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RESEARCH OF METHODS OF ANTIBACTERIAL TREATMENT OF TEXTILE MATERIALS

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Abstract: In this article, analyzes were conducted on the basis of the types, characteristics, processing processes, areas of use, advantages, disadvantages of the new structural antibacterial, hygienically usable gauzes created on the basis of modern innovative technologies.

Keywords: Pathogenic effects, hygienic, antibacterial, fungi, stains, silver ions, polymers, chemical processing, technical purposes, protective gases, silver nanoparticles.

Introduction. Today, as a result of the emergence and rapid increase of pathogenic effects, odors and stains caused by various microorganisms, medical devices, health care, hygienic applications, water purification systems, hospitals, The needs of antibacterial materials used in many fields such as dental surgery equipment are increasing day by day. Also, clothing and household items such as socks, sportswear, work clothes, as well as mattresses, floor coverings and shoe linings are prone to hygienic problems in daily use. Textile products, especially sewing products made of natural fibers, create a favorable environment for the development of microorganisms due to their large surface area and moisture retention during operation. According to the results of the conducted analysis and expertise, it was found that the spread of viral infections such as HIV and hepatitis through the use of directly contaminated materials in the laboratory work process is a high result for the protection of workers with functional clothing.

Methodology & empirical analysis. Textile fabrics obtained by electrochemical metallization are characterized by high mechanical properties. The method of vacuum thermal deposition is also used for metallization of textile fabrics. Thin film coating by ion sputtering on fabric has many advantages, and the method can be used in dielectrics and magnetic compositions. However, this method has disadvantages, the energy of the covered particles and the hygienic areas of the film on the surface of the fabric are insufficient.

The main method of imparting antibacterial properties to textile materials is the use of antimicrobial agents (biocides). Preparations based on silver nanoparticles have a number of advantages, including the effectiveness of action against the most common microorganisms, the non-toxicity of biocidal concentrations used for the human body, as well as the low cost of biocides based on silver nanoparticles. The cost of finished products with antibacterial properties should be cheap.

There is a known method of producing antibacterial textile fiber material, which consists of reducing an aqueous solution of silver nitrate with an aqueous solution of tannin as a reducing agent [14].

Tannin is prepared by soaking textile fabric in an aqueous solution of potassium antimonyl tartrate. During the process, the aqueous phase is separated, and the textile gauze soaked in moisture is placed in an aqueous solution of silver nitrate heated to 50-100 C0. After soaking with a concentration of 0.1-3.0 g, the aqueous phase is separated and the resulting silver-coated textile fabric is dried. After that, it is treated with aqueous solutions of sodium hypochlorite or potassium bichromate [14]. The production of antibacterial textile materials by this method allows to increase the resistance of the resulting textile fabrics to wet treatments during operation and to expand the color range of the resulting antibacterial textile fabrics to light colors. However, the use of large amounts of chemical reagents requires additional costs for wastewater treatment, so this production technology is environmentally harmful.

Antibacterial treatment of special work clothes (overalls). Currently, promising types are distinguished among technical textile materials. Their creation is connected with the development of nano and biotechnologies and the use of the latest achievements in physics and chemistry. This is a so-called functionally active textile, each of its specific variants is designed for a specific purpose, which determines which modifying components are used to give the textile certain properties.

In accordance with officially accepted quality standards, the main requirements for special working overalls include: protection against mechanical effects, high and low temperatures, resistance to sea water, acids and alkalis, petroleum products. During operation, overalls must fully meet these requirements, and the employee should be able to work in the clothes for a long time without causing discomfort. Suppression of the growth of pathogenic microorganisms in the cavity of underwear leads to a decrease in unpleasant odors, which allows you to use the product for a longer time without washing. At the same time, the obtained antibacterial materials are recommended for the production of disposable medical clothing and underwear, as well as disposable personal protective equipment for medicine. The antibacterial effect of the obtained materials is significantly reduced after 5 washes. Also, research scientists have not conducted a complete analysis of the protection of fabrics from various external influences. The purpose of the invention is to develop a method of production of textile material for overalls resistant to strong external influences (acid, alkali, oil, sea water) and long-lasting antibacterial properties.

Solving the technical problem is aimed at increasing physical, mechanical and hygienic properties, as well as maintaining long-lasting antibacterial properties.

The invention is illustrated by the following examples.

The following fabrics were used for sewing special clothes:

- ✓ Sample 1. 18422 is padded under the code "Premier Comfort 250" (composition 80% - cotton + 20% polyester);
- ✓ Sample 2. 10408 under the code "Premier Cotton 300" (content 100% - cotton);
- ✓ Sample 3. 18422a/X-M under the code "Premier Comfort 250A" (composition 80% - cotton + 20% - polyethylene + antistatic thread);

✓ Sample 4. 10202AM under the code "Premier FR-350" (content 100% cotton + antistatic thread).

Plasma treatment of tissues was carried out in "BATT 1500 R/R - Plasma 3" tissue modification high-frequency vacuum plasma unit (VVPU). Impregnation was carried out by completely immersing each sample in a colloidal solution of silver nanoparticles, the time of impregnation was from 10 to 20 minutes, the temperature of the solution was 20-24 ° C. After impregnation, samples of the material are removed from the solution, dried in a suspended state without direct exposure to sunlight until completely dry. According to GOST 6709-72, a solution with the required concentration was obtained by diluting the initial solution of silver nanoparticles with a concentration of 10 g/l with distilled water.

The main and most promising way to expand the assortment of textile materials of different compositions and improve their properties is not to develop new types of chemicals for the production of textile fibers, but to change the existing fibers and finished textile materials in order. Giving them new features.

Antimicrobial finishing mechanisms. Various chemical coatings have been used to produce textiles with antimicrobial properties. These products can be divided into two types depending on the mode of attack on microbes. One type consists of chemicals that work with a controlled release mechanism. The antimicrobial agent is released from the reservoir gradually on the surface of the fabric or inside the fiber. This type of antimicrobial "wash" can be very effective against microbes on or around the surface of the fibers. Eventually, however, the reservoir will run out and termination will no longer be effective. In addition, the antimicrobial agent released into the environment may interfere with other desirable microbes, such as those present in waste treatment facilities. The second type of antimicrobial coating consists of molecules chemically bound to fibrous surfaces. These products can control microbes not only in the surrounding environment, but on the surface of the fibers. "Tethered" antimicrobials can potentially degrade or become inactive as they adhere to the fiber and lose their long-term durability. Antimicrobial coatings that control the growth and spread of microbes are more correctly called biostats, i.e. bacteriostats, fungistats. Products that actually kill microbes are biocides, that is, bacteriocides, fungicides. This distinction is important when dealing with government regulations, as biocides are tightly controlled. Textile products with biostatic properties are subject to fewer regulations. The actual mechanisms by which antimicrobial coatings control microbial growth are very diverse: preventing cell proliferation, blocking enzymes, reacting with the cell membrane (for example, with silver ions), destroying cell walls, and poisoning the cell from within.

Antimicrobial coating for textiles in contact with the skin requires additional safety information regarding this aspect. For manufacturers with relatively low volumes of biocides, the costs of generating the necessary data may make ongoing production uneconomical. Acute toxicity data are relatively inexpensive to generate, but sub-acute and other long-term studies are very expensive. Therefore, the number of biocides produced in the future may decrease and it may become more expensive to bring new products to the market. A possible future development may be microencapsulation of

biocides. The potential is huge if the right performance and economics can be achieved. Advantages can include better durability and higher security. The search for more cost-effective testing methods will continue.

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