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Report

on scientific research

on the issue **"Development and Study of the Technology of Dyeing Liquor Preparation with Application of Ultrasonic Oscillations"**

Scientific advisor

Doctor of Technical Sciences, Professor V.V. Rubanik

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Introduction

Dyeing of textile materials is a complicated diffusion process, in which both diffusion of a dye in material and accumulation of a dye on fibre play a significant role. The variety of effects characteristic of the dyeing process excludes a possibility of creating a simple theory of dyeing. The quality of finished products and production process parameters are determined by various physical factors. In particular, the dyeing process is greatly affected by the chemical composition of the dye which influences the resistance to chemical agents, the ability to withstand photochemical oxidation, the strength of bonding with dyed substance, etc. However, not only the chemical composition determines the quality and the degree of dyeing process complexity. The physical state of the dye before dyeing, i.e. the size of particles, the degree of aquation, wettability, plays a significant role.

To intensify the dyeing process and to improve the quality of the dyed products various energy methods of influence on the dyeing liquor, in particular ultrasonic impact, are used. High efficiency of application of ultrasonic oscillations in various production processes is verified by numerous researches and long experience of application at a number of enterprises not only in Belarus but also in foreign countries, in particular in textile industry. It has been experimentally proved, that ultrasonic oscillations allow us to speed up several times the processes running between two or several heterogeneous media (dissolution, purification, dispersion, impregnation, emulsification, chemical and electrochemical changes).

The preliminary experiments have shown that if to treat the dye solution by acoustic vibrations its application efficiency will increase and the colour of the dyed materials will become more saturated. These effects are caused by the change of the physical properties of the dye as a result of ultrasonic treatment, in particular, due to the change of dyeing liquor viscosity, limiting wetting angle, dispersivity, etc.

The aim of the present work is to study the influence of ultrasonic oscillations on the dyeing liquor properties.

To achieve the assigned aim the following tasks have been solved:

- the method of dye solution preparation with application of ultrasonic oscillations has been worked through;

- the influence of the modes of ultrasonic effect on the dyeing liquor properties has been studied, the best value has been indicated
- the influence of the temperature and time of ultrasonic action on the dyeing liquor properties has been studied, the best value has been indicated
- the influence of surplus static pressure on the efficiency of ultrasonic action on the dyeing liquor has been studied, the best value has been indicated
- the properties of the fabrics dyed with the dyeing liquor prepared with the help of ultrasonic oscillations have been studied; the best value has been indicated
- the best modes of ultrasonic oscillations influence on the dyeing liquor have been chosen.