

Electrochemical production of iron-containing composites based on metal ferrites Ya.A.Vissurkhanova^{*},

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Abstract

The paper presents the results of an investigation into the electrochemical reduction of metal ferrites with the formation of iron-containing composites and their electrocatalytic activity in the electrohydrogenation of organic compounds. Samples of metal ferrites (CuFe₂O₄, NiFe₂O₄ and ZnFe₂O₄) were prepared by co-precipitation method without and with addition of polyvinyl alcohol as polymer stabilizer. The obtained samples were annealed at 500°C, 700°C and 900°C for 2 hours in corundum crucibles with a closed lid. Their structural-phase changes and morphological features have been studied by XRD analysis and electron microscopy. It was found that all copper ferrite samples prepared without and in the presence of polymer are able to be reduced in electrochemical system on Cu-cathode in aqueous-alkaline catholyte at 30°C with the formation of Cu⁰- and Fe⁰-containing composites with metal predominance depending on the annealing temperature. NiFe₂O₄ and ZnFe₂O₄ ferrite samples undergo electrochemical reduction only in the case of their synthesis in polymer solutions; the phase constitutions of resulting composites are also depended on the annealing temperature. Thus, it has been established that the content of both metals in the composites formed after reduction can be controlled, and that can be used in the additional selective extraction of these metals from their ferrites in metallurgical wastes. The resulting composites with reduced metal particles were used as electrocatalysts in electrohydrogenation of organic compounds. The high electrocatalytic activity of the CuFe₂O₄-based composites in acetophenone electrohydrogenation and low one for NiFe₂O₄-based composites were found, which is due to the structure of Fe-Ni particles formed.

Biography:

Yakha Vissurkhanova is a 1st year PhD student of Academician E. A. Buketov Karaganda State University. Since 2012 she has been working as Researcher at Institute of Organic Synthesis and Chemistry of Coal of Kazakhstan Republic. Her research activities are focused on the synthesis of metal-polymer composites, metal ferrites, and the investigation of their

electrochemical reduction and electrocatalytic activity in electrohydrogenation of organic compounds. She has published more than 15 research papers in various reputed national and international journals.

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