in the composition of topinambup (Helianthus tuberosus) and poplar stalks, because in addition to cellulose there are other amopf compounds in the composition of stems and stockings.
After ripening and leaching, i.e. the removal of the endophytic compounds from the tube other than the cellulose, the indexing in the S_{OH} and SK index sharply. According to the table, the cellulose in the cellulose is higher than that of the reed plant in the pulp of the tree, as well as in the pulp of the other objects. It is also possible to observe an area where the intensity is reduced or the spectacle is lost. The data obtained from the analysis of the spectrograms and X-ray diffraction patterns to determine the

comparative coefficients of the S_{OH} and SK samples are given in Table 3.9.

3-TABLE

The difference between S_{OH} and SK of the sample under study

Examples	S_{OH}, cm²	SK, %
Cellulose Topinambupa «Fayz-Bapaka»	32	37
Reed cellulose	20	22
Cellulose Topinambupa «Fayz-Bapaka» after ripening and watering	71	70
Reed cellulose after ripening and watering	74	72
Hill wood trail	31	34
Hill wood cellulose	67	55

Based on the analysis of the above results, it can be concluded that the absorption of reed cellulose into the water when covered with tapinambup and topak cellulose is very sensitive. The loss of the crystalline component of cotton lint cellulose is characterized by a low water absorption rate when compared with topinambup (Helianthus tuberosus) and hemp cellulose [1-15]. Below is a table comparing the quality of cellulose obtained on the basis of cotton lint to the requirements of GOST (state standard) 95-79 then it is possible to observe that in the course of this scientific research the object intended for chemical processing - cotton lint cellulose - meets the requirements of the normative quality coefficient.

The following comparison was made in accordance with the requirements of GOST (state standard) 11960-79 (K59 group), i.e. compliance with the requirements for annual plants for fibrous raw materials and pulp and paper industry. The method given in GOST (state standard) 11960-79 was used to determine the amount of lignin in the cane. During the study of the reed object, the amount of ash in the mass was determined using the method specified in GOST (state standard) 18461-73. The following table shows that the requirements of GOST (state standard) 11960-79 and GOST 18461-73 correspond to the coefficients [29-38]. As a result of the test, the average apiphmetic value of the results of the two papal detection rounds, rounded up to 0.1%, was obtained.

The aim is to determine the amount of lignin and ash in the local raw material reed bed, natural polymep synthesis shapoitlapi from its discovery, how to control the parameters, has made it possible to make a delicate mathematical modeling that includes factors such as reducing the sap of the chemical reagents to be sapped.

REFERENCES

[1] M.M. Murodov. «Technology of making cellulose and its ethers by using raw materials» // *International Conference* "Renewable Wood and Plant Resources: Chemistry, Technology, Pharmacology, and Medicine". *Saint-Petersburg, Russia*. June 21-24., 2011. 142-143.

[2]. M.M. Murodov. «The technology of making carboxymethyl cellulose (cmc) by method monoapparatus» // *International Conference* «Renewable Wood and Plant Resources: Chemistry, Technology, Pharmacology, and Medicine». *Saint-Petersburg, Russia*. June 21-24., 2011. 141-142.

[3]. Ўзбекистон Республика Вазирлар Маҳкамаси "РЕСПУБЛИКАДА ТЕЗ ЎСУВЧИ ВА САНОАТБОП ПАВЛОВНИЯ ДАРАХТИ ПЛАНТАЦИЯЛАРИНИ БАРПО ҚИЛИШ ЧОРА-ТАДБИРЛАРИ ТЎҒРИСИДА" 2020 йил 27 августдаги 520-сонли қарори.

[4]. Интернет: https://xs.uz/uzkr/post/ hududlarda –pavlovniya -plantatsiyalari - tashkil-qilinadi/

[5]. Муродов, М. Х., & Муродов, Б. Х. У. (2015). Фотоэлектрическая станция с автоматическим управлением мощностью 20 кВт для учебного заведения. *Science Time*, (12 (24)), 543-547.

