

COMPOSITE RECEIPT AND APPLICATION OF AREAS OF APPLICATION

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Abstract. *This article presents the process of developing a composite using MC-6 type of waste paper and basalt fiber. A study was conducted on improving the quality indicators of waste paper based on basalt fiber and obtaining wrapping paper.*

Keywords: *composite, waste paper, cellulose, composition, basalt fiber, quality indicators.*

Introduction. Over the past 20 years, the Republic of Uzbekistan has made significant progress in pulp and paper production. It should be noted that among dozens of paper and paper products manufacturing enterprises in Uzbekistan, there is a single cardboard paper manufacturing enterprise "TECHNO PRINT" LLC, and now there are more than 10 such large enterprises producing sanitary-hygienic paper. However, the country's demand for pulp and paper is still not being met.

"TECHNO PRINT" LLC was fully operational in 2008. The enterprise is equipped with equipment imported from China. The production process of the enterprise is continuous. The enterprise specializes in the production of thick paper and box products, using MC-5B and MC-6B types of waste paper as raw materials.

It is necessary to restore the physical parameters of waste paper fibers by mechanical and chemical processing, to create good conditions for regenerating the properties of water and fibril structure.

The use of mineral (basalt) fibers in the composition of paper and paper products gives them a set of unique properties that cannot be achieved in materials

based on waste paper fibers. These are high thermal, chemical and biological stability insulating properties, as well as stability to the movement of various types of radiation, including very hard gamma and ultraviolet. The main interesting unique filtration properties are the combination of low aerodynamic resistance with high retention effect of submicron particles.

Traditional types of paper and paper products based on mineral fibers determine their use in various fields of technology, which are suitable or unsatisfactory due to the low stability of waste paper fibers to the aggressive effects of external factors. Examples of successful use of composites such as paper based on mineral fibers can be found in various fields of science and technology. Taking into account the above considerations, we conducted this experiment on MC-6 (old corrugated cardboard or scraps) and basalt (3 different types) fibers of paper.

The technology of mass production from waste paper and basalt fibers for the production of composite paper products includes the following processes:

Separation of waste paper into separate fragments, shredding of fragments, cleaning of waste paper mass in cyclones, sorting and fine cleaning, separation of secondary fiber suspension into fractions depending on size, condensing the mass to 10...15%.

Then, from each of these separately, i.e., by taking equal amounts and mixing them, a composite material was prepared in the laboratory using the wet method. The prepared mass was diluted by 1-1.5%, and a paper sample was cast on the paper casting machine. When the cylinder of the apparatus is slowly raised together with the mesh part, the water mass at the end passes through the mesh to form a wet paper layer. The resulting paper layer together with the mesh is removed and dehydrated in a drying cabinet at 105-110 °C to 75-80% moisture. Then it is pressed in a press until the desired thickness is formed and kept in the press for 30 minutes. At the next stage, the quality indicators of the samples, i.e. breaking length, bending resistance, ash content and water absorption were studied. The following tables show the analysis of the results.

Table 1

Quality indicators of composite paper samples based on basalt fiber (ultrafine) and waste paper

№	Waste paper, %	Basalt fiber, %	Quality indicators			
			Breaking length, mm	Bending strength, H	Ash content, %	Water absorption, %
1	100	-	3700	25	6.80	3.45
2	75	25	2100	15	7.10	3.36
3	50	50	900	3	8.20	2.36
4	-	100	-	-	9.80	2.20

Quality indicators of composite paper samples based on basalt fiber (fine) and waste paper

№	Waste paper, %	Basalt fiber, %	Quality indicators			
			Breaking length, mm	Bending strength, H	Ash content, %	Water absorption, %
1	100	-	3700	25	6.80	3.45
2	75	25	2800	17	7.90	3.81
3	50	50	1600	8	9.60	3.66
4	-	100	-	-	12.12	3.95

Quality indicators of composite paper samples based on basalt fiber (coarse) and pulp

