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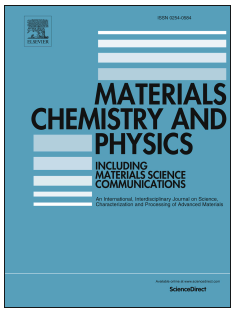

Degradation kinetics of polyanethole: a newly synthesized green polymer

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Degradation kinetics of polyanethole: a newly synthesized green polymer

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Abstract

The non-isothermal decomposition kinetics of polyanethole (**PA**), a newly synthesized "green" polymer was investigated using TGA and DTG techniques. Evaluation of the TGA data with the Friedman method produced results which suggest that the degradation of **PA** is controlled by the rate of a single-step reaction with an estimated E and Ln(A) values of 255.249 ± 6.3 kJ/mol and 47.956 ± 0.27min^{-1} respectively. These values were validated by E values from the Starink and Coats-Redfern methods. The estimate value of E does not tally with the bond dissociation energy of the groups in **PA** which reveals that the rate determining reaction (rds) involves a post chain-scission reaction. Based on the variation of E and the reaction rate with conversion, we speculate that the rate determining step involves reactions between intermediate aromatic radicals and **PA**. This reaction was found to be well described by Avrami-Erofeev model. The present study is the first step in understanding the plausible decomposition route of **PA**.

Keywords: Biomaterials; Polymers; Thermogravimetric analysis (TGA); Heat treatment; Differential Scanning Calorimetry (DSC).

1. Introduction

In this age of depleting fossil fuel reserves and rising global temperatures due to over reliance on fossil fuel and the emission of greenhouse gases, the most pressing issue for the