

Abstract

Using the method of chain growth coordination polymerization, the soluble high molecular weight linear poly(3-ethynylbenzaldehyde) has been prepared, which is the polyacetylene type polymer with reactive benzaldehyde pendant groups. The postpolymerization cross-linking of poly(3-ethynylbenzaldehyde) via a condensation reaction with various aliphatic, aromatic-aliphatic and aromatic diamines has been demonstrated as an efficient tool for the transformation of linear poly(3-ethynylbenzaldehyde) to polymer networks. The cross-linking has been proved to proceed under formation of cross-links of the Schiff base type containing two azomethine groups per one cross-link. In dependence on the cross-linking agent the extent of cross-linking varied from 20 to 100 %. Furthermore, the possibility has been demonstrated to cross-link a soluble linear poly[*N*-(4-ethynylbenzylidene)-4-*tert*-butylaniline] via postpolymerization transimination reaction with 1,4-phenylenediamine, again, under formation of cross-links of the Schiff base type containing two azomethine groups per one cross-link. A comparison of the covalent structure and texture of the prepared networks has revealed that the post-polymerization cross-linking using condensation reaction of poly(3-ethynylbenzaldehyde) with diamines can provide polymer networks with a microporous texture and a specific surface area of up to 279 m²/g under optimal conditions. To achieve microporous texture, it was necessary to use a cross-linking agent with a rigid segment between amino groups while, at the same time, achieving a cross-linking degree > 40 %.