

Study of the Resistance of Special Textile to Exposure to Acid and Oil

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Summary

Special textile is considered related to the development of special-purpose textile materials for employees in chemical, petrochemical and oil-producing industries using nonequilibrium low-temperature plasma of reduced pressure and polymer coatings, as well as water-repellent impregnation. The most important indicator determining the protective properties is resistance to aggressive media (oil and alkali). Research tests of the protective properties of textile materials have been carried out and the results obtained are presented.

Keywords: Special textile; Plasma; Resistance to aggressive environments; Protective properties; Nanostructuring

Introduction

Now it is necessary to design new types of textile materials for special clothing that are characterized by necessary complex of protective characteristics. The special clothes for chemical and oil industry workers are exposed to various aggressive environments. Since work in these industries is associated with a large number of adverse factors, their workwear should protect them from the effects of aggressive media (oil and alkali). Harmful effects are also caused by oil and petroleum products when liquid petroleum products enters the human body or when one inhales its vapors [1-3].

Determining the degree of influence of aggressive factors on the durability of textile is also one of the most important tasks in the scientific development and design of products, since the production of high-quality clothing is possible only when developing fabrics considering various parameters.

The purpose of this work is to develop a unique textile for special working clothes of the chemical, petrochemical and oil-producing industries, the main characteristic of which is resistance to aggressive environments of oil and alkali.

An analysis of global trends in the design of modern fabrics for special clothes in various industries was carried out, the working conditions of employees in the chemical, petrochemical and oil-producing industries were analyzed, industries that need modern protective clothing from these factors were identified (for the most harsh environment), and also analyzed the volume of special fabrics and personal protective equipment required in these industries. One of the main directions in improving the quality of textile products is to increase their wear resistance [4-6]. Polymer textile is commonly used for these purposes [7,8].

Studies of the influence of nonequilibrium low-temperature plasma of reduced pressure to increase resistance to aggressive environment (oil, alkali and acid) of special-purpose clothing made of nanostructured textile materials containing natural fibers have been carried out.

As a result of studies of the effect of plasma flow on oil permeability in samples of textile materials it was found that a short exposure ($\tau=1\text{m} / \text{min}$) leads to an increase in the permeability time of an oil drop to 12 hours [9].

Conclusion

Thus, the textile materials for workwear based on the application of the nanostructuring method of samples by the flow of nonequilibrium low-temperature plasma are able to protect against caustic chemicals and oil.

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