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**STUDY OF TOPOGRAPHY AND MICROSTRUCTURE
OF SPECIAL CLOTHING MATERIALS
FOR OILMEN AFTER WASHING**

**ИЗУЧЕНИЕ ТОПОГРАФИИ И МИКРОСТРУКТУРЫ МАТЕРИАЛОВ
СПЕЦОДЕЖДЫ ДЛЯ НЕФТЯНИКОВ ПОСЛЕ СТИРКИ**

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The article given describes the study of the protective properties of special clothing materials for oilmen after their washing. To investigate an elemental composition of the textile materials' fibers after the washing process, there was conducted X-ray spectral microanalysis. Based on researches conducted it is determined, that the material art. 18422a / X-m has a resistance to the washing process.

В статье рассматриваются защитные свойства материалов спецодежды для нефтяников после стирки. Для изучения элементного состава волокон текстильных материалов после процесса стирки был проведен рентгеноспектральный микроанализ. В результате исследований установлено, что материал артикула 18422a / X-м имеет устойчивость к процессу стирки.

Keywords: overalls for oil industry workers, protective properties, X-ray analysis, washing process.

Ключевые слова: спецодежда для нефтяников, защитные свойства, рентгеноспектральный анализ, процесс стирки.

It is known that systematic washing is used to preserve the protective and hygienic properties of special clothes during its wear. However, frequent washing of overalls leads to a change in its size and tissue properties, which is one of the factors of wear and tear of overalls [1], [2].

In order to get closer to the real working conditions, the washing of the clothing materials is carried out in the washing machine "Indesit". For the washing process the following detergents were used (laundry soap - 500 g, washing powder - 1 package), which are used in laundry conditions of Aktobe Munai-Gaz Energo LLP:

In order to check the quality of the fastening of oil-repellent finish after repeated washes of material art. 18422a / X-m we investigated the chemical structure of the surface of a material with the scanning electron microscope JSM-6510LA (Japan) before and after washing.

In order to study the topography and microstructure of the surface and the elemental composition of the textile material's fibers, the X-ray spectral microanalysis was performed, using a scanning electron microscope JSM-6510LA.

The low-vacuum scanning electron microscope JSM-6510LA (Japan) is designed for obtaining an image of the object's surface with a high spatial resolution, an information about

the composition, structure and some other properties of near-surface layers of materials. The principle of operation of a scanning electron microscope consists in the interaction of an electron beam with the substance being studied.

It should be noted that the surface of the samples for research should be flat. Presence of reliefs on the surface leads to a decrease in accuracy of determination of the elements' concentration. So, the test sample is fixed in the microscope mount. In order to obtain an image of the structure and to detect the electron beam, after the sample was placed in the microscope column, emission was switched on and the magnification was reduced. After obtaining the image of the structure with the help of the sample transport handles, a place for analysis was chosen. Having found the place of the analysis, the operating mode of the microscope and made its adjustment.

An analysis of the chemical composition of the elements contained in the fabric fibers, 18422a / X-m before and after 20 times washings is shown in Fig. 1 (analysis of the chemical composition of the elements contained in the fabric fibers before the washing process) and Fig. 2 (analysis of the chemical composition of the elements contained in the fabric fibers after the washing process).

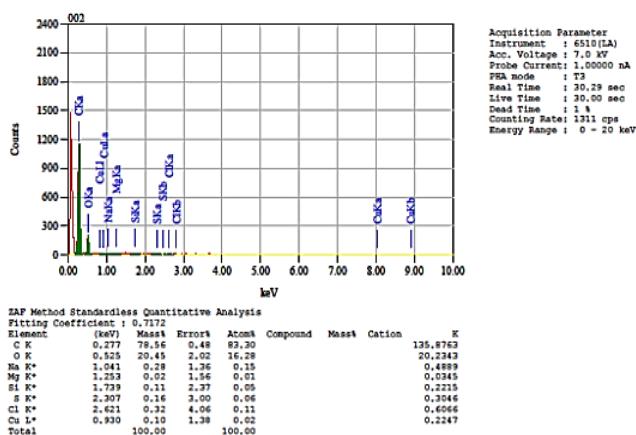


Fig. 1

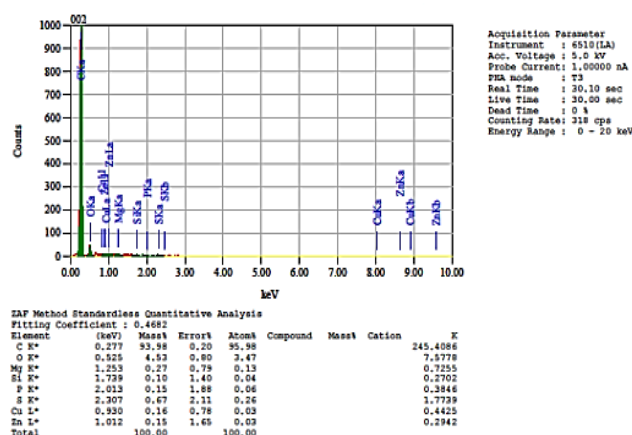


Fig. 2

Table 1 shows a comparative analysis of microelements contained on the surface of fi-

bers and tissues before and after the washing process.

Table 1

	Chemical composition of elements, %									
	C	O	Na	Mg	Si	S	Cl	Cu	Zn	P
Before washing	93,98	4,53	-	0,27	0,10	0,67	-	0,16	0,15	0,15
After washing	78,56	20,45	0,28	0,02	0,11	0,16	0,32	0,10	-	-

As can be seen from Table 1, the study of the elemental composition of the surface structure of the material 18422a / X-m before the washing process showed that 93.98% of carbon (C), 4.53% of oxygen (O), are present on the surface of fibers and tissue, insignificant magnesium (Mg), silicon (Si), sulfur (S), copper (Cu), zinc (Zn), phosphorus (P). It should be noted that in 2 cases, after 20 washings, zinc (Zn) and phosphorus (P) were removed.

At the same time, the following minor percentage of elements on the fibers' surface fibers was found: 0.028% sodium (Na), 0.32% chlorine (Cl). This is due to the fact that during washing, special clothing is affected simultaneously by moisture, temperature, detergents and mechanical factors, which reduces its protective properties. However, based on the studies conducted, it was found that the material of art. 18422a / X-m has a resistance to the washing process.

CONCLUSIONS

Thus, based on the results of the conducted studies, it was revealed that from the surface of the fibers the material of art. 18422a / X-m zinc

and phosphorus were removed. However, an insignificant percentage of elements on the surface of sodium and chlorine fibers were found due to the influence of moisture, temperature and washable materials on the materials during washing. Based on conducted studies it is established that the material of art. 18422a / X-m have a resistance to the washing process, which allows increasing the wear of special clothes.

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