

### Synthesis of high molecular weight thermoplastic Lignin polymer through Step – Growth urethane polymerization

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The aim of this work is to investigate influence of reaction temperature on decomposition temperature of polymers and then to use the optimal reaction temperature to synthesized lignin-based polyurethane with different reaction times. The influence of reaction temperature and time on the thermal properties of different lignin-based polyurethanes were demonstrated by means of several characterization techniques such as Fourier transform infrared spectroscopy (FTIR) displays some strong peak  $3364\text{ cm}^{-1}$  (NH) or  $1673\text{ cm}^{-1}$  (NHCOO), dielectric analysis was defined  $T_g = 175\text{ }^\circ\text{C}$ , and increased thermogravimetric analysis (TGA) was at  $T_{id}(2\%) = 204\text{ }^\circ\text{C}$ , moreover this aim studied was successfully increased molecular weight 724 000. The results obtained in this work showed the optimal reaction condition and confirm that lignin was incorporated in a polyurethane sample by chemical reaction with isocyanates, i.e., formation of urethane linkages.