

SYNTHESIS AND CATALYTIC PROPERTIES OF POLYMER-IMMOBILIZED NANOPARTICLES OF NICKEL AND COBALT

Kozhabekova G.Y., Khamitova T.O., Burkeev M.Zh., Tazhbayev Ye.M.

*Academician Ye.A. Buketov Karaganda State University,
Karaganda, Kazakhstan
151194@mail.ru*

Composites, which functionality expands essentially at immobilization of metal nanoparticles, attract greater attention of researchers. The heterogeneous systems based on polymers and superfine metal particles bound with them by adsorption combine advantages of polymers such as low density, elasticity and strength with antifriction, catalytic, magnetic properties and electroconductivity typical for metals [1,2].

Novel metal-polymer catalysts on the basis of polyethylene(propylene)-glycol maleinate (p-EGM, p-PGM) with Ni and Co were obtained. The catalytic activity of the catalysts based on copolymers of polyester resins with unsaturated carboxylic acids of acryl series was studied on hydrogenation of pyridine. Polymer matrix was prepared by bulk radical copolymerization of unsaturated polyester resins with acrylic acid (AA) at five different monomer ratios as a basis for metal-polymer composite [3].

Nanoparticles of Ni and Co included in the hydrogel matrix were obtained by chemical method of precursors reduction by potassium hypophosphite. Metal-polymer complexes were tested in reaction of electrocatalytic hydrogenation of pyridine. Studies on electrocatalytic hydrogenation were carried out in electrocatalytic cell with division of cathode and anode chamber at a current of 2A and temperature from 25°C to 40°C. The systems show higher activity than skeletal cobalt and nickel.

Therefore, the possibility of using copolymers of p-EGM, p-PGM with AA as a matrix for obtaining effective metal-polymer composites was shown. Nanocatalysts prepared in polymer matrix have novel properties in contrast to Raney nickel. Thus, these properties require further intensive scrutinize to develop nanocrystalline catalysts for different catalytic process.

References:

1. POMOGAILO, A.D., and JARDIMALIYEVA, G.I. 2015. *Metallpolimernye gibridnye nanokompozitsiyu*, M.: Nauka
2. JSHTULOV, N.A., LEBEDEVA, M.V., and PHLID, V.R. 2015. Sintez i elektrohimicheskie kharakteristiki polimernyh bimetallicheskih nanokatalizatorov Pt-Pd, *Izv. RAN. Ser. Him.*, **64** (8), pp. 1837-1841.
3. BURKEEV, M.ZH., TAZHBAYEV, Ye.M., and KHAMITOVA, T.O. 2013. Sposob polucheniya novykh gidrogelei, obladayushih vysokimi vlagosorbiruyushimi svoistva na osnove polietilenglikolmaleinata s nekotorymi ionogennymi monomerami, Patent RK № 0222.1 ot 11.11.2013.