Thematic Section: Research into New Technologies. **Full Paper**
Subsection: Organic Chemistry. *The Reference Object Identifier* – ROI: jbc-01/19-59-8-47
The Digital Object Identifier – DOI: 10.37952/ROI-jbc-01/19-59-8-47
Submitted on August 16, 2019.

Thematic course: Synthesis and study of the properties of composite materials based on cellulose and chitosan containing various therapeutic agents. Part 3.

Hydrolytic destruction of dressings based on dialdehydecellulose

© **Anna A. Vaniushenkova**, **Elina E. Dosadina**, **Svetlana N. Ivanova**, **Sergey V. Kalenov**, **Nikolay S. Markvichev**, and **Alexey A. Belov***[+]
Mendeleev University of Chemical Technology of Russia. Department of Biotechnologies. Heroev Panfilovcev St., 20. Moscow, 125480. Russia. Phone: +7 (499) 978-95-15. E-mail: ABelov2004@yandex.ru

*Supervising author; [+]Corresponding author

Keywords: immobilized proteinases, chitosan, hydrolytic degradation, therapeutic agent, dialdehydecellulose, wound healing materials.

Abstract

Creating systems for targeted delivery of drugs to the affected organ is one of the most promising areas for the development of systems with controlled release of the active substance. Polysaccharides are widely used as drug carriers. However, most of them are chemically inert and require preliminary functionalization in order to interact with physiologically active compounds (therapeutic agents-TA). A simple and effective method for introducing reactive groups is the periodic oxidation of the polysaccharide by the Malaprade reaction. While cellulose is insoluble in water and resistant to weak solutions of acids and alkalis, dialdehyde cellulose (DAC is the product of the periodic oxidation of cellulose) and its derivatives are destroyed in water and weakly acidic and slightly alkaline solutions. This process is called hydrolytic destruction. The kinetics of hydrolytic destruction is described by semi-logarithmic anamorphosis, which allows us to calculate the rate constants of hydrolytic destruction as the rate constant of first-order reactions. The products of hydrolytic degradation were studied by UV spectroscopy and using 3,5-dinitrosalicylic acid (DNSA). The degradation products of C and DAC were also studied by the phenol-sulfur method. From the data presented and cited earlier, it follows that when our composite material is placed in a liquid medium, the hydrolytic destruction of the drug immediately begins. What can be connected with the breakdown of both the carrier – TA bonds (DAC, C, Ct carriers) and the destruction of the carrier itself. Under the conditions of the organism, biological destruction can also join process. Biodestruction is the process of destruction (both carriers and immobilized TAs) under the action of the body's enzymes. Using IR spectroscopy, cellulose carriers were studied before and after exposure to 1/15M FB medium (pH 6.2 and 37 °C) for 48 hours. As can be seen from the data obtained, primarily for DAC samples, significant changes in the spectrum are visible in the 1800-1600 and 900 cm^{-1} fields.

The results of experimental toxicological studies of samples of various cellulosic materials allow us to conclude that the samples studied do not have toxic, hemolytic, allergenic effects, as well as mutagenic activity.

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