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SYNTHESIS AND PROPERTIES OF FURANIC POLYAMIDE BY DIRECT POLYCONDENSATION USING REACTOR AND MICROWAVE

Cláudia Fontoura, Jorge Cândido, Raquel Mauler, Rosina Coimbra,

Química Organica, Universidade Federal do Rio Grande do Sul - UFRGS

**Corresponding author: claudia.fontoura@gmail.com*

The synthetic fibers produced from aromatic polyamides (aramides) have properties of great industrial interest due to its thermal stability and high tensile and impact strength. Moreover, they are fireproof and are not corrosive. However, research has been performed in the search of raw materials from renewable sources as an alternative to raw materials from oil. In this way, the aim of this work is producing polyamides employing 2,5-furandicarboxylic acid (FDCA) as replacement for terephthalic acid (TPA). The FDCA can be obtained by oxidation of HMF (hydroxymethylfurfural), product of dehydration of fructose. Polyamides were synthetized by Yamazaki-Higashi phosphorylation method, which consists in the reaction of FDCA with p-phenylene diamine (PPD) from activation of the diacid by a complex formed between triphenyl phosphite (TPP) and pyridine (Py). The solvent used was NMP (N-methyl-2-pyrrolidone) with LiCl to facilitate the solubility. The synthetic process was performed in a reactor during 8 and 20 hours and in a microwave for 60s. The reactor system was kept by agitation (~300 rpm), heating (110°C) and inert atmosphere of argonium. In the microwave, the reagents were mixed for 2 minutes before the reaction and irradiated for 30s, mixed again and irradiated for more 30 s. The analyses of ATR-FTIR and UV-Vis evidenced the formation of furanic polyamide, with the conversion of approximately 80%. TGA analyses showed a high degradation temperature (higher than 460°C) and a good thermal stability. In the intrinsic viscosity measurements, the polyamides synthetized by microwave presented values of 3 mL/g, which were lower than the polyamides synthetized by reactor (around 13 mL/g). The results indicated that the obtained furanic polyamide represent a starting point for the study of polymerizable structures from renewable source.