Full Paper _____ *Thematic Section:* Physicochemical Research.
Reference Object Identifier – ROI: jbc-02/17-49-3-44 *Subsection:* Applied Chemistry.
Publication is available for discussion in the framework of the on-line Internet conference "*Butlerov readings*".
http://butlerov.com/readings/
Submitted on Marth 26, 2017.

Changing of mechanical properties of the pulp-and-paper material when processing his surface

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Keywords: pulp and paper materials, sack paper, polylactic acid, unipolar corona discharge.

Abstract

Complex strength properties of sack paper M-70 and sack paper with polylactide coating (polylactide manufactured by Sigma Aldrich) were studied in work. From the photographs of the surface of the sack paper it can be seen that it has a developed fibrous structure with the presence in the composition of various fillers and formations in the form of resin inclusions. The production of paper with a polymer coating was carried out by the trailing blade coating of paper from a solution of polylactide in chloroform. The thickness of the polylactide tape is 1.5-2.0 μm. Coating with a solution method allows the polymer to flow to a greater depth than traditional viscous polyolefins applied to paper from melts. It is shown that applying a coating on the surface of a paper sheet increases the strength parameters (pop strength, wet strength, breaking stress, breaking length, rigidity in tension, resistance to pressure on short distance fracture toughness) by an average of 10% due to the filling of interfiber pores by macromolecules. It is shown that sack paper and sack paper with polylactide coating after processing in a unipolar (negative) corona discharge have low electret characteristics. However, even a low level of surface potential, electric field intensity and effective surface charge density of pulp and paper materials is sufficient to influence their strength characteristics. Comparison of the strength properties between conventional and electret samples of sack paper showed the effectiveness of this hardening method. Processing of pulp and paper materials in a unipolar corona discharge increases the strength properties by 6-15%. The strengthening effect of the electret for the sack paper with polylactide coating is more significant. This is due to the orientation of the segments of the cellulose macromolecules, lignin and polylactide in the electric field and due to the increase in the potential of the double electrical layer on the surface of the fibers under the action of charge carriers injected into the paper during corona treatment.

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