

Polystyrene with dendritic branching by convergent living anionic polymerization. II. Approach using vinylbenzyl chloride

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Abstract

Vinylbenzyl chloride (VBC) has been used as a coupling agent in Convergent Living Anionic Polymerization to produce polymers with dendritic branching. The slow addition of a stoichiometric amount of VBC to living polystyrene chains allows the coupling to proceed through macromonomer formation followed by vinyl addition. Changing the reaction conditions produced two types of structures. Star-shaped polymers with a hyperbranched core were made by the continuous slow addition of VBC alone, and chain-extended hyperbranched structures with varied molecular weight between branch points were produced by the slow addition of VBC mixed with different amounts of styrene monomer. The extent of growth of the two different types of structures ranged from 2.4 to 2.6 generations for the case of VBC added alone, corresponding to an average of 5.3 to 6.1 arms attached to the hyperbranched core, and from 3.2 to 4.2 generations for polymers produced from the addition of VBC mixed with styrene. Relatively low polydispersities were obtained for all samples. The highly branched nature of the polymers was reflected in the low intrinsic viscosity relative to linear polystyrene and in the dependence of glass-transition temperature on the molecular weight relative to the number of end groups. © 2000 John Wiley & Sons, Inc. *J Polym Sci A: Polym Chem* 38: 4289-4298, 2000

Keywords

hyperbranched; convergent living anionic polymerization; polystyrene; dendritic

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