NANOCATALYTIC SYSTEMS BASED ON POLY(ETHYLENE GLYCOL MALEATE)-ACRYLAMIDE COPOLYMERS

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The latest studies on copolymerization of unsaturated polyester resins were published in the 1980s. They mainly deal with the development of new formulations for preparing structural materials based on styrene and acrylates. On the other hand, 3D cross-linked copolymers based on unsaturated polyester resins can be highly effective polymeric supports for nanocatalysts based on transition metals. Such compounds are stable and prevent metal particles from aggregation and oxidation for a long time.Here we report on a first study of the radical copolymerization of poly(ethylene glycol maleate) with acrylamide in solution to obtain 3D cross-linked polymers and consider the possibility of using these polymers as matrices for preparing catalysts based on nickel nanoparticles.

Poly(ethylene glycol maleate) (p-EGM) was prepared by polycondensation of maleic anhydride with ethylene glycol according to the standard procedure. The reaction progress was monitored by determining the acid number and the volume of the released water.The radical copolymerization of p-EGM with acryl-amide (AA) was performed at different initial weight ratios of the components at 333 K.

Metal–polymer complexes (MPCs) with incorporated nickel metal were prepared from p-EGM–AA copolymers by reduction of a 0.01 N solution of nickel chloride. The reduction of Ni^{2+} ions to Ni^{0} was performed with potassium hypophosphite in the presence of an ammonia solution of silver chloride used as catalyst.

The amount of nickel in the polymer matrix was determined with anAA140 Varian atomic absorption spectrometer (the United State). The surfaces of the metal–polymer complexes were examined with an Axioscop 40 Pol microscope

New 3D cross-linked copolymers of poly(ethylene glycol maleate) with acrylamide were prepared for the first time by radical copolymerization. The influence of pH, temperature, and organic solvents on the swelling and collapse of the copolymers was studied.The possibility of using poly(ethylene glycol maleate)–acrylamide copolymers for preparing metal–polymer complexes for pyridine hydrogenation was demonstrated