Polycaprolactone Hydrolysis Using Immobilized Enzymes

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Plastic pollution is the introduction of plastic regardless of size, shape and type, which can create possible threats to organisms, human health and the environment. Plastics are durable to various chemicals; they can be used multiple times and can attract toxic chemicals. They can stay in the environment for a very long time due to their low biodegradability and biodeterioration. When I analyzed this issue, I started researching about the question “Are there any enzymes that can degrade plastics in nature?” with the catalytic properties of enzymes in mind. After my initial literature review, I noticed that several enzymes had effects on various plastic types, and I started researching a newly researched topic called immobilizing enzymes. I found two immobilized enzymes, taken from Thermomyces lanuginosus (Lipozyme TL IM) and Candida antarctica (Novozym 435). Then, I used these two enzymes to degrade a type of plastic called Polycaprolactone which I picked due to it being mainly used in industrial and medical applications. For these purposes, based on the idea that two immobilized could be used for bioplastic degradation, I studied the hydrolysis capabilities of these enzyme lipases by incubating concentrations of 500 mg, 1000 mg, 1500 mg and 2000 mg of both immobilized enzymes in 1 cm2 PCL films in 40 ºC, 180 rpm conditions for 72 hours.

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