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Structural Characterization of Aramid Fibers

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Fibers are polymer matrix composite materials that present one dimensional structure, stiffness, low density, and high structural and thermal properties. They can be used in activities under high temperature, being in the form of fabric and yarn. Aramid yarns are high performance textile fibers with excellent physicochemical properties that favor their use in applications where there is the requirement for advanced technology. The present research proposed the structural characterization of two different types of aramid yarn – 1100 dTex and 3300 dTex. X-ray diffraction (XRD), scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDS), atomic force microscopy, thermogravimetric analysis (TGA), and difference thermogravimetry (DTG) were used for structural characterization, morphology analysis, chemical composition, and thermal degradation of samples. The results obtained demonstrated that the aramid fibers exhibit a crystalline structure, presenting a homogeneous surface morphology and low roughness. It was verified that the fibers in study have good thermal stability. The thermal decomposition of the 1100 dTex aramid occurs in the range of 493 °C – 629 °C, while the thermal degradation of the 3300 dTex aramid is initiated at approximately 504 °C and is completed around 644ºC, which allows to conclude that the 3300 dTex aramid is endowed with excellent thermal resistance when compared to other textile materials.