

TASSYMBEKOVA ALIMA

Development of resource-saving technology of dyeing wool materials

RESUME

on the Dissertation for the scientific degree Doctor of philosophy (PhD) on specialty – «Technology and design of textile materials »

Topicality of research work. Dyeing wool fibers and a combed sliver improve physical -mechanical parameters increases feathering during carding breakage in spinning and weaving, which in turn reduces the yield and quality of yarn. Reducing the degree of damage to the fibers can be achieved by lowering the dyeing temperature, but it is inevitable slowing down the transfer speed of the dye on the fiber, thereby increasing the duration of the dyeing deteriorates uniformity and color fastness.

Because of the very high sensitivity of the wool fiber to high temperatures and to concentrated solutions of chemicals of greatest practical interest are the ways of dyeing at a low temperature to ensure minimum damage to the fibers. Maximum preservation of the strength properties of the wool fiber in dyeing is one of the factors for further improvement of mechanical processing in the spinning mill.

Reduced temperature dyeing wool at 15-20⁰C helps to reduce energy consumption, water and steam, which is one of the ways to achieve resource in the dyeing and finishing of textile manufacturing companies.

Object and subject of research work are the combed wool and wool fabric (code - 782, 100% wool), textile auxiliaries: acrylamide, polyvinylpyrrolidone, silver citrate, acid dyes, surfactants.

Aim and task of work. The development of technology of dyeing wool at low temperatures (80-85⁰C), aimed at generating sustained and intense colors with maximum preservation of the strength properties of the fibers.

Scientific novelty of the results are:

The thesis for the task were used modern methods of research:

- IR spectroscopy - to study the mechanism of interaction of components of the biocide composition in the structure of the fiber-polymer;
- electrons microscopic - with the use of a scanning electron microscope JSM-6510 for the study of the morphological features of textile materials after a biocide finishes;
- physical -chemical methods for studying the properties of the fiber;
- physical -mechanical - with the DIT-M, MT-140 to determine the indicators abrasion and strength characteristics of the treated wool fabric;
- Microbiological - to study the biological stability of textile materials;

The optimal parameters of the combined method of finishing woolen textiles treated with the application package «Matlab».

Scientific novelty of the results of research carried out by the author, is as follows:

- Has developed a new polymer composition based on a water-soluble complexion polymer polyvinylpyrrolidone and low molecular weight compound acrylamide to produce an intense and stable color wool at low temperatures (80-85⁰C);
- Developed a combined method of dyeing and final finishing of woolen material at a lower temperature with acrylamide and citrate (Nano carboxylate) silver;
- The high durability and resistance to microbial degradation of wool;
- Based on the analysis of infrared IR spectra of colored wool fibers provided a mechanism for the formation of insoluble complexes between acrylamide and silver citrate in the structure of the keratin hair;
- The optimal technological parameters of the combined process dyeing finishing woolen materials using computer programs.

Conclusions and the offers designed by a combined method of dyeing and finishing of woven fabrics at a low temperature for maximum preservation of the strength properties of the fibers, further contributing to the improvement of the processes of mechanical processing, gives the antibacterial properties of wool.

Practical results of the research produced and used in the activities of research laboratories of the Republic of Hungary and Kazakhstan: in the lab, "Organic Chemistry and Technology" of the Budapest University of Technology and Economics (Republic of Hungary), in the laboratory, "Electron microscopy studies" Kazakh - Japanese Innovation Center at Kazakh National Agrarian University, in the «Open type nanotechnology laboratory» of Al-Farabi Kazakh National University (Almaty), equipped with modern equipment.

The main provisions of the thesis presented at the international, foreign and national scientific conferences: the Republican conference of young scientists "Science. Education. Youth "dedicated to the 20th anniversary of independence of the Republic of Kazakhstan, on 19-20 April 2012 and 2015; International scientific-practical conference "Innovative technologies of production of goods, improving the quality and safety of products of light industry", Almaty, 25 May 2012; XXIII International congress «IFACC International Federation of Textile Chemists and Colorists», Budapest, 2013; International scientific-practical conference "Innovative development of food processing, light industry and the hospitality industry", Almaty, 2013 - 2015; VII International Scientific and Practical Conference "Research and development of young scientists" - Novosibirsk, 2015, November.

The results of the research were published 12 works, including 1 article in a foreign edition, is part of the database Scopus, 3 articles in scientific journals recommended by the Committee, 6 reports in materials of international and national conferences, including 1- foreign, filed 1 application paten.