

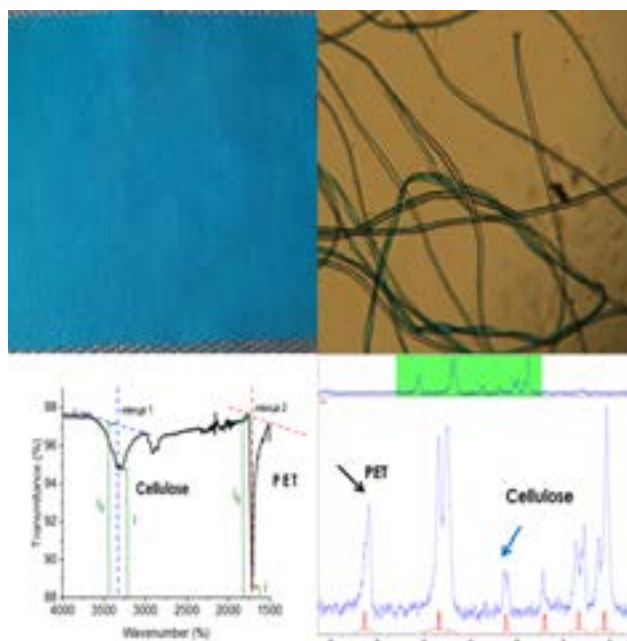
ANALYSIS OF TEXTILE BLENDS BY CHEMICAL, MECHANICAL AND INSTRUMENTAL METHODS

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The variety of natural and chemical fibers enables the production of textile materials with specific properties and many applications. To meet consumer requirements, the mixing of different fibers is being increasingly employed. Therefore, identifying the composition of textile materials is necessary for production, trade, and preservation of cultural heritage, and is an essential stage in the successful implementation of the principles of the circular economy. There are various methods for proving the type of fibers. They can be classified as: chemical, mechanical, and instrumental. Through combustion and microscopic analysis, we can quickly obtain information about the qualitative composition of materials. However, to determine the quantitative composition, other methods must be used. Depending on the specific sample, mechanical counting of fibers or dissolution in various solvents can be applied. The use of Infrared Spectroscopy allows rapid non-destructive analysis of samples. Another helpful method is solid-state nuclear magnetic resonance (NMR), which can be applied for both qualitative and quantitative analysis of small samples, eliminating the need for complex sample preparation.



In this study, the qualitative and quantitative composition of four fabrics of unknown composition was determined using the methods indicated. Using combustion and microscopic observation, it was found that sample 1 is composed entirely of cotton fibers, while sample 2 is made up of polyester fibers only, a finding confirmed by IR and NMR spectroscopy. In the case of sample 3, combustion and microscopic analysis provide only initial information indicating a mixed composition of both cotton and chemical fibers. To determine the type of fibers and their quantitative composition, the dissolution method was applied to one of the sample components, and IR and NMR spectroscopy were also used. The composition of sample 4 is also a mixture of two types of fibers, which, however, are of different colors and can be clearly distinguished; therefore, BDS EN ISO 1833-1:2020, BDS, Annexe B “Method for quantitative analysis by manual separation” was applied.

Keywords: fiber identification, chemical and mechanical test, microscopy, spectroscopy

Acknowledgements: D. Atanasova gratefully acknowledges the additional funding provided by the Program “For Women in Science” 2024, granted by L’Oreal and UNESCO. The IR and NMR analyses were done as part of Project BG-RRP-2.004-0008, financed by the European Union Next Generation EU through the National Recovery and Resilience Plan of the Republic of Bulgaria.