

Abstract

Homopolymerization of 3-ethynylbenzaldehyde, 4-ethynylbenzaldehyde and 1-ethynylbenzene-3,5-dicarbaldehyde and copolymerization of these monomers with phenylacetylene have been studied with the aim to prepare soluble homo and copolymers of polyacetylene type with aldehyde groups in pendants. The Rh(I) complexes have been demonstrated to be efficient catalysts of these polymerizations. The solubility of homopolymers prepared was controlled by the symmetry/non-symmetry of the substitution of pendant phenyl groups of the monomeric units. Non-symmetrically substituted 3-ethynylbenzaldehyde provided soluble homopolymer, on the other hand symmetrically substituted 4-ethynylbenzaldehyde and 1-ethynylbenzene-3,5-dicarbaldehyde gave insoluble homopolymers: the insolubility of these homopolymers most probably reflected a tight packing of symmetrically substituted polymer chains in the solid phase. 3-Ethynylbenzaldehyde, 4-ethynylbenzaldehyde and 1-ethynylbenzene-3,5-dicarbaldehyde when copolymerized with phenylacetylene yielded soluble binary copolymers with a tuneable composition. The polymerizability of 3-ethynylbenzaldehyde and 1-ethynylbenzene-3,5-dicarbaldehyde was close to that of phenylacetylene. However, 4-ethynylbenzaldehyde exhibited about half the polymerizability than phenylacetylene.

Homopolymer of 3-ethynylbenzaldehyde and copolymers of 3-ethynylbenzaldehyde with phenylacetylene were successfully modified by reaction with an excess of chiral (R)-(+)- α -ethylbenzylamine to chiral polymers in which the chiral segments were linked to the side phenyl groups of the polymer chains via the azomethine links. The modified polymers exhibited high specific rotation values, apparently due to a helical conformation with a uniform orientation of the helix that the chains assumed as a consequence of the post-polymerization modification by the chiral agent.