№	Waste paper, %	Basalt fiber, %	Quality indicators			
			Breaking length, mm	Bending strength, H	Ash content, %	Water absorption, %
7	100	-	3700	25	6.80	3.45
8	75	25	1500	13	8.20	4.92
9	50	50	800	2	10.12	4.10
10	-	100	-	-	14.12	5.95

Conclusion. As can be seen from the tables, three different types of basalt fiber samples and MS-6 composite paper samples obtained on the basis of different waste paper were studied and compared for breaking length, bending resistance, ash content and water absorbency indicators. From the results of the analysis, it can be concluded that it is appropriate to use very fine and fine types of basalt fiber, because the amount of ash and the degree of elasticity are smaller than those of coarse fiber.

REFERENCE

1. E.Egamberdiev, S. Turabdjano, D. Mirzaeva, Kh. Khaydullaev, U. Sharipova, A. Shokhakimova, and O. Bakhtiyorov.: Effect of chitosan substance on the mechanical properties of paper obtained on the basis of flax cellulose. E3S Web of Conferences 371, 01045 (2023) <https://doi.org/10.1051/e3sconf/202337101045>
2. Igamqulova N.; Mengliev, Sh.; Egamberdiev E.: Reduction of waste disposed to the environment through recycling of unused methyldiethanolamine. E3S Web of Conferences 371, 01049 (2023) <https://doi.org/10.1051/e3sconf/202337101049>
3. Ergashev Y.; Egamberdiev E.; Mirkhodjaeva D.; Akmalova G.; Umarova M.; Kholdarov R.: Obtaining a filter material used in gas and air purification. E3S Web of Conferences 371, 01012 (2023) <https://doi.org/10.1051/e3sconf/202337101012>
4. Egamberdiev E.; Ergashev Y.; Turabdjano S.; Abdumavlyanova M.; Makhkamov A.; Rashidov, Sh.; Karimov, Sh.: Effect of chitosan on the surface properties of cellulose-based paper obtained from the flax plant. E3S Web of Conferences 371, 01010 (2023) <https://doi.org/10.1051/e3sconf/202337101010>
5. Arslanov, Sh.; Turabdjano S.; Azimova, Sh.; Azimov D.; Sultankhojaeva N.; Egamberdiev E.: Physico-chemical properties and research of acids contained in oils of Uzbekistan. E3S Web E3S Web of Conferences, 2023, 371, 01021
6. Ergashev Y.; Egamberdiev E.; Turabdzhanov S.; Akmalova G.; Isanova R.; Rashidov R.; Sobitov O.: Obtaining filter material from natural fiber composition and areas of its use. E3S Web of Conferences, 2023, 371, 01047
7. Egamberdiev E.; Turabdjano S.; Akmalova G.; Mukhtarova N.; Ayubova I.; Mirzakhmedova M.; Rakhmonberdiev G.: Obtaining paper from composition of different fibers and its analysis. E3S Web of Conferences, 2023, 371, 01004
8. Egamberdiev, E.; Ergashev, Y.; Khaydullayev, K.; Husanov, D.; Rahmonberdiev, G. Obtaining paper samples using basalt fibers and studying the effect of natural glue obtained from chitosan on paper quality. *Universum: technical science* 2022, 4, 14-18, <https://7universum.com/ru/tech/archive/item/13348>.