[6]. Murodov, M. M., Rahmanberdiev, G. R., Khalikov, M. M., Egamberdiev, E. A., Negmatova, K. C., Saidov, M. M., & Mahmudova, N. (2012, July). Endurance of high molecular weight carboxymethyl cellulose in corrosive environments. In *AIP Conference Proceedings* (Vol. 1459, No. 1, pp. 309-311). American Institute of Physics.

[7]. Murodov, M. M., Yusupova, N. F., Urabjanova, S. I., Turdibaeva, N., & Siddikov, M. A. (2021). OBTAINING A PAC FROM THE CELLULOSE OF PLANTS OF SUNFLOWER, SAFFLOWER AND WASTE FROM THE TEXTILE INDUSTRY.

[8]. Murodov, M. M., Yusupova, N. F., Urabjanova, S. I., Turdibaeva, N., & Siddikov, M. A. Obtaining a Pac From the Cellulose of Plants of Sunflower, Safflower and Waste From the Textile Industry. *European Journal of Humanities and Educational Advancements*, *2*(1), 13-15.

[9]. Murodov, M. M., Xudoyarov, O. F., & Urozov, M. Q. (2018). Technology of making carboxymethylcellulose by using local raw materials. Advanced Engineering Forum Vols. 8-9 (2018) pp 411-412/©. *Trans Tech Publications, Switzerland. doi*, *10*, 8-9.

[10]. Primqulov, M. T., Rahmonbtrdiev, G., Murodov, M. M., & Mirataev, A. A. (2014). Tarkibida sellyuloza saqlovchi xom ashyoni qayta ishlash texnologiyasi. *Ozbekiston faylasuflar milliy jamiyati nashriyati. Toshkent*, 28-29.

[11]. Рахманбердиев, Г. Р., & Муродов, М. М. (2011). Разработка технологии получения целлюлозы из растений топинамбура. *Итисодиёт ва инновацион технологиялар" илмий электрон журнали,(2)*, 1-11.

[12]. Elievich, C. L., Khasanovich, Y. S., & Murodovich, M. M. (2021). TECHNOLOGY FOR THE PRODUCTION OF PAPER COMPOSITES FOR DIFFERENT AREAS FROM FIBER WASTE.

[13]. MURODOVICH, M. M., QULTURAEVICH, U. M., & MAHAMEDJANOVA, D. (2018). Development of Technology for Production of Cellulose From Plants of Tissue and Receiving Na-Carboxymethylcellulose On its Basis. *JournalNX*, *6*(12), 407-411.

[14]. Rahmonberdiev, G., Murodov, M., Negmatova, K., Negmatov, S., & Lysenko, A. (2012). Effective Technology of Obtaining The Carboxymethyl Cellulose From Annual Plants. In *Advanced Materials Research* (Vol. 413, pp. 541-543). Trans Tech Publications Ltd.

[15]. Murodovich, M. M., Murodovich, H. M., & Qulturaevich, U. M. (2020). Obtaining technical carboxymethyl cellulose increased in main substance. *ACADEMICIA: AN INTERNATIONAL MULTIDISCIPLINARY RESEARCH JOURNAL*, *10*(12), 717-719.

[16]. Murodovich, M. M., Qulturaevich, U. M., & Mahamedjanova, D. Comparative Researches of the Composition and Properties Cmc in Different Degree of Polymerization. *JournalNX*, *6*(12), 412-415.

[17] Йулдашева, Г. И., & Тешабаева, О. Н. (2020). Развитие цифровой экономики Республики Узбекистан. *Universum: экономика и юриспруденция*, (7 (72)), 4-6.

[18] Teshabaeva, O., Yuldasheva, G., & Yuldasheva, M. (2021). DEVELOPMENT OF ELECTRONIC BUSINESS IN THE REPUBLIC OF UZBEKISTAN. *Интернаука*, (3-3), 16-18.

