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Comparison of Polyurethanes with Polyhydroxyurethanes: Effect of the Hydroxyl Group on Structure-Property Relationships EMILY K. LEITSCH, VINCE M. LOMBARDO, KARL A. SCHEIDT, JOHN M. TORKELSON, Northwestern University — Polyurethanes (PUs) are commonly synthesized by rapid step-growth polymerization through the reaction of a multifunctional alcohol with a polyisocyanate. PUs can be prepared at ambient conditions utilizing a variety of starting material molecular weights and backbones, resulting in highly tunable thermal and physical properties. The urethane linkages as well as the nanophase separated morphology attainable in PU materials lead to desirable properties including elastomeric character and adhesion. The isocyanate-based monomers used in the synthesis of traditional PUs have come under increasing regulatory pressure and thus inspired the investigation of alternative routes for the formation of PU materials. We examine an alternative route to synthesize PU– the reaction of five-membered cyclic carbonate with amines. This reaction results in the formation of a urethane linkage with an adjacent alcohol group. The effects of this hydroxyl group on the thermal and mechanical properties of the resulting polymer are investigated and compared with an analogous traditional PU system.

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