9. Egamberdiev E.; Akmalova G.; Rahmonberdiev G. Obtaining paper products from cellulose-containing plants and researching its field of application. 3rd International Conference on Energetics, Civil and Agricultural Engineering, ICECAE 2022Virtual, Online13 October 2022до 16 October 2022Код 187394, DOI 10.1088/1755-1315/1142/1/012054
10. Egamberdiev E.; Makhkamov A.; Rakhimjonov B.; Khusanov D.; Akmalova G.; Mirzakhmedova M.; Rahmonberdiev G. Effectiveness of cleaning of sunflower oil with filter material made from composition of organic and inorganic fibers. 3rd International Conference on Energetics, Civil and Agricultural Engineering, ICECAE 2022Virtual, Online13 October 2022до 16 October 2022Код 187394, DOI 10.1088/1755-1315/1142/1/012050
11. M. Mirzakhmedova., D. Tukhtaboeva., E. Egamberdiev., G. Akmalova. Study of paper technology on the basis of reed cellulose. “Harvard educational and scientific review”, 2022. 149.
12. E.A. Egamberdiev., Y.T. Ergashev., Kh.Kh. Khaydullaev., G.Y. Akmalova., G.R. Rakhmonberdiev. The effect of chitosan on the surface properties of cellulose-based paper obtained from the stem of flaxseed. “Technical science and innovation”, 2022. 27.
13. Egamberdiev E.A., Makhkamov A.R., Rakhmonberdiev G.R. Obtaining wrapping paper used in furniture wrapping and quality delivery and determining its quality indicators // Tashkent state technical university named after Islam Karimov Technical science and innovation–Tashkent,– No. 2(12). 2022.– P. 33–39.
14. Egamberdiev E.A., Norboyev S.K. Extraction of cellulose nanocrystals from secondary paper waste and their use in paper production // Tashkent state technical university named after Islam Karimov Technical science and innovation –Tashkent,– No. 3(13). 2022.– P. 215–222.
15. Soatboev, K., Daddahodjaev, A., & Egamberdiev, E. (2023). Creation of mixed polyfunctional catalysts for hydration of acetylene in vapor phase. Educational Research in Universal Sciences, 2(5), 430–433. Retrieved from <http://erus.uz/index.php/er/article/view/3167>
16. Zokirbekov, J. K., Aliev, B. A., & Egamberdiev, E. A. (2023). Modified mineral sorbents for waste water treatment. Innovative Development in Educational Activities, 2(10), 155–157. Retrieved from <https://openidea.uz/index.php/idea/article/view/1345>
17. Zokirbekov, J. K., Aliev, B., & Egamberdiev, E. (2023). Effect of temperature on sorbents. Innovative Development in Educational Activities, 2(10), 158–161. Retrieved from <https://openidea.uz/index.php/idea/article/view/1346>

