

THE SUMMARY OF Ph . D . DISSERTATION

Major Chemistry	Student Identification Number	SURNAME, Firstname OSANAI, Yasushi
<p>Title</p> <p style="text-align: center;">Studies on the Synthesis and Chemical Recycling of Biodegradable Polyesters Using Biocatalyst</p>		
<p>Abstract</p> <p>Recently, biodegradable polymers that can be degraded by microorganisms in the nature system, have been attracted attentions for solving environmental problems caused by synthetic polymers. Also, the establishment of the environmentally benign process under the concept of Green Chemistry has been studied extensively. Therefore, the enzymatic polymerization and the enzymatic degradation of the biodegradable polyester directed towards chemical recycling were investigated.</p> <p>This thesis consists of 6 chapters.</p> <p>In Chapter 1, the background of the research area and the object of this research were presented.</p> <p>In Chapter 2, the mechanisms of the lipase-catalyzed polymerization were analyzed in detail. And, it was clarified that the lipase recognized the produced polymers, and then the cyclic structures were formed via intramolecular transesterification in the acyl-enzyme intermediate.</p> <p>In Chapter 3, the enzymatic degradation of the biodegradable polyesters was studied. Then it was found that the lipase degraded the polyesters and yielded the cyclic oligomers in hydrophobic solvents. In addition, it was found as the forming mechanism of the cyclic oligomer and the novel reaction utilizing the cyclic oligomers.</p> <p>In Chapter 4, the continuous enzymatic degradation of the aliphatic polyesters was developed. The toluene solution of polyesters was injected into the enzyme column by HPLC pump, then it was clarified that the tested polyesters were transformed into the corresponding cyclic oligomers immediately. Moreover, it was found that supercritical carbon dioxide increased the enzyme activities for the polymer degradation.</p> <p>In Chapter 5, BOD method according to JIS K6950 was selected as the evaluation method for testing the biodegradability of the biodegradable polyesters. Then, it was clarified that polymer thin film was the suitable sample shape for the BOD test of aliphatic polyesters in the short term.</p> <p>In Chapter 6, the contents from each chapter were summarized, then the results and the trends from this thesis were presented.</p>		

