

STABILITY OF CHITOSAN IN WOVEN FABRIC STRUCTURES IN THE WASHING PROCESS

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Abstract: This study explores and discusses the woven fabric structures with chitosan yarns for medical application. Chitosan was used precisely because of its biodegradability and antibacterial properties. Fabric samples were subjected to washing tests to verify the stability of the material treatment in terms of microbiological effectiveness. Pathogenic bacterial strains, namely *Staphylococcus aureus* (gram-positive bacteria) and *Escherichia coli* (gram-negative bacteria) were used for the tests. Two test methods were used to evaluate the results, namely the qualitative method - the agar plate spread test and the quantitative method.

Keywords: woven fabric, chitosan, interlacing.

INTRODUCTION

Textiles have always been widely used in the medical sector and make various medical procedures much easier. At present, together with the development of new technologies and materials, a huge shift is noted in the field of medical textiles, and thanks to this, the healthcare industry is becoming more developed. The parameters that are required for textile products intended for biomedical applications include biocompatibility, resistance and protection against viruses and microorganisms, and absorbability in the human body. Chitosan is one of the most important derivatives of the natural biopolymer chitin, which can be applied in crustacean shells, exoskeletons of insects, cell walls of fungi and plankton. Crustacean shells consist of 30 to 40% protein, 30 to 50% calcium carbonate, 20 to 30% chitin and also contain pigments (astaxanthin, canthaxanthin, lutein and β -carotene) [1]. Chitosan is able to provide textile fibers and fabrics with antimicrobial, antiviral, anti-odor and other biological properties [2].

CONSTRUCTION OF WOVEN FABRIC STRUCTURES WITH CHITOSAN

The rapier weaving machine CCI with an electronic dobby shedding mechanism was used to produce the experimental woven samples. Construction parameters of

tested woven fabrics are: plain weave; woven fabric sett of ends / picks (cm^{-1}): 28.5 / 20; yarn count ends/picks 2x20tex.

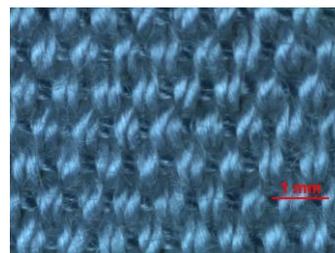


Figure 1 2D woven fabric structures with chitosan yarns.

WASHING PROCESS DEFINITION

In order to monitor the loss of chitosan in the woven structures, washing was performed. The stability of the antibacterial effect is then tested - i.e. even repeated washing should cause only minimal separation or dissolution of the active substance. A Miele Professional W 6071 drum washing machine with an automatic dosing system for BSL Bright Star laundries was used to wash the samples. Washing took place at a temperature of 40 °C and spinning at 1200 rpm. Hang drying took place according to the ČSN EN ISO 6330 standard. 1, 2, 3, 6, 9 and 12 washing cycles were carried out.

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