Abstract

A new concept of Porous Organic Polymers (POP) of the type of hyper-cross-linked networks was implemented, in which the main (polyacetylene) chains were cross-linked both by permanent (biphenylene-type) and releasable (*N*-benzylideneaniline-type) links. It has been shown that the azomethine groups of the *N*-benzylideneaniline links of the networks can be readily and efficiently dissociated by means of hydrolysis or transmination. The dissociation of the azomethine groups accompanied by links releasing leads to a change in the covalent structure and texture of the networks. The composition of the networks has been optimized to maintain porous texture after releasing the *N*-benzylideneaniline links.

Two possibilities of potential use of the new POP type for analytical chemistry applications have been studied. It has been shown that newly prepared POPs have a high capacity in the selective and reversible chemisorption of primary aromatic amines and hydrazines from solutions. The networks can be used repeatedly for these purposes, the chemisorption being carried out through transimination in the first use and through condensation of the aldehyde and amine groups in the subsequent uses. Thus, prepared POPs could potentially serve to extract primary aromatic amines from more complex mixtures of analytes. Furthermore, it has been shown that fluorescence-active molecules with complementary reactive groups (3-amino-9-ethylcarbazole and dansyl hydrazine) can be covalently anchored to POPs via highly efficient transmination under formation of fluorescently active POPs. It has been demonstrated that the intensity of emission of fluorescently modified POPs dispersed in various solvents was effectively decreased by the addition of nitrobenzene. Fluorescently modified POPs could therefore be useful for detecting nitroaromatic compounds in various systems.