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STUDY OF THE ANTIMICROBIAL PROPERTIES OF THECHITOSAN-BASED THICKERS APIS MELLIFERA FOR THEPRINTING OF COTTON-SILK FABRICS

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Annotation: *The article presents the composition of a new thickener for printing cotton-silk fabrics based on chitosan ApisMellifer. The antimicrobial properties were studied and the properties of the intensity of the printed pattern obtained using the composite thickener based on ApisMellifera chitosan and the thickener based on imported traditional DGT were compared.*

Keywords: *thickener, chitosan, cotton-silk, properties, properties, mold, fermentation, biological protection.*

Introduction

It is known that one of the urgent tasks is the protection of textile materials from biodamage by microorganisms and mold fungi.

In the textile industry, starch and its derivatives are used for sizing, sizing and for printing fabrics as thickeners. Starch at the same time is a rich environment for obtaining energy by many microorganisms through fermentation processes. Fermentation is a process of splitting organic substances, mainly carbohydrates, occurring under the influence of microorganisms or enzymes isolated from them, without or with the participation of oxygen.

In this regard, preservatives (antimicrobial agents) are often used in the textile industry, which are able to prevent the liquefaction of ready-made thickeners (prepared for the future with the expectation of several days). An alternative to the use of preservatives is the modification of starch thickeners or the addition of chitosan. In this case, it is expected that the shelf life of the prepared thickeners is multiplied, which is economically beneficial, increases the environmental safety of technological processes, simplifies the technological process, and leads to a reduction in energy costs.

The problem of biodamage is complex in scientific sense and diversified in practice. Scientifically, it is based on the knowledge of materials science, biology and chemistry.

Recently, the use of thickeners with biocidal properties has been considered as a promising method of biological protection of tissues from the effects of mold fungi. The use of such thickeners allows you to combine the process of coloring and special finishing. The ingredients used in the finishing factories of the textile industry must have antibacterial properties; otherwise, after a day they are unusable [1].

One of the most important types of raw materials in the textile industry are various types of wool: sheep, camel, goat, rabbit, etc. Sheep wool is of the greatest industrial importance, the structure and properties of which have been studied in most detail [2].

Currently, 135 strains of fungi have been isolated that can damage cotton fibers belonging to various genera. It has been established that the number of phytopathogenic fungi is significantly inferior to the number of cellulose destroyers: Chaetomiumglobosum, Aspergillusflavus, Aspergillusniger, Rhizopusnigricans, Trichotheciumroseum. According to the author [3], these types significantly worsen the condition of raw cotton, in particular, they sharply reduce the spinning properties of the fiber.

It was also found that the following types of fungi usually exist on cotton fibers: Mucor (uses water-soluble substances),Aspergillus, Penicillium (use insoluble compounds), Chaetomium, Trichoderma, etc. (decompose cellulose). This suggests that some molds cause true fiber breakdown, which should be distinguished from mere surface microbial growth. For example, Mucor fungi, which are unable to cause cellulose breakdown, can actively vegetate on the sizing of yarn and fabrics [4–5].

Experimental part

Recently, the use of thickeners with biocidal properties has been considered as a promising method of tissue bioprotection from the effects of mold fungi.

In this regard, we have studied the fungicidal properties of mixed thickeners for active dyes used in fabric printing.

The most likely representatives causing damage are filamentous fungi [6-7].

For this reason, we used Czapek-Dox 6-balling wort containing selective medium, which is a rich substrate for filamentous fungi. The chemical composition of the nutrient medium Chapek-Dox (g/l): glucose-30.0; $NaNO_3$-3.0; K_2HPO_4-1.0; $MgSO_4$ x $7H_2O$-0.5; KCl-0.5; $FeSO_4$ x $7H_2O$-0.01; agar-agar 25; distilled water - pH 6-6.5.

The medium was sterilized at 1.0 atm.

For cultivation, a cellulolytic active strain of pure cultures of the fungus Aspergillusterreus was used, obtained from the collections of cultures of the Institute of Microbiology of the Academy of Sciences of the Republic of Uzbekistan.

The medium with the inoculated samples of the thickener was incubated in a thermostat 28°C for 5 days.

Determination of fungicidal activity was carried out in vitro.

Freshly prepared thickeners were added to the medium under aseptic conditions in an amount of 1:2.

Optical density was measured in a spectrophotometer at 550 nm.

As a result of observations, it was revealed that these new based thickeners exhibit a pronounced antimicrobial activity against the filamentous fungus Aspergillusterreus.

The optical density of the samples shows that these thickeners are resistant to filamentous fungi [8-11].

Results

A thickening composition of water-soluble polymer compositions with desired properties has been developed based on a polymer synergistic system consisting of carboxymethyl starch and chitosan, a hydrolyzed acrylic emulsion, and instead of expensive ingredients.

The bactericidal properties of thickeners based on chitosan, carboxymethylated starch, and water-soluble polyacrylates have been studied. They exhibit pronounced antimicrobial activity against various types of microorganisms that cause spoilage of thickeners. This mixed thickener is stable and can be used even on the second day for printing cotton-silk fabrics with active dyes.

Conclusion

From the results of the study of the antimicrobial properties of thickeners based on ApisMellifera chitosan, it can be concluded that chitosan has valuable properties that can improve the anticolor characteristics of finished textile materials, and makes it a promising textile auxiliary substance, unreasonably poorly used in the textile industry. Due to its biological activity, chitosan imparts fungicidal and bacteriostatic properties to textile materials, increases the durability of products. The new mixed thickener is highly resistant to bacteria and exhibits fungicidal properties. Among the thickeners, thickeners based on chitazan-KMK-GAE, chitazan-KMK have the most pronounced bactericidal activity, and these thickeners are more stable, they can be used the next day and even the 2nd day for printing mixed fabrics.

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