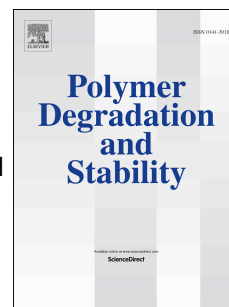


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The study of the correlation between ascending and descending rates of the imposed specific stress and transposition of chemical reactions during PAN precursor fibers stabilization

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The study of the correlation between ascending and descending rates of the imposed specific stress and transposition of chemical reactions during PAN precursor fibers stabilization

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Abstract

The effect of ascending and descending rates of the imposed specific stress (ISS) on the extent and transposition of chemical reactions was investigated during the step-wise stabilization of special polyacrylonitrile (PAN) fibers. The stabilization was performed in three thermal stages (220, 240, and 260 °C) and three levels (0.6, 1.1, and 1.7 cN/tex) of ISS. In the ascending rate of ISS, the reaction occurring during the first stage of stabilization (220 °C) in the minimum level of ISS (0.6 cN/tex) was mainly the oxidation (63.5%). As the temperature and ISS were increased, the cyclization and dehydrogenation progression were grown; then this was followed by the reduction of the oxidation progress. It was also found that the stabilization was completed gradually in the ascending rate of ISS. In the descending rate of ISS, the maximum level of ISS (1.7 cN/tex) during the first stage of the stabilization (220 °C) prevented the progression of chemical reactions. As ISS was decreased, the cyclization and oxidation progression were grown sharply, reaching to 46.5% and 62.3%, respectively.

Keywords: PAN precursor fibers, Stabilization, Specific stress, Chemical reactions

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