

Possibilities in Polyurethane Synthesis in their way to Biomedical Applications

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Polyurethanes (PUs) constitute one of the most important classes of polymeric materials with applications ranging from high-performance structural applications to foam padding. Due to their extreme utility and relatively low cost, these materials account for nearly 5 wt % of total worldwide polymer production and are expected to exceed 18 kilotons annually by 2016. Additionally, PU material properties are easily tailored through structural variation of the monomers.

In spite of their versatility, biodegradability and biocompatibility the utilization of PU in biomedical applications is not highly extended taking into account their potential. The main limitations related to their utilization in medicine are that not only a tin based catalyst must be employed to carry out the polymerization, but also the impossibility to synthesize them in aqueous media using conventional synthesis methods due to the high reactivity of isocyanate groups towards water.

Herein we report an innovative aqueous phase method of synthesizing polyurethanes from activated carbonate precursors under tin catalyst- and isocyanate-free conditions. In addition, we describe organic acids as efficient replacement for tin based catalyst in isocyanate alcohol reaction. We believe that this work can increment the utility of polyurethanes in biomedicine.