18. Zokirova , Z. Q. qizi, Egamberdiyev, E. A., & Sattarkulov , L. A. o‘g‘li. (2023). Installation of new types of basalt fiber filters in industry. SCHOLAR, 1(11), 122–125. Retrieved from <https://researchedu.org/index.php/openscholar/article/view/3281>
19. Zokirova Zilola Qaxramon qizi, Egamberdiyev Elmurod Abduqodirovich, & Sattarkulov Lazizbek Abror o‘g‘li. (2023). Use of cellulose based filters in the oil and gas industry. Ta’limni rivojlantirishda innovatsion texnologiyalarning o‘rni va ahamiyati, 1(1), 261–264. Retrieved from <https://researchedu.org/index.php/konferensiya/article/view/3388>
20. S.S. Aliev, E.A. Egamberdiev, G.Yu. Akmalova, G.U. Ilkhamov. Analysis of physical-mechanical properties of new type of wood-polymer composite materials. *Vol. 3 No. 1 (2023): Harvard Educational and Scientific Review*, 48-53
21. Turabdjanov , S., Egamberdiev, E., Iskandarov, A., & Zokirova, Z. (2023). Installation of new types of basalt fiber filters in industry. SCHOLAR, 1(10), 106–110. Retrieved from <https://researchedu.org/index.php/openscholar/article/view/3109>
22. Rashidov Sh.A., Egamberdiev E.A., Turabdjanov S.M. Obtaining cellulose nanocrystals and their use in paper production. *Austrian Journal of Technical and Natural Sciences 1.2 2023*, 3-8. <https://doi.org/10.29013/AJT-23-1.2-3-8>
23. E Egamberdiev, R Kholdarov, R Masharipov, O Muratkulov, G Akmalova, Ergashev Yo, M Mirzakhmedova. [Effect of flocculants on stability of paper materials](https://doi.org/10.29013/AJT-23-1.2-9-12) *Austrian Journal of Technical and Natural Sciences 1.2 2023*, 9-12. <https://doi.org/10.29013/AJT-23-1.2-9-12>
24. Egamberdiev Elmurod, Ergashev Yorkinjon, Mahkamov Adham, Umarova Muattar, Akmalova Guzal. [Obtaining oil filters from local fiber raw and its advantages](#). *Universum: технические науки 8-3 (101) 2022* – P. 49-54.
25. Egamberdiev Elmurod, Ergashev Yorqinjon, Khaydullayev Khurshid, Husanov Dilshod, Rahmonberdiev Gappor. [Obtaining paper samples using basalt fibers and studying the effect of natural glue obtained from chitosan on paper quality](#). *Universum: технические науки 4-13 (97) 2022* – P. 14-18.
26. Gulnoza Iskhakova Elmurod Egamberdiev, Jamshid Ziyadullaev. Obtaining thermal insulation materials containing basalt fiber and cellulose. *International scientific and practical conference modern views and research 2021/6*, 10-11
27. G‘.R.Rakhmonberdiev E.A.Egamberdiev, G.Yu.Akmalova, Yo.T.Ergashev, M.M.Shakirova. The influence of different natural fibers applied on the quality index of the paper. *American journal of research 2021/4*, 48-57
28. G.Akmalov S.Arslanov, E. Egamberdiev. Physiologically active polymers with anti tuberculosis activity. *International scientific and practical conference modern views and research 2021/2*, 48-50.

29. G.Rakhmanberdiev E. Egamberdiev, Yo.Ergashev. Obtaining a filter material based on basalt fiber used for the oil industry. International scientific practical conference modern views and research 2021/2, 63-65

30. Toyir Safarov, Elmurod Egamberdiev, Yorqin Ergashev. Study of the effect of binders on paper materials made based on mineral fibers. Internationales Deutsches Akademika Aachener, Germany 2021, 40-43

31. S.Arslanov, E. Egamberdiev, G.Akmalova. Physiologically active polymers with antituberculosis activity. Modern views and research - 2021, January-February, 2021: Egham. 48-50

32. E. Egamberdiev, Yo.Ergashev, G.Rakhmanberdiev. Obtaining a filter material based on basalt fiber used for the oil industry. Modern views and research - 2021, January-February, 2021: Egham. 63-65

33. Aliev S.S., Rakhmanberdiev G.R., Sharafatdinov B. Study physical and mechanical properties of wood-polymer composition materials made on the basis of local wood flours and polyvinylchloride // "Technical science and innovation", Tashkent State Technical University named after I.A. Karimov, Tashkent 2022, pp. 211-214.

34. Aliev S.S., Egamberdiev E.A., Akmalova G.Yu., Ilkhamov G.U. Analysis of physical-mechanical properties of new type of wood-polymer composite materials // Harvard Educational and Scientific Review. International Agency for Development of Culture, Education and Science. 0362-8027 47 Vol.3. Issue 3 Pages 48-53

35. Aliev S.S., Egamberdiev E.A., Juraev A.B., Ismatov M.N., Zokirova Z.Q. The Effect of Wood Fillers in Individual Conditions on Wood-Polymer Composites // "Technical science and innovation", Tashkent State Technical University named after I.A. Karimov, Tashkent 2023, pp. 208-213.

36. Aliev S.S., Egamberdiev E.A., Akmalova G.Yu. Obtaining environmentally friendly polymer composite material from local wood flour // Al-Farabi Kazakh National University NJSC Faculty of Biology and Biotechnology Department of Biodiversity and Bioresources Research Institute for Problems of Biology and Biotechnology Research Institute for Ecological Problems. Almaty, 2023, pp.168-171