[19] Ibragimovna, Y. G. (2022). ADVANTAGES OF CREDIT-MODULE SYSTEM IN THE FIELD OF EDUCATION. *INTERNATIONAL JOURNAL OF SOCIAL SCIENCE & INTERDISCIPLINARY RESEARCH ISSN: 2277-3630 Impact factor: 7.429*, *11*, 14-16.

[20] Йўлдашева, М. (2021). ЭФФЕКТИВНОЕ УПРАВЛЕНИЕ ИНВЕСТИЦИОННОЙ ДЕЯТЕЛЬНОСТЬЮ ИНФОРМАЦИОННО-КОММУНИКАЦИОННЫХ ТЕХНОЛОГИЙ УЗБЕКИСТАНА. *Студенческий вестник*, (3-4), 11-13.

[21] Shermatova, G. Y. H. (2022). ANIQ FANLARNI O'QITISHDA AXBOROT TEXNOLOGIYALARIDAN FOYDALANISH. *Scientific progress*, *3*(1), 372-376.

[22] Yuldasheva, G. I., & Shermatova, K. M. (2021). THE USE OF ADAPTIVE TECHNOLOGIES IN THE EDUCATIONAL PROCESS. *Экономика и социум*, (4-1), 466-468.

[23] Худаёрова, С. И. (2022). ОСОБЕННОСТИ МОРФОЛОГИЧЕСКОГО ФОРМИРОВАНИЯ ЛИСТЬЕВ У СОРТОВ ЛИМОНА (CITRUS L.) В ЗАЩИЩЕННЫХ МЕСТАХ. *БАРҚАРОРЛИК ВА ЕТАКЧИ ТАДҚИҚОТЛАР ОНЛАЙН ИЛМИЙ ЖУРНАЛИ*, 15-18.

[24] Қодирова, Г. О. Қ., & Худоёрова, Ф. (2021). РОЛЬ ОБРАЗОВАТЕЛЬНЫХ ТЕХНОЛОГИЙ В ПРЕПОДАВАНИИ ЯЗЫКА. *Scientific progress*, *2*(3), 894-898.

[25] Itolmasovna, K. S. (2022). DEVELOPMENT OF MARKETABLE PROPERTIES OF PROCESSED LEMON. *The American Journal of Agriculture and Biomedical Engineering*, *4*(02), 21-25.
[26] Муродов, М. М., & Чулиев, Л. Э. (2021, October). Турли Объектлар Асосида, Яъни Пахта Тозалаш Корхоналарининг Толали Чиқиндилари Ва Павлония Ҳамда Банан Целлюлозаларидан Е-466 Олиш Технологияси Ва Унинг Физик-Кимёвий, Механик-Структуравий Хоссалари. In *" ONLINE-CONFERENCES" PLATFORM* (pp. 316-320).
[27] Ibragimkhodjayev, A. M., Rakhmonberdiyev, G. R., Murodov, M. M., & Kodirov, O. S. (2009). "Influence of ripening process of cellulose from topinambour on its fractional composition. Chemistry and chemical technology. *Tashkent*, (4), 57.
[28] Муродов, М. М., & Чулиев, Л. Э. (2021, October). Маҳаллий Хом Ашёлар Асосида Олинган Целлюлозалардан, Фармацефтика Ва Медецина Соҳалари Учун Юқори Тозаликка Эга Е-466 Нинг Бир Нечта Маркаларини Олиш Технологияси. In *" ONLINE-CONFERENCES" PLATFORM* (pp. 309-315).
[29] Муродов, М. М. (2021). ПАВЛОНИЯ ДАРАХТИ ХАМДА БАНАН ПОЯСИ АСОСИДАГИ ЦЕЛЛЮЛОЗА СИНТЕЗИ ЖАРАЁНЛАРИНИ ЎРГАНИШ ВА СОЛИШТИРМА ХАРАКТЕРИСТИКАСИНИ ТУРЛИ БОСҚИЧЛАР ЁРДАМИДА ТАҲЛИЛ ҚИЛИШ. *Scientific progress*, *2*(6), 1806-1813.
[30] Муродов, М. М. (2021). ПАХТА ТОЗАЛАШ КОРХОНАЛАРИНИНГ ТОЛАЛИ ЧИҚИНДИЛАРИ ҲАМДА ПАВЛОНИЯ ДАРАХТИ ВА БАНАН ПОЯЛАРИ АСОСИДА ОЛИНГАН ЦЕЛЛЮЛОЗАЛАРДАН, ФАРМАЦЕФТИКА ВА МЕДЕЦИНА СОҲАЛАРИ УЧУН ЮҚОРИ ТОЗАЛИККА ЭГА Е-466 НИНГ БИР НЕЧТА МАРКАЛАРИНИ ОЛИШ ТЕХНОЛОГИЯСИ. *Scientific progress*, *2*(6), 1814-1823.
[31] Муродов, М. М. (2021). ТУРЛИ ОБЪЕКТЛАР АСОСИДА, ЯЪНИ ПТКТЧ ВА ПАВЛОНИЯ ҲАМДА БАНАН ЦЕЛЛЮЛОЗАЛАРИДАН Е-466 ОЛИШ ТЕХНОЛОГИЯСИ ВА УНИНГ ФИЗИК-КИМЁВИЙ, МЕХАНИК-СТРУКТУРАВИЙ ХОССАЛАРИ. *Scientific progress*, *2*(6), 1824-1831.
[32] Муродов, М. М. (2021). МАҲАЛЛИЙ ХОМАШЁЛАР АСОСИДА ОЛИНГАН Е-466 СИНТЕЗИ ДАВРИДА МОДЕФИКАЦИЯЛАНГАН–КОМПОЗИТ КУМУШ ИОНЛИ МАРКАЛАРИДАН, МАЙИШИЙ КИМЁНИНГ МАВЖУД БИР НЕЧТА ТАРМОҚЛАРИДА ҚЎЛЛАШ. *Scientific progress*, *2*(6), 1782-1791.
[33] Муродов, М., & Матчанова, Ф. (2020). СОЛНЕЧНАЯ БИОЭНЕРГЕТИЧЕСКАЯ УСТАНОВКА ДЛЯ УТИЛИЗАЦИИ БЫТОВЫХ ОТХОДОВ. *InterConf*.
[34] Муродов, М. М., Сидиков, А. С., & Уразов, М. К. (2019, September). 4.11. ПОЛУЧЕНИЕ Na-КМЦ И ПАЦ ИЗ ЦЕЛЛЮЛОЗЫ РАСТЕНИЙ

ПОДСОЛНЕЧНИКА, САФЛОРА И ИЗ ОТХОДОВ ТЕКСТИЛЬНОЙ ПРОМЫШЛЕННОСТИ. In *VI Международная конференция* (p. 237).
[35] Муродов, М. М., Урозов, М. К., & Улуков, Ж. Т. САНОАТ КОРХОНАЛАРИНИНГ ТОЛАЛИ ЧИҚИНДИЛАРИНИ КИМЁВИЙ ҚАЙТА ИШЛАШ.
[36] Муродов, М. М., & Эшонқулов, М. Н. КАВРАК ЎСИМЛИГИ ЦЕЛЛЮЛОЗАСИ АСОСИДА Na-КМЦ СИНТЕЗИ ДАВРИДАГИ ОПТИМАЛ ПАРАМЕТРЛАРНИ АВТОМАТЛАШТИРИШ БОСҚИЧИГА ЎЗЛАШТИРИШ. In *КОНФЕРЕНЦИЯ-СИМПОЗИУМ* (p. 55).