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Characterization of Kevlar 29 for Multifunction Applications

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Abstract : Technical textiles refer to textile materials that are engineered and designed to have specific functionalities and performance characteristics beyond their traditional use as apparel or upholstery fabrics. These textiles are usually developed for their unique properties such as strength, durability, flame retardancy, chemical resistance, waterproofing, insulation and other special properties. The development and use of technical textiles are constantly evolving, driven by advances in materials science, manufacturing technologies and the demand for innovative solutions in various industries. Kevlar 29 is a type of aramid fiber developed by DuPont. It is a high-performance material known for its exceptional strength and resistance to impact, abrasion, and heat. Kevlar 29 belongs to the Kevlar family, which includes different types of aramid fibers. Kevlar 29 is primarily used in applications that require strength and durability, such as ballistic protection, body armor, and body armor for military and law enforcement personnel. It is also used in the aerospace and automotive industries to reinforce composite materials, as well as in various industrial applications. Two different Kevlar samples were used coated with cooper lithium silicate (CLS); ten different mechanical and physical properties (weight, thickness, tensile strength, elongation, stiffness, air permeability, puncture resistance, thermal conductivity, stiffness, and spray test) were conducted to approve its functional performance efficiency. The influence of different mechanical properties was statistically analyzed using an independent t-test with a significant difference at P-value = 0.05. The radar plot was calculated and evaluated to determine the best-performing samples. The results of the independent t-test observed that all variables were significantly affected by yarn counts except water permeability, which has no significant effect. All properties were evaluated for samples 1 and 2, a radar chart was used to determine the best attitude for samples. The radar chart area was calculated, which shows that sample 1 recorded the best performance, followed by sample 2. The surface morphology of all samples and the coating materials was determined using a scanning electron microscope (SEM), also Fourier Transform Infrared Spectroscopy Measurement for the two samples.

Keywords : cooper lithium silicate, independent t-test, kevlar, technical textiles.
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