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Rheological and Thermal Properties of Bio-based Hyperbranched Polyesters ROBERT BUBECK[1], ADINA DUMITRASCU, TRACY ZHANG, PATRICK SMITH, Michigan State University — Hyperbranched poly(ester)s (HBPEs) of designed molecular structures and targeted molecular weight can be prepared from a variety of multi-functional acids and alcohols. These polymers find application in the areas of coatings and rheology modifiers for coatings. These functional polymers can be synthesized in variety of architectures, possessing either hydroxyl or carboxyl reactive end-groups suitable for the attachment of active entities. The rheological characteristics as related to variation in molecular structure were determined using cone and plate or couette geometries. Viscosities of the HBPEs were found to be near Newtonian. HB polymers permit the control of Tg that is not as readily attained with linear polymers. Accordingly, Tg and viscosity are affected little as a function of Mw but vary dramatically with the nature of the end-groups, are highly dependent on hydrogen bonding of the hydroxyl end groups, and decrease dramatically with the incorporation of aliphatic end-caps. The thermal properties and the degradation characteristics of the HBPEs were determined. Thermal degradation of the hydroxyl-terminal HBPEs is initiated by dehydrative ether formation (crosslinking) while decarboxylation is the initial decomposition event for the carboxyl-terminal polymers.

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