

## OPTIMIZATION OF THE TECHNOLOGY OF CLEANING TEXTILES

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The aim of research is the identification of the most important factors that effect on the process of cleaning of textiles [1, 2].

We used an orthogonal plan and built a planning matrix used first line of plan for  $N = 20$  and  $k = 19$ , where  $N$  – number of experiments,  $k$  – number of factors. All factors were varied on two levels (-1, +1). The average value of response of function was determined on the basis of results of two parallel experiments. The experiment was carried out with special equipment, which modeled the washing drum [1]. 18 quantitative and qualitative factors ( $X_i$ ) were selected for research: dissolvent ( $X_1$ ), temperature of washing, °C ( $X_2$ ), duration of washing, min ( $X_3$ ), quality and cleanness of dissolvent ( $X_4$ ), speed of wringing ( $X_5$ ), speed of rotation, rev/min ( $X_6$ ), diameter of drum, sm ( $X_7$ ), machine utilization, g/sm<sup>3</sup> ( $X_8$ ), module of liquid, ml/g ( $X_9$ ), concentration of surfactant, g/l ( $X_{10}$ ), fibre ( $X_{11}$ ), linear density of fibre ( $X_{12}$ ), moisture of fibre before cleaning ( $X_{13}$ ), oil pollutants ( $X_{14}$ ), water-solluble pollutants ( $X_{15}$ ), solid pollutants ( $X_{16}$ ), method of solid pollution ( $X_{17}$ ), tipe of pollution ( $X_{18}$ ).

Degree of pollution and washing of fibres were determined by gravimetric method. Cleaning process was carried out for each sample of fibre according to the parameters defined in matrix of planning. We calculated the degree of desorption of pollunants during cleaning process and results of experiment using specially written program for this plan in Excel. The results of research are show:

1. The maximum removal of pollution was observed for the first two minutes of cleaning.

2. Nonspecific pollutants that were used in research do not penetrate deeply into the textiles and are removed almost equally from fibres in the case of a small difference in their thickness.

3. The water introduced into the washing system is practically insoluble in solvents and her amount is not enough to remove the soluble pollution.

4. The factors related to the properties of dirt and mechanical action during cleaning are significantly effect on the process of desorption of pollutions from textiles.

### References

1. ISO 3175-4:2003. Textiles – Professional care, drycleaning and wetcleaning of fabrics and garments – Part 4: Procedure for testing performance when cleaning and finishing using simulated wetcleaning. [Electronic resource]. Access mode: <https://www.iso.org/standard>.

2. Paraska O. Mathematical modelling in scientific researches of chemical technology processes / O. Paraska, S. Karvan // Mechanics. Technical Transactions. – 2010. – P. 203-210.