



Indian Journal of Chemistry  
Vol. 63, September 2024, pp. 860-867  
DOI: 10.56042/ijc.v63i9.10604



## Thermogravimetric analysis of 2,6-diaminopyridine substituted polymers using green conditions and conventional method

W Shanthi\*<sup>a</sup>, R Nalini Suja<sup>b</sup>, M Chitra<sup>c</sup> & B Sridevi<sup>a</sup>

<sup>a</sup>Department of Chemistry, Presidency College, Chennai 600 005, Tamil Nadu, India

<sup>b</sup>Department of Chemistry, Panimalar Engineering College, Chennai 600 123, Tamil Nadu, India

<sup>c</sup>Department of Chemistry, Chellammal Women's College, Chennai 600 032, Tamil Nadu, India

E-mail: shanthi.w0404@gmail.com

*Received 22 April 2024; accepted (revised) 30 August 2024*

Polyamides have been synthesised by a modified phosphorylation method using 2,6-diaminopyridine with diacids such as citraconic acid, succinic acid and phthalic acid. Reaction has been carried out with NMP/Pyridine mixture containing 4% LiCl using the following conditions: Higashi to increase viscosity and thermal stability, reported by the authors. In the present study we carried out the synthesis under green conditions ionic liquid and microwave combined with ionic liquid and the results have been compared. Thermogravimetric analysis of synthesized polymers have been performed in the temperature range 30 to 900°C. Thermogravimetric data have been used to calculate activation energies and compared with other integral and differential methods like Friedmann, Freeman-Carroll, Coats-Redfern, Chang, Sharp Wentworth. Kinetic parameters - Gibb's free energy, entropy and enthalpy have been determined for all polyamides synthesized using microwave assisted ionic liquid method employing Coats-Redfern method. Regression analysis has been carried out for all the three polyamides for all the stages of decomposition which involves seven different kinetic models. The limiting oxygen index has been calculated and the fire-retardant properties have been noted. This result is compared with all known methods.

**Keywords:** 2,6-Diaminopyridine, Succinic acid, Phthalic acid, Citraconic acid, Energy of activation, Thermogravimetry, Limiting Oxygen Index (LOI), Regression analysis, Kinetic models