Patcharin Pinthong 2009: Synthesis and Characterization of Polyamide-4. Master of Science (Chemistry), Major Field: Chemistry, Department of Chemistry. Thesis Advisor: Associate Professor Cholticha Noomhorm, Ph.D. 88 pages.

Synthesis and characterization of polyamide-4 (PA-4) were investigated. Synthesis of polyamide-4 from γ-aminobutyric acid (GABA) by melt polymerization was unsuccessful. PA-4 was successfully synthesized by anionic ring-opening polymerization of 2-pyrrolidone (Py) by using N-sodium-2-pyrrolidone (Na) as initiator and N-benzoyl-2-pyrrolidone (BPy) as activator in the presence of 15-crown-5 at 30 to 60^{o}C from12 to 24 h under alternating between under nitrogen atmosphere for 3 h and reduced pressure for 1 h. Weight average molecular weight ($\overline{M}_W$) from 398 to 9233 and quite low yield from 2.94 to 25.43% of PA-4 having T_m ~ 241-256^{o}C and T_c ~ 168-210^{o}C was obtained. The effect of the sodium and 15-crown-5 was studied at 40^{o}C. It was found that $\overline{M}_W$ and yield of PA-4 slightly increased with increasing the amount of Na and 15-crown-5. PA-4 was also obtained from copolymerization of Py and GABA using mmol ratio of Py:BPy:Na:Crown = 100:1:3:2 and varying the mmol of GABA from 10 to 30 at 105^{o}C for 8 h and at 40^{o}C for 24 h. Polymer yield obtained was extremely low (highest was 6.5%). $\overline{M}_W$ of PA-4 obtained by the copolymerization of Py and GABA at 105°C was higher than at 40°C. The highest $\overline{M}_W$ PA-4 obtained in this study was 9233 which can be obtained either from Py:BPy:Na:Crown = 100:1:3:2 at 40^{o}C for 24 h or from copolymerization of Py:BPy:Na:Crown:GABA = 100:1:3:2:20 at 105^{o}C. Polyamide-4,4 was synthesized by both solution and interfacial polycondensation at room temperature for biodegradation comparison with PA-4. PA-4 begun to degrade after incubating in composted soil for 120 h but was not degraded after incubating 14 h in all the enzymes used.

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