Study of Degradation a new Poly (ether-urea-urethane) by Bacillus bacteria Isolated from Soil

Abstract: Biodegradable materials are used in packaging, agriculture, medicine and other areas. In recent years there has been an increase in interest in biodegradable polymers because environmental pollution by synthetic polymers has assumed dangerous proportions, attempts have been made to solve these problems by including biodegradability into polymers in everyday use through slight modifications of their structures.

Conventional polyurethanes (PUs) are among biomaterials not intended to degrade but are susceptible to hydrolytic, oxidative and enzymatic degradation in vivo. Biodegradable PUs are typically prepared from polyester polyols, aliphatic diisocyanates and chain extenders. In this work we have developed a degradable monomer based on α-amino acid to accelerate hard segment degradation. Thus a new class of degradable poly(ether–urethane–urea)s (PEUUs) was synthesized via direct reaction of 4,4’-methylene-bis(4-phenylisocyanate) (MDI), L-leucine anhydride (LA) and polyethylene glycol with molecular weight of 1,000 (PEG-1000) as polyether soft segment.

The present study deals with the isolation of bacteria from soil with the ability to degrade polyurethane (PU). A pure bacteria isolate was analyzed for its ability to utilize PU as a sole carbon source in culture for 30 days. Incubation of PU with Bacillus resulted in reduction in weight of PU. The biological degradability of the polymer was investigated by FTIR, SEM, TGA, DSC and XRD techniques before and after exposure to bacteria "Bacillus".