Abstract:

In this work, a variety of hyperbranched polymers (HBPs), such as hyperbranched polycarbonates, polyesters, polyurethanes and polyacetals, was successfully synthesized from castor oil and soybean oil based monomers via a A21B3 polycondensation. First, B3 monomer triols (TriOL), trialdehydes (TriAD), and tricarboxylic acids (TriAC) were obtained by ozonolysis of castor oil and soybean oil with following reductive or oxidative treatment. Their structures were characterized by 1H NMR and ATR-FTIR spectroscopy as well as electrospray ionization-Time of Flight-mass spectrometry. These trifunctional B3 monomers were applied in the preparation of HBPs. The resulting HBPs had number averaged molar mass (Mn) up to 9400 g/mol and weight averaged molar mass (Mw) up to 40,000 g/mol. Through adjusting the initial molar ratio of A2 to B3 monomers, hydroxyl terminated (from TriOL monomers) or carboxylic acid (from TriAC monomers) terminated HBPs could be obtained. All the HBPs were characterized by 1H NMR, size exclusion chromatography, and DSC. These HBPs are potential candidates for the synthesis of cross-linked polymeric materials or in biomedical applications.

Keywords:

biodegradability; hyperbranched polymer; ozonolysis; vegetable